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# Development and Validation of a Questionnaire on Eating Behaviour for School Children and its Correlation with Nutritional Status

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## Abstract

**Background:** Eating behaviours in childhood are linked to malnutrition and have found to influence the eating behaviour into adolescence and adulthood.

**Aim:** (i) To develop and validate a questionnaire on the eating behaviour patterns of school children and correlate it with their nutritional status (ii) To test the utility of the questionnaire using the Intra-class coefficient, factor and construct validity.

**Objective:** (i) To develop a self-administered questionnaire on the prevailing eating behaviour patterns among school going children and validate the content using a multidisciplinary team ii) To compare the eating behaviour of school children and the nutritional status of children using anthropometric measures (iii) To test the developed Eating Behaviour Questionnaire for School Children for its factor and construct validity.

**Method:** A questionnaire was developed and validated based on eating behaviour patterns and habits that were prevalent supported by scientific evidence. The validated questionnaire was administered among 462 school going children of age 10 -12 years. Factor analysis, construct validity for the same was performed and correlated with the anthropometric measures.

**Results:** The correlation of BMI verses WHtR was 0.305 and the correlation value between the subsets was  $>0.2$  indicating weak uphill (positive) linear relationship.

**Conclusion:** The Eating Behaviour Questionnaire was found to have an acceptable reliability but the intraclass correlation coefficient was found to be unacceptable and the scores of the questionnaire were found to be independent of BMI and WHtR.

**Keywords:** *Eating behaviour, Body Mass Index, Waist to Height Ratio, Questionnaire, Obesity, Overweight.*

## Introduction

Healthy eating is essential during school going years due to their increasing nutritional needs and because these behaviours are carried forward in the later years of life<sup>[1]</sup>. Eating behavior is a term that encompasses physiologic, psychological, social, and genetic factors influencing a person's meal timing, quantity of food intake, food preference food choice and motives, feeding practices, dieting, and eating-related problems<sup>[2]</sup>.

**Purpose of the Study:** There is a need to find out the type of eating behaviour existing among school children. Though there are many questionnaires that have been widely used across the globe to study the eating behaviour patterns in school children, questionnaire that are formulated to specific geographic areas is limited

**Aim:** (i) To develop and validate a questionnaire on eating behaviour patterns of school children and correlate it with their nutritional status (ii) To test the utility of the

questionnaire using the Intra-class coefficient, factor and construct validity

**Objective:** (i) To develop a self-administered questionnaire on the prevailing eating behaviour patterns among school going children and validate the content using a multidisciplinary team ii) To compare the eating behaviour of school children and the nutritional status of children using anthropometric measures (iii) To test the developed Eating behaviour Questionnaire for School Children for its factor and construct validity.

## Method and Materials

The study employed descriptive research design. The sampling technique employed to carry out the study was multistage cluster sampling. The study was conducted during the period of June – July 2018. Inclusion criteria included students willing to participate, students present on the day of data collection, students of 10 to 12 years age group, students without present or past health issues, students without learning, writing or cognitive disabilities (as indicated by the teacher), students who completed the questionnaire, students who submitted participant and parent informed consent form.

**Development of the Questionnaire:** The initial questionnaire was formulated after a thorough review of publications and literature search and six categories were framed. The questions were close-ended and all the questions were given five options (*always, mostly, sometimes, rarely, never*) to choose from. After the initial setting up of the questionnaire, it was subjected to content validation by a Dietitian, Paediatrician, Academician and Psychologist.

**Pilot Study:** A pilot study was conducted with a sample of n=30. The questionnaire was administered twice within a duration of two weeks to the same participants, to find the reliability of the questionnaire. These samples were excluded from the major study.

**Major Study:** The major study was carried out using 462 samples and. The previously validated Eating Behaviour Questionnaire for School children was administered to N=462 students, it took approximately

15- 20 minutes for the study participants to fill the questionnaire. Height, weight, waist to height ratio of all the subjects were measured and tabulated.

**Informed Consent:** Informed consent was obtained from all the individual participants included in the study.

**Statistical Analysis:** SPSS 22.0 was utilized for examining primary data including descriptive statistics, correlation analysis, factor analysis, independent sample t-test with the end goal to touch base at a more decisive result of the information assembled through the survey.

## Results

The final questionnaire had a total of n=23 questions with each question having five options to choose from. The options given in the questionnaire were *always, mostly, sometimes, rare and never*. Environmental Factors had the minimum mean value (2.664) and Meal Preparation had the maximum mean value (3.488). The analysis showed negative skewness values for Food Responsiveness (-.084), Hygiene (-.125), Meal Preparation (-.271). Meal Timings (.144), Environmental Factors (.438), Eating Problems (.908) were found to be positively skewed. The subsets including Food Responsiveness (-.306), Meal Timings (-.234), Environmental Factors (-.373), Meal Preparation (-.464) had negative Kurtosis and Hygiene (.709), Eating Problems (6.675) had positive Kurtosis.

Extraction values for all the six categories are listed in the communalities and Eigen values for the components were also found along with the% of variance and cumulative% (Table I). Finally, one component was extracted using principal component analysis. The Eating Behaviour Questionnaire for School Children was entered into a 6 factor model and all factor loadings were found to be >0.4 by Principle Confirmatory Analysis method. The communalities of the six subsets ranged between 0.241 and 0.444. Only two factors (Food Responsiveness and Meal Timings) had Eigen values  $\geq 1$  with a total variance of 57.13% the other factors has Eigen values <1.

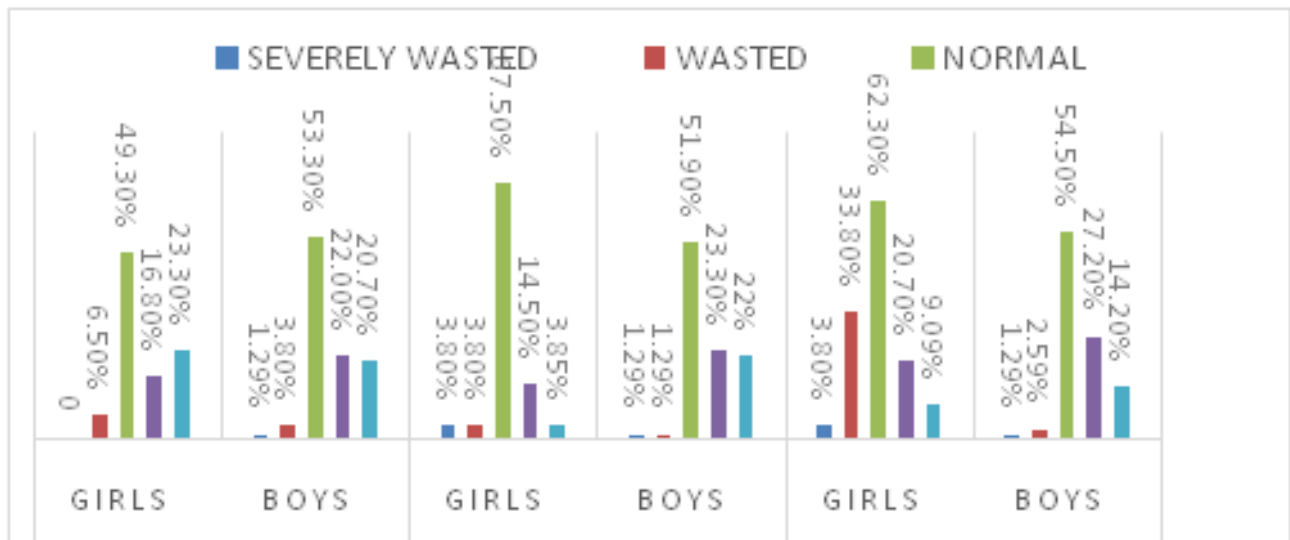
**Table I: Factor analysis - indicating the communalities, eigen values,% of variance and the components extracted (n=462)**

Subsets (N=23)	Communalities	Eigen values	% of Variance	Factor loadings** <sup>a</sup>
Food Responsiveness (n=4)	0.433	2.429	40.475	0.658
Meal Timings (n=4)	0.437	1	16.659	0.661
Environmental Factors (n=4)	0.344	0.737	12.278	0.586
Eating Problems (n=6)	0.53	0.679	11.324	0.728
Hygiene (n=1)	0.444	0.611	10.189	0.666
Meal Preparation (n=3)	0.241	0.545	9.075	0.491

**Note:** \* one component extracted, <sup>a</sup>Extracted using principle confirmatory analysis

**Construct Validity of the Eating Behaviour Questionnaire:** The Kaiser-Meyer-Olkin measure of sampling Adequacy was found to be 0.770 and the Bartlett’s test of sphericity was found to have a significance of 0.000.

The Figure I depicts the percentage of students under each category of BMI including severely wasted, wasted, normal, overweight and obese.



**Figure I Various categories of nutritional status classified according to BMI in relation to their age**

Boys under 12 years of age are seen to have the highest incidence of overweight (27.20%) when compared to all the three age groups. Finally, obesity is higher in girls of 10 years of age with a percentage of 23.30%. It was found that the mean for all age groups was 0.5 with merger differences in the standard deviation. When compared with the different age groups severe wasting was found to be higher among girls. Wasting was found to be higher among girls than boys

among all the three age groups. In obese category both boys and girls were equally distributed among 10 years old, but the incidence was higher among boys compared to girls in 11- and 12-years categories. Figure II depicts the various categories of nutritional status classified based on their BMI in relation to their age, Class I and II obesity according to WHtR is highest in 12 year-old boys and differs among gender based on age. Class III obesity is highest in 11 year-old boys.



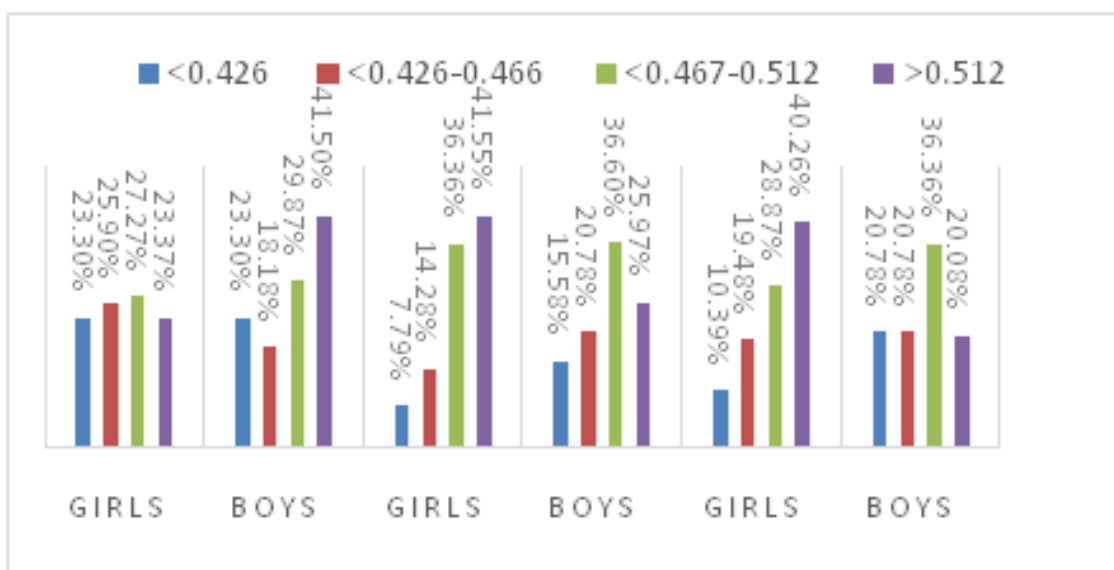


Figure II. Various categories of nutritional status

**Classified according to BMI in relation to their age:** The percentage of participants in relationship to BMI and WHtR was analysed and it was noted that only n=52 of the total sample had a normal BMI and WHtR.

Out of n=80 participants who were identified to have a normal WHtR, it was found that according to BMI eight were overweight and six were obese despite normal abdominal fat distribution.

Table II: Cross tabulation of Waist Height Ratio in comparison with their corresponding body mass index (n=462)

Anthropometric Variables		BMI (kg/m <sup>2</sup> ) n (%)					Total
		Severely wasted (<5 <sup>th</sup> percentile) n(%)	Wasted (5 <sup>th</sup> -15 <sup>th</sup> percentile) n(%)	Normal (15 <sup>th</sup> -85 <sup>th</sup> percentile) n(%)	Overweight (85 <sup>th</sup> -97 <sup>th</sup> percentile) n(%)	Obese (>97 <sup>th</sup> percentile) n(%)	
WHtR	Less than 0.426 (normal) n(%)	6(1.29)	8(1.73)	52(12.385)	8(1.73)	6(1.30)	80
	0.426-0.466 (class I obese) n(%)	2(0.43)	2(0.43)	55(13.09)	17(3.68)	11(2.38)	87
	0.467-0.512(class II obese) n(%)	1(0.21)	3(0.65)	90(21.43)	40(8.66)	19(4.11)	153
	More than 0.512 (Class III obese) n(%)	1(0.21)	1(0.21)	63(13.64)	41(8.87)	36(7.79)	142
Total		10	14	260	106	72	462

Table III illustrates the correlation values of all of variables. The WHtR versus BMI was 0.305 and this reflects that the two variables have weak uphill (positive) linear relationship and p-value =.01 indicating that they were significantly related. The correlation value r = 0.314 between meal timing versus food responsiveness shows that there is a weak uphill (positive) linear relationship between them. The correlation value of 0.590 of environmental factors and meal timing indicates a moderate uphill (positive) relationship between these

variables, and the p-value=.01 indicates that they are positively significant. The relationship between eating problem versus food responsiveness, meal timing, and environmental factors are r=0.357, 0.310, 0.314 respectively. This again shows a weak uphill (positive) linear relationship with significant p values. While the relationship of hygiene versus food responsiveness, meal timings, environmental factors and eating problems are 0.273, 0.314, 0.289, and 0.395 respectively this again indicates a weak uphill (positive) linear relationship.

**Table III: Cross tabulation of waist height ratio in comparison with their corresponding body mass index (n=462)**

Anthropometric Variables		BMI (kg/m <sup>2</sup> ) n(%)					Total
		Severely wasted (<5 <sup>th</sup> percentile) n(%)	Wasted (5 <sup>th</sup> -15 <sup>th</sup> percentile) n(%)	Normal (15 <sup>th</sup> -85 <sup>th</sup> percentile) n(%)	Overweight (85 <sup>th</sup> -97 <sup>th</sup> percentile) n(%)	Obese (>97 <sup>th</sup> percentile) n(%)	
WHtR	Less than 0.426 (normal) n(%)	6(1.29)	8(1.73)	52(12.385)	8(1.73)	6(1.30)	80
	0.426-0.466 (class I obese) n(%)	2(0.43)	2(0.43)	55(13.09)	17(3.68)	11(2.38)	87
	0.467-0.512(class II obese) n(%)	1(0.21)	3(0.65)	90(21.43)	40(8.66)	19(4.11)	153
	More than 0.512 (Class III obese) n(%)	1(0.21)	1(0.21)	63(13.64)	41(8.87)	36(7.79)	142
Total		10	14	260	106	72	462

### Discussion

Overall reliability of the questionnaire was found to be acceptable but when each component subset was compared for the intra-class correlation it was concluded that the subsets were dependent on each other with a low reliability index. Similarly, the Cronbach's alpha value was also below 0.5 for all the six categories indicating an unacceptable internal consistency. A study named "Association between eating habits and body mass index (BMI) of adolescents" used Eating Behaviour Questionnaire (EBPQ) among Iranian female students like the present investigations, it was found to have Cronbach's  $\alpha$  and ICC which ranged between 0.55 to 0.78 and 0.67 to 0.89, respectively.<sup>[3]</sup> Similarly, a study conducted to validate child nutrition questionnaire was found to have ICCs ranging from 0.47–0.66 ( $p < 0.001$ ) while for two scores ICCs were  $< 0.4$  ( $p < 0.05$ ) and Cronbach's alpha was 0.50–0.80.<sup>[4]</sup>

The KMO value of other similar questionnaire was also found to be higher than 0.07 and Bartlett's specificity was also found to be significant ( $p < 0.01$ ).<sup>[5, 6]</sup>

Data from UK National Diet and Nutrition Survey that was used in a study on Waist-to-height ratio as an indicator of 'early health risk' outlined that the value for WHtR (0.5) identifies more people at 'early health risk' than does a more complex 'matrix' using traditional boundary values for BMI and WC.<sup>[7]</sup> Similar results were obtained in the present study. However, the proportion of participants by both the method are not same, this is mainly due to the fact that, BMI have been classified into Normal, Underweight, Overweight and Obese, whereas, WHtR is determined based on single cut-off value of 0.5.

In a study children between 6 to 12 years were assessed for their BMI and it was found that the largest numbers of overweight and obese children belong to age group 11 years and also females were more likely to be overweight and obese.<sup>[8]</sup> In another study it was found that overweight and obesity prevalence was more in girls when compared to boys.<sup>[9]</sup> These were similar to the results obtained in the study. A study on "The importance of waist circumference and body mass index in cross-sectional relationships with risk of cardiovascular disease in Vietnam" by<sup>[10]</sup> found that measurements of WC and BMI were correlated. In a study to find "The correlation between eating habits and body mass index (BMI) of adolescents in Karnataka" as per the BMI assessment, it was found that 34% belonged to normal and underweight, 21.44% were obese and 10.66% were overweight. It was also found also that there was no correlation between BMI and eating behaviour.<sup>[5]</sup> In a study to examine how body image, Body Mass Index (BMI), and eating attitudes were related among adolescents aged 13 to 17 years old in Malaysia, it was found that only snacking and convenience as well as emotional eating were shown to be associated with BMI status.<sup>[11]</sup> A study conducted in Spain using EAT 26 Eating Attitudes Test indicate that restrictive eating attitudes and habits can have different effects depending on the BMI and the gender of the subjects.<sup>[12]</sup>

Anthropometric parameters assessed between the age groups show that boys have a much higher prevalence of overweight and obesity when compared to girls. Only about 52 samples in the study had normal BMI and WHtR and there was also prevalence of underweight categories who were found to have a higher WHtR cut off. The BMI and WHtR ratio had a positive

correlation and showed significance between both the variables. When extraction values were computed for sections in the questionnaire all the values were positive and no negative extraction values were found. The BMO and the Bartlett's value for sphericity confirmed that structure of the questionnaire and that the factor analysis was useful for the data along with condition that the correlation matrix would be an identical one. Correlation analysis found that there was no significant relationship between various categories of the questionnaire and the anthropometric measures.

**Conclusion:** The questionnaire was validated using factor analysis and correlation between the variable was found using Pearson's correlation. There was a significant correlation between BMI and WHtR and between the categories of the questionnaire. However, the eating behaviour questionnaire did not significantly correlate with anthropometric measures indicating that they were independent of the anthropometric measures. The results suggested that the questionnaire is validated and thus can be used to assess eating behaviour of school children of age 10- 12 years in the given population.

**Conflicts of Interest:** None

**Funding:** Self funded

**Ethical Clearance:** Ethical approval obtained from the Institutional Ethical Committee of Sri Ramachandra Institute of Higher Education and Research.

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# Occupational Varicella outbreak at a Tertiary Care Hospital: An Insight

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## Abstract

Varicella is a contagious viral disease which is caused by Varicella Zoster. Nosocomial Varicella is costly for healthcare settings increasing absenteeism and hampering quality patient care. Human are the only known susceptible host for this viral illness. The disease is usually acute and self-limiting but occasionally can lead to complications such as encephalitis, pneumonia, and secondary bacterial infections. Once believed to be the infection of pediatric age group now gripping mostly adults in a severe manner in health care setting. The previous vaccination and primary episode of infection are not found to be protective. In India, >30% of persons >15 years of age are susceptible for this infection. Reports have suggested the airborne transmission plays a key role in transmission of Varicella Zoster in health care settings

In health care setting the close contact between subclinical cases and susceptible individuals favors the rapid spread of the disease. Areas like Intensive Care Units (ICUs) are the most focal point of spread as immunity of admitted individuals are mostly compromised. The closed cubicles and chambers of the resident and working nursing officers in hospital setting act as a point of focus for the disease spread. Strict isolation words and quarantine procedures to be followed at institutional level for limiting viral dissemination. Knowledge building activities like Hand washing, Barrier nursing and mask use to be promoted among all health care staffs. Institutional policy to be made in order to control any viral outbreaks

**Keywords:** *Clinical outbreak, Isolation, Chickenpox, Case fatality Rate, Incubation period, Integrated Disease Surveillance Project (IDSP).*

## Introduction

Chickenpox or Varicella is an acute infection caused by Varicella zoster virus, belong to the family Herpesviridae. Human are the only known susceptible hosts of the virus. It is a highly contagious illness with rash that is transmitted from person to person by airborne route, however transmission via aerosol or by

direct contact is also reported<sup>1</sup>. The average incubation period is 14–16 days (Range, 10–21 days). Chickenpox is primarily a disease of the temperate regions where it occurs throughout the year, commonly in children between 1 and 14 years of age<sup>2,3</sup>. The prevalence of the disease is 13–16/1000 people per year. The fact that, chicken pox is more severe in adults than in children is well established<sup>4,5</sup>.

Based on conservative estimates, the global annual varicella disease burden would include 4.2 million severe complications leading to hospitalization and 4200 deaths [20]. The extent of disease and severity in adults in tropical climates is also greater than for temperate climates. In India, >30% of persons >15 years of age are susceptible for this infection. Persons with underlying

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immune compromising medical conditions (e.g., cancer, HIV/AIDS) are especially likely to have more severe disease and a longer time to crusting of lesions; thus, they may shed virus from skin lesions for a prolonged

period<sup>6</sup>. The Secondary attack rates among susceptible household contacts occur in 65% to 86% of cases<sup>7-9</sup>.

In India as per IDSP January 2019 compiled report there are 7 outbreaks of chickenpox.

**Table No 01: State and Unon territories showing Chickenpox out break in January, 2019**

State/UT	District	Cases	Deaths
Dadra & Nagarhaveli	Dadra & Nagarhaveli	15	0
Bihar	Madhubani	19	01
Gujrat	Mahesana	28	0
Karnataka	Hassan	89	0
Karnataka	Tumkur	12	0
Kerala	Ernakulum	65	0
Madhya Pradesh	Alirajpur	11	0

**Source:** Integrated Disease Surveillance Programme, National Centre for Disease control, Director general health services. Goi

Investigations of varicella outbreaks in hospital settings in the vaccine era will improve the knowledge on the epidemiology of varicella and patterns of virus transmission. In addition, monitoring the frequency and proportion of varicella outbreaks in previously infected/vaccinated individuals will help to assess impact of the vaccination. Here this study is describing the events, their chronology, use of spot map in identification of possible source and various containment measures at a tertiary care hospital, which will facilitate the development and refinement of appropriate measures to control and prevent future varicella outbreaks.

#### **Study objectives:**

##### **Primary objective:**

- To describe the Outbreak of the Varicella in terms of time, place and person in the Tertiary care hospital
- To assess various factors possibly modifying viral dynamics during this outbreak

#### **Material and Method**

It's a hospital based cross sectional study conducted at All India Institute of Medical Sciences, Patna between August to October 2018 (3 months). All the person developed the sign and symptom of Varicella are being taken as study subjects during this study period. Person who have not given their consent are excluded from the

study. The pretested questionnaire are being used as data collection instruments. Microsoft excel, Spss-16 are being used as statistical analysis tools. Microsoft word used for Flow chart and Spot map construction.

The study ethics and confidentiality of the data has been maintained.

#### **Results**

**Reporting about the incident:** A client named Shilam Devi, 36 year old female (The Index case), brought her baby to AIIMS for treatment and later on advised for surgical intervention. During her stay on 20/07/2018 Shilam Devi had noticed rashes in face, hand and which gradually developed all over body which was clinically diagnosed as Chickenpox infection. The Baby of the client was not kept in isolation ward in paediatric surgical Intensive Care Unit (ICU) .No screening had been done neither for the patient, nor for the family members and health workers at that point of time.

Two weeks later One of Junior resident posted in Paediatric Intensive Care Unit (PICU) and Paediatric surgical ward reported similar episodes of Rashes, fever and headache and were diagnosed clinically as chickenpox. Further in varying interval of days (with in next 2months) 5 nursing officers, whose place of posting was close to the Paediatric ward and PICU had reported

similar episodes of Varicella infections. These residents and the Nursing officers were directly involved in patient care in clinical area. Meanwhile two paediatric patient were diagnosed to be affected by varicella infection. Severity of the infection was assessed by the number of lesions present over the body.

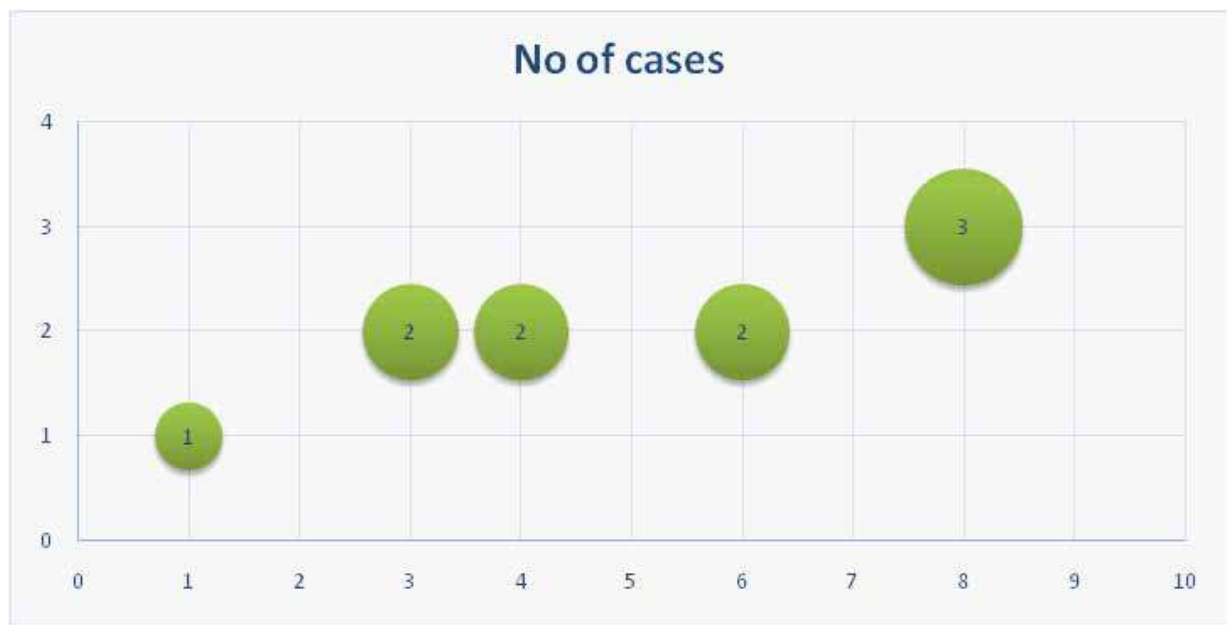
Junior resident and nursing officers immediately went on leave till all their rashes were subsided. Two paediatric patients were shifted to isolation corner of the paediatric ward. Patient cubical once occupied by those patients were prohibited from further admission.

**Table No 02: Details of the person involved in the Varicella outbreak at AIIMS Patna**

Sl. No	Name of the Person	Age in Yrs	Gender	Designation	Previous history of Chicken pox	Previous Vaccination for Chicken pox	Diagnosed on
01.	Ms Shilamdevi	32	F	Index patient	No	No	20-7-2018
02.	Dr Dharendra Kumar	25	M	JR	No	No	5-08-2018
03.	Mr Divyanshukumar	06	M	Patient	No	No	10-8-2018
04.	Mr Surendra	26	M	Nursing Officer	Yes	No	21-08-2018
05.	Mr Rajanish	28	M	Nursing officer	No	No	22-08-2018
06.	Mr Deepsingh Choudhary	24	M	Nursing Officer	Yes	No	7-09-2018
07.	Mr Shivamraj Mishra	07	M	Patient	No	No	9-09-2018
08.	Mr Mejin	30	M	Nursing Officer	Yes	No	21-09-2018
09.	Mr Satish	27	M	Nursing officer	yes	No	23-09-2018
10.	Ms Madhukumari	24	F	Nursing Officer	No	No	24-09-2018

The above table describe the details of the cases, their designation and place of working at AIIMS Patna during the study period. The date of their clinical diagnosis had been given in the right column of the table. It also describe their early vaccination status and previous episodes of infection. The operational definitions had been used for describing the Varicella outbreak episodes at AIIMS Patna were as per CDC (Center for Disease Control).

For the purpose of investigations, the outbreak recognition or definition was taken as three cases or more from any given long term care facility, within one incubation period and chicken pox cases were defined according to Center for Disease Control (CDC) case classification. Definition of exposure was considered as the presence in the same room of a known case, regardless of duration of time and a susceptible employee was defined as one who had never had varicella and who had never been vaccinated before being in contact with affected persons.



X-axis represents no of weeks since the first case, Y-axis represents no of cases of Varicella

**Figure No 01: Description of cases as per time distribution**

The above two figures are describing the place and time distribution of clinically confirmed Varicella cases at AIIMS Patna.

### Discussions

This report explains about an occupational outbreak of Varicella in a tertiary health care delivery hospital. The hospital setting may act as an excellent opportunity for the viral spread, as mobility is maximum and immunity status of most of the person is unknown<sup>10</sup>. The contact between suspected or confirmed cases with other susceptible person often resulted in outbreaks in hospital settings. Similar events have been reported consistently across India in which health personnel like Resident doctors, Nursing officers and ward attendants are being affected by several occupational outbreaks of Varicella. In an event from Jaipur, Rajasthan six health care workers (three were previously vaccinated) have developed Varicella following exposed to an admitted case of the disease. These cases had no direct contact with the index case, but they had either worked or resided (in the nurses hostel) with the primary case before their diagnoses had been made at some point of time. All the secondary cases were reported at varying intervals of time possibly indicating towards either a subclinical infection in some staffs or altered viral transmission dynamics depending on immunization. Another community outbreak of Varicella was reported

at Chandigarh where in total 162 cases reported<sup>11</sup>.

Among all the person developed Varicella infection at AIIMS, four (4) individuals are having previous episodes of Chicken pox infection. Many International opinion states that with time there is evidence of decreasing immunity (Due to primary infection) or may be vaccine failure to a single dose of vaccine<sup>12, 13</sup>. There is an ambiguity in the doses of Varicella vaccine in prevention of the infection as per existing literature. The American advisory committee on immunization practices has recommended a single dose of Varicella vaccine at 4-6 yrs of age since 2006<sup>14</sup>. However the expected effectiveness of the two doses vaccine is upto 98% as per a randomized prospective trial and another cohort study<sup>15, 16</sup>. In this outbreak the average age of occurrence of this outbreak episode is found to be 30 years, which is in adult age group. Across many literatures researchers have suggested that a longer time since vaccination act as a risk factor for developing varicella in adult patients. This aspect of this research is consistent with the findings from other studies<sup>3, 17-19</sup>. As per Ozakia et al in Japan, the vaccine failure is seen in around 5% of the recipient after single dose of the vaccine administration<sup>20</sup>. The other finding need

to highlight from this research is that Breakthrough varicella infection, which is common in hospital setting can be attributed to waning vaccine immunity. This breakthrough infection in previous infected/vaccinated individuals may point towards administration of another dose of the vaccine. The additional dose will be highly effective in reducing severity of Varicella infection and frequency of intermittent outbreaks.

Another study in North East India on Varicella outbreak among Troops, reveals that this infection mostly occur in winters due to huddling together of susceptible in one location. These kind of setting is perfect for spread of the disease<sup>21, 22</sup>. Garnet et al point towards the transmission of VZV might be adversely affected by temperature and moisture in tropical countries<sup>23, 24</sup>. However this present outbreak has occurred in the Month of August and September possibly indicating transmission of the Virus throughout the year among susceptible person as subclinical infection. This finding has been supported by studies which have concluded that there is inconsistent seasonal pattern in its occurrence.

**Conclusion:**

Chicken pox has been known to cause frequent outbreaks in Health care settings like Hospitals, Nursing homes and clinics. It may affect adults in more severe manner than that of children. The focal aggregation of subclinical cases and health care workers in wards and ICUs is a perfect point of contact and spread of this infection. Thou predominant season for the infection is winter, it is seen in Post Monsoon months indicating towards circulation of the virus throughout the year. The previous episodes of infection/vaccination is not protective, as found in this study. Hence more than one doses of the vaccine may be recommended in the appropriate age for full protection.

The general awareness activities regarding Hand hygiene and self-protection against droplet infections are the key measures that can successfully check the outbreak in Health care setting. Proper isolation, timely quarantine, Risk group (Antenatal staffs) duty relocation, Planning at Institutional level and commitment from all hierarchy is a must for successful control of any Outbreak of Varicella.

**Conflicts of Interest:** Nil

**Source of Funding:** Nil

IEC Approval-Taken from AIIMS IEC Committee

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# An Exploratory Study To Identify Factors Affecting Non Compliance To Dots Therapy Among Tb Patients At Selected Dots Centre Vadodara

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## Abstract

**Background:** Tuberculosis kills 2 people in every 3 minutes. While India has been relying on DOTS treatment to fight the disease, & also faced the recent controversy of drug resistance after a team of doctors from Mumbai's Hinduja hospital recently found cases of totally-drug resistant TB resistant to all drugs used to treat the disease.

**Material and Method:** In this research study a quantitative research approach with non-experimental descriptive survey design was used, The sampling technique was non probability purposive sampling to collect the 100 TB patient and the data collection was done by using self-structured rating scale and checklist. Result: the study results shows that among samples the majority of the participants (68%) from 21-40 year age group. Majority of the participants (86%) were male and (16%) were female. Majority of the participants (73%) belongs to nuclear family and (27%) belongs to joint family. Majority of the participants (42%) working as private employ. Majority of the participants (58%) family income was around 10,001-15,000/- Rs. Majority of the participants (69%) were having the primary education. Majority of the participants (86%) were from rural area and (14%) were from urban area. Majority of the participants (62%) were having episode for second time.

It seen that out of 100 participants 31% were non compliance to DOTS therapy and 69% participants were compliance to DOTS therapy.

It shows that the factors related to non compliance to DOTS therapy among TB patient. Among total sample 76.16% were non compliance to DOTS therapy due to Transportation Factors, while 75% were due to Side effects of DOTS therapy, 68.80% were due to Factor related to Health care facility, 79.50% were non-compliance due to Factor related to Discrimination and stigma, 70.16% were due to Factor related to Lake of time and 75.50 were due to other Factors.

There is no significant association between the demographic variable except Family monthly income and Occupation in hence H<sub>1</sub> hypotheses is rejected. Conclusion: the purpose of the study was identify factors affecting non compliance to DOTS therapy among TB patients at selected DOTS centre Vadodara" The findings of the study concluded that majority 69% participant's were compliance to DOTS therapy and 31% were non compliance to DOTS therapy.

**Keywords:** Factor affecting, non compliance, DOTS therapy.

## Introduction

*"Anybody can get tuberculosis, but everybody can prevent it"*

Anybody can get tuberculosis; TB is communicable disease it can be transmit to anybody. It isa droplet infection. But it can be prevent by DOTS treatment, DOTS can cure the TB. Mycobacterium tuberculosis,

the bacteria that causes tuberculosis has been around for centuries. Recently fragments of the spinal cord from Egyptian mummies from 2400 B.C. were found to have definite sign of the ravage of this terrible disease. Tuberculosis was first described by Greek doctor Hippocrates around 460 B.C. He called it phthisis which is the Greek word for consumption; because it described the disease consumed its victims. Consumption was the most widespread disease of the time, and most people are died. The consumption was used to describe unit 1882, when the tuberculosis bacteria were identified as the cause of disease. Researcher can trace the history of tuberculosis back many of years. Throughout history, developing a cure for tuberculosis has proved to be a difficult task.<sup>1</sup>

In 1993, World Health Organisation (WHO) declared TB to a global emergency saying that: "Tuberculosis today is humanity's greatest killer, and it's out of control in many parts of the world." The disease is preventable and treatable, has been grossly neglected and no country is immune to it (Arati Kochi, Manager WHO Tuberculosis program).<sup>1</sup>

The problem of global TB results in the deaths each year of the nearly one and a half million people from a disease that many years has been treatable and curable. It is clear though whether this continuing high level of deaths is due to a failure of global TB control strategies, the impact of the joint TB and HIV epidemics, the increasing problem of drug resistance TB, a lack of TB funding or more likely combination of all four.<sup>2</sup>

**Need of the Study:** Tuberculosis continues to be a major health problem in the world particularly in the developing countries. 24<sup>th</sup> March is the World Tuberculosis Day. India is a highest TB burden country in the World HHHHHHHealth Origination statistics of 2011 giving an estimated incidence figure of 2.2 million caused of TB preventable figure for 2011 is given as 3.1 million. It is estimated that about 40% of the Indian population is infected with TB, the majority of who have latent rather than active TB.<sup>2</sup>

In India, according to the health ministry's TB control programme statistics. In 2016, there were an estimated 1.3 million TB deaths among HIV-negative people (down from 1.7 million in 2000) and an additional 3,74,000 deaths among HIV-positive people. An estimated 10.4 million people fell ill with TB in 2016: 90% were adults, 65% were male, 10% were people

living with HIV (74% in Africa) and 56% were in five countries: India,<sup>4</sup>

**Statement of the Problem:** "An exploratory study to identify factors affecting non compliance to DOTS therapy among TB patients at selected DOTS centre Vadodara"

#### **Objectives:**

1. To identify prevalence of non compliance to the DOTS therapy among TB Patients.
2. To identify the factor affecting non compliance to DOTS therapy among TB patients.
3. To find out the association between treatments non compliance to DOTS therapy among TB patient with selected demographic variables.

#### **Hypothesis:**

**H<sub>1</sub>**-There will be significant association between treatment non compliance to DOTS therapy with selected demographic variables.

### **Methodology**

**Research design:** The research design used for the study was non-experimental descriptive survey research design.

**Setting:** The main research project was conducted at DOTS centre of Dabhoitaluka, Vadodara

**Sample:** The 100 participants included in this study. The sample for the study was selected by non-probability purposive sampling technique according inclusion criteria as availability of sample.

#### **Inclusion Criteria:**

- TB patients who were taking DOTS treatment minimum from last 3 month.
- TB patients who were present at the time of study.

#### **Exclusion criteria for sampling:**

- A critically ill patient
- Patient who were not willing to participate in study.

#### **Tool for data collection:**

#### **This consist in three parts**

**Section A:** Description of the samples according their demographic characteristics

**Section B:** Rating scale was used to identify prevalence of non compliance DOTS therapy among TB patient.

**Scoring interpretation**

**If the scoring is:**

- 11-20 were including in non compliance to DOTS therapy.
- 21-30 were including in compliance to DOTS therapy.

**Section C:** Check list was used to identify factors affecting to non compliance to DOTS therapy with selected demographic variables.

**Data collection procedure:** The main study data collection was conducted from 10<sup>th</sup> December to 22<sup>nd</sup>December. The data collection done within a given period of 2 week. Investigator selected 100 TB patient from selected DOTS centre Dabhoi who meeting the inclusion criteria for data collection by using non-probability convenient sampling. We were selected the

subject and established the rapport by explaining purpose of the study. Formal administrative approval was obtained from the concerning authority and informed consent was obtained from the samples. The data collection done within a given a period of 2 week. We were selected 100 participants meeting the including criteria for data collection by using non probability purposive sampling. Investigator collects demographic data, and with the use of rating scale and checklist to identify the prevalence of compliance and factors affecting of non compliance DOTS therapy.

**Statistical Design:** Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (chi square) was applied to test the study hypothesis

**Findings:**

**Section A:** Description of the samples according their demographic characteristics

**Table: 1 Frequency and percentages distribution of samples, according to their demographic characteristic. n=10**

Sr No	Demographic variable	Categories	No of respondents in frequency	No of respondent in percentage
1	Age in Year	≤20	03	03%
		21-40	68	68%
		41-60	22	22%
		>60	07	07%
2	Gender	Male	84	84%
		Female	16	16%
3	Type of family	Nuclear	73	73%
		Joint	27	27%
4	Occupation	Govt Employ	03	03%
		Private Employ	48	48%
		Self Employ	15	15%
		Unemployed	34	34%
5	Family income	≤5000	04	04%
		5001-10,000	23	23%
		10,001-15,000	58	58%
		>15,000	15	15%
6	Education Status	No formal education	05	05%
		Primary	69	69%
		Higher secondary	25	25%
		Graduation and above	01	01%

Sr No	Demographic variable	Categories	No of respondents in frequency	No of respondent in percentage
7	Residential area	Rural	86	86%
		Urban	14	14%
8	Episode of TB	1 <sup>st</sup> Episode	28	28%
		2 <sup>nd</sup> Episode	62	62%
		3 <sup>rd</sup> Episode	10	10%
		More than 3 Episode	00	00%

Majority of the participant (68%) from 21-40 year age group and minimum participant (3%) were in the group of  $\leq 20$  year age group. Majority of the participant (86%) were male and (16%) were female. Majority of the participant (73%) belongs to nuclear family and (27%) belongs to joint family. Majority of the participant (42%) working as private employ. Majority of the participant (58%) family income was around 10,001-15,000/- Rs.

Majority of the participant (69%) were having the primary education. Majority of the participant (86%) were from rural area and (14%) were from urban area. Majority of the participant (62%) were having episode for second time.

**Section B:** Prevalence of compliance and non compliance to DOTS therapy among TB patient.

**Table: 2 Distribution categories, frequency and percentage of TB patient regarding use of DOTS therapy among TB patient. n=100**

Sr No	Statement	Categories	Frequency	Percentage
1	Non compliance to the DOTS	11-20	31	31%
2	Compliance to the DOTS	21-30	69	69%

In this it shows that out of 100 participant's 31% were non compliance to DOTS therapy and 69% participant's were compliance to DOTS therapy.

**Section C:** Distribution of mean, mean percentage and SD of factors related tonon compliance to DOTS therapy among TB patient

**Table: 3 Distribution of mean, mean percentage and SD of factors related tonon compliance to DOTS therapy among TB patients. N=100**

Sr No	Factors	Maximum	Mean Score	Mean percentage
1	Transportation factors	06	4.27	71.16%
2	Side effects of DOTS therapy	04	3.00	75%
3	Factor related to health care facility	10	6.88	68.8%
4	Factor related to Discrimination and stigma	06	4.77	79.5%
5	Factor related to lack of time	06	4.21	70.16%
6	Other Factors	08	6.04	75.5%
7	Overall score	40	29.17	72.92%

In this, it shows that the factors related to non complianceto DOTS therapy among TB patient. Among

total sample 76.16% were non compliance to DOTS therapy due to Transportation Factors, 75% were non

compliance to DOTS therapy due to Side effects of DOTS therapy, 68.80% were non compliance to DOTS therapy due to Factor related to Health care facility, 79.50% were non compliance to DOTS therapy due to Factor related to Discrimination and stigma, 70.16% were non compliance to DOTS therapy due to Factor related to Lack of time and 75.50 were non compliance to DOTS therapy due to other Factors.

SECTION D: Association between factor related to non compliance to DOTS therapy with selected demographic variables.

It reveals that association between factors and demographic variables. Significant demographic variable are occupation of the participant with  $\chi^2$  value 7.90 (3df=7.82) and Family income  $\chi^2$  value 8.10 (3df=7.82), so hypotheses  $H_1$  rejected.

### Discussion

the researcher presents with discussion part according to the results obtained from statistical analysis based on the data of the study, the reviewed literature, hypothesis which were selected for the study. The researcher also presents the conclusion about the meaning and implication of the findings, i.e., what the results mean, why things turned out the way they did, how the findings fit with other evidence, and how the results can be used in practice. The discussion includes the following elements:

The present study was conducted study to identify factors affecting Non compliance to DOTS therapy among TB patients at selected DOTS centre Vadodara. In order to achieve the objectives of the study, a descriptive survey design was adopted. Purposive sampling technique was used to select the sample. The data was collected from 100 respondents by using check list. The findings of the study have been discussed with reference to objectives, hypothesis, and with the findings of other studies.

### Conclusion

Nursing research is needed to update and expand knowledge and awareness regarding TB and DOTS therapy to cure it to upgrade the nursing profession. The study findings help in the base for other professional nurses and the student nurse researcher to conduct more studies.

Research study regarding factor affecting non compliance to the DOTS therapy can be conducted in a large scale which helps to understand the factors affecting to DOTS therapy and how to overcome from it.

**Conflicts of Interest Disclosure:** The authors declare that there is no conflict of interest statement

**Source of Funding:** Fund for this research is researcher own.

**Ethical Clearance:** Ethical clearance for this dissertation was obtained from the ethical committee SVIEC of Sumandeep Vidyapeeth University.

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# Assessment of Cognitive Impairment among Elderly in the Selected Rural Community, Kancheepuram District, Tamil Nadu

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## Abstract

A study was conducted to assess the cognitive impairment among elderly. The objectives were 1. To assess cognitive impairment among elderly in the selected rural community and 2. To associate cognitive impairment with selected demographic variables. Majority of the clients who scored positive for cognitive impairment were between 60 - 70 year of age, were female, living in nuclear families, were supported by family members financially, watching television was their leisure time activity, remembered family occasions had altered vision and/or hearing and were using denture.

**Keywords:** Cognitive impairment, elderly.

## Introduction

Cognition is the process of thinking, learning and remembering. Cognitive impairment is not uncommon in later life and may be due to the normal aging process associated with physical or mental disorders. It is characterized by memory disturbance, which occurs frequently among the elderly.

### Objective:

- To assess cognitive impairment among elderly in the selected rural community.
- To associate cognitive impairment with selected demographic variables.

### Methodology:

**Research approach:** Descriptive approach.

**Research design:** Non experimental, descriptive research design.

**Research setting:** The study was conducted among individuals age group of 60 and above who were residing at a selected village, Kanchipuram district.

**Population:** Individuals aged 60 and above, who are residing at a selected village, Kanchipuram district.

**Sample Technique:** A convenient sampling technique was used to select 81 participants for the study.

**Sample size:** The sample size was calculated using the formula  $n = \frac{4pq}{d^2}$

**Subject Selection:** Individuals aged 60 and above, who are residing at a selected village, Kanchipuram district, during the time of data collection.

**Instrument:** Section- A consisted of self structured questionnaire consisting of 9 question to assess demographic variables and Section -B includes standardized Brief Cognitive Rating Scale (BCRS) to assess the cognitive level among elderly which consist of 5 axis.

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## Scoring and Interpretation:

Each axis score is interpreted as follows:

Score	Interpretation
1.	Normal, no cognitive decline present. Average or better performance.
2.	Very mild. Subjective impairment in comparison with 5 or 10 years previous.
3.	Mild. Minimal impairment which is clinically verifiable with detailed questioning
4.	Moderate. Marked impairment which is readily evidenced clinically.
5.	Moderately Severe. Severe impairment on assesment.
6.	Sever. Very severe impairment; some residual capacity in some assesment areas.
7.	Very severe. Very severe impairment, little residual capacity elicited in assessments.

**Findings:** Majority of the participants were between 60-70 years of age (47%), females (64%), belonged to nuclear families (63%), supported financially by family members (60%), had watching television as their leisure time activity (53%), were able to remember family occasions (79%) and had altered vision, hearing and were using dentures (86%).

Remembering family occasions was significantly associated with Axis I: Concentration ( $p=0.037$ ). Age, source of income and ability to remember family occasions were significantly associated with Axis II: Recent memory ( $p=0.000$ ,  $0.014$ ,  $0.037$  respectively). Age and ability to remember family occasions were significantly associated with Axis III: Past memory ( $p=0.001$ ,  $0.007$  respectively). Age, leisure time activity and ability to remember family occasions were significantly associated with Axis IV: Orientation ( $p=0.000$ ,  $0.001$ ,  $0.000$  respectively). Age, leisure time activity and ability to remember family occasions were significantly associated with Axis V: Functioning and Self-care ( $p=0.000$ ,  $0.046$ ,  $0.000$ )

## Discussion

Cognitive impairments impair everyday functional abilities. It is reported that there exist significant impairment in cognitive domains of concentration, recent memory, remote memory, orientation, functioning and self-care along with disorientation, disturbance in attention and recent memory<sup>1</sup>. Moreover age related disorders accelerate cognitive impairment.

## Conclusion

Elderly should be assessed for cognitive impairment and intervened appropriately. Healthy lifestyle may decrease cognitive decline among the elderly<sup>2</sup>.

**Conflict of Interest:** Nil

**Source of Funding:** Self-funding and no external funding

**Ethical Clearance:** Department clearance was obtained from department of mental health nursing and Chettinad college of Nursing. UG Committee clearance and institutional ethical committee clearance was obtained from Chettinad university. Formal permission was be obtained from the Principal, Chettinad college of Nursing. Formal consent was obtained from the study samples before collecting the information.

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# Safety and Tolerability of Two Different Formulations of Mycophenolate (Mycophenolate Mofetil and Mycophenolate Sodium) among Patient with Connective Tissue Disease Associated Interstitial Lung Disease (CTD-ILD) in a Tertiary Care Hospital

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## Abstract

**Background:** One of the leading cause of mortality in various connective tissue diseases(CTD) like systemic sclerosis(SSc)is Interstitial lung disease(ILD). The various CTD which may present as ILD include systemic sclerosis (SSc), rheumatoid arthritis(RA),dermatomyositis (DM), primary Sjogren's syndrome(pSS), mixed connective tissue disease(MCTD) and systemic lupus erythematosus (SLE).

**Objective:** To compare the safety and tolerability of two salts of mycophenolate,i.e. mycophenolate mofetil and mycophenolate sodium in our patients with CTD-ILD.

**Patients and Method:** Ourstudy was retrospective observational study; involving 70 patients diagnosed with CTD-ILD and was treated with two formulations of Mycophenolate (Mofetil and Sodium) minimum for six months with at least one follow-up during the period of May 2013 to April 2017 at tertiary care hospital from India. Fifty-six patients received MPS and fourteen patients received MMF. The details of patients obtained from case records were recorded in a proforma. Statistical analysis was performed using Graph pad for frequency, mean and percentages.

**Results:** In our study,most of the patients receivedMycophenolate sodium (n=56) with the BD dose regimen of 720 mg (n=36), 540 mg (n=18) and 180 mg (n=2). Patients treated with MMF 1000 mg (n=12) and 750 mg (n=2) as BD dose regimen.The adverse events reported in this study were GI (diarrhoea), herpes zoster infection, cytopenia, malignancies or any other infections. The incidence of diarrhea is most commonly observed in this study population. Out of 26 reported cases, 14 patients had an episode of diarrhea at least once and 12 patients had diarrhea attack twice the preceding year.

**Conclusions:** Both formulations of Mycophenolate were tolerated well, and have low-dose corticosteroid use with no discontinuation of therapy.

**Keywords:** *Mycophenolate, Connective tissue disease, Interstitial Lung disease.*

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## Introduction

Interstitial lung disease (ILD) refers to a heterogeneous group of lung diseases with typical restrictive pattern of lung function in spirometry with typical radiological findings in chest radiograph or high resolution computed tomography (HRCT) scan of chest. It is associated with significant morbidity and mortality

due to progressive fibrosing nature of the disease. ILD can be either idiopathic, known as idiopathic pulmonary fibrosis (IPF) or it can be complication of connective tissue disease known as CTD-ILD. One of the leading cause of mortality in various connective tissue diseases (CTD) like systemic sclerosis (SSc) is Interstitial lung disease (ILD). The various CTD which may present as ILD include systemic sclerosis (SSc), rheumatoid arthritis (RA), dermatomyositis (DM), primary Sjogren's syndrome (pSS), mixed connective tissue disease (MCTD) and systemic lupus erythematosus (SLE). Early recognition of CTD-ILD improve outcome due to early institution of therapy. There is limited data on CTD-ILD from India where lung disease due to tuberculosis burden is very high.<sup>1</sup>

In the study by Sen et al and Kumar et al, ILD is under reported in India due to lack of awareness and inadequate availability of diagnostic facilities for the same.<sup>2,3</sup>

In patients with clinically significant CTD-ILD, immunosuppression therapy remains the mainstay of treatment along with supportive care, however there few prospective and systemic studies for the same in available literature.<sup>4</sup> Though in systemic sclerosis associated ILD, cyclophosphamide has been well studied, toxicity limits its use in various CTD-ILD.<sup>5</sup> Fisher et al studied the use of MMF in CTD-ILD with low discontinuation rate, with stable or improved lung function over median follow up of 2.5 years, hence MMF appears to be promising therapy in spectrum of CTD-ILD including scleroderma lung disease.<sup>6,7</sup>

In this study, we compared the side effect profile of mycophenolate mofetil and mycophenolate sodium in patients with CTD-ILD, as both are bioequivalent.<sup>8</sup>

### Patients and Method

70 patients diagnosed with CTD-ILD and were treated with two formulations of Mycophenolate minimum for six months with at least one follow up during the period of May 2013 to April 2017 were included in this study. The clinical and laboratory details of the patients were obtained from the case records retrospectively; they were recorded in a proforma. We analysed the details of medical history, physical findings, laboratory test results like hemogram, liver function, renal function, lung function tests like spirometry, mantoux test, sputum for acid fast bacilli, chest radiograph and high resolution computed tomography of thorax of the patients.

In case of incomplete data, patients were contacted for required data from our hospital study team. As this was a retrospective observational survey, there was no ethical consideration required. Patient's privacy and confidentiality in relation to the patients information was maintained throughout the duration of the study.

As per patients records, side effects of MMF and MPS in CTD-ILD parameters were considered; like gastrointestinal side effects, respiratory and other infections, herpes zoster infection and number of hospitalization (if any). Information on duration of MPS/MMF therapy & average dosage of glucocorticoid therapy of patients were also obtained.

### Results

Out of 70 patients, 58 were females and 12 were males, with mean age of 44.81 years, with mean disease duration of 4.2 years. The clinical presentation commonly noted was dry cough in 60 (85.7%) and exertional dyspnea in 50 (71.4%) patients. Other symptoms noted were fever in 35 (50%), skin involvement in 42 (60%) and dysphagia in 35 (50%) patients. Prior history of misdiagnosed tuberculosis with anti-tubercular treatment was observed in 7 (10%) patients. On radiological examination (chest X-ray), the signs of ILD were observed in 35 (50%) patients, whereas, on HRCT scan 60 (85.7%) patients have shown positive findings.

Patients were treated with Mycophenolate sodium (n=56) with the BD dose regimen of 720 mg (n=36), 540 mg (n=18) and 180 mg (n=2) and those treated with MMF 1000 mg (n=12) and 750 mg (n=2) as BD dose regimen. Table 1 shows the steroid usage in CTD-ILD patients. The duration of MMF usage in all patients was in between 6 months to 4 years. The use of steroid (Prednisolone or Deflazacort) has been observed during study period. The patients received Prednisolone dose as 5 mg once daily (n=33) or alternate day (n=25), whereas the dose of Deflazacort was 6 mg per day. Table 2 shows the comparison of adverse events in patients treated mycophenolate mofetil and mycophenolate sodium within last one year. The adverse events reported in this study were GI (diarrheal attacks), herpes zoster infection, cytopenia, malignancies or any other infections. The incidence of diarrhea is most commonly observed in this study population. Out of 26 reported cases, 14 patients had an episode of diarrhea at least once and 12 patients had diarrhea attack twice the preceding year.

**Table 1: Steroid Usage in CTD-ILD Patients**

Steroid usage in CTD-ILD:	Total Number of Patients	Mycophenolate Mofetil (MMF) (No. of Patients)	Mycophenolate Sodium (MPS) (No. of Patients)
	70	14	56
Oral Steroids	63	10	53
a. Prednisolone (Dose)	33	5mg/day	5mg/day
b. Deflazacort (Dose)	25	5mg/alternate day.	5mg/alternate day.
	12	6mg/day	6mg/day
Dosage and Duration (N) Strength:	----	a.1000mgBD (12) b.750mg BD (02) c.500mg BD- None	a.720mgBD (36) b.540mgBD (18) c.180mgBD (02)

**Table 2: Comparison of adverse events in mycophenolate mofetil and mycophenolate sodium treated CTD-ILD patients within last one year.**

Parameters	Total Number of Patients	Mycophenolate Mofetil (MMF)	Mycophenolate Sodium (MPS)
1. Gastro-Intestinal ADRs	26	a. Diarrhoea: 03 b. Nausea: 02	a. Diarrhoea: 11 b. Nausea: 10
2. Other Infections	16	Respiratory N = 02 Urinary Tract Infections (UTIs) N = 01 Not Known N = 01	Respiratory N = 09 Urinary Tract Infections (UTIs) N = 02 Not Known N = 01
3. Hospital Admissions	5	1	4
4. Cytopenia	02	0	02
5. Tuberculosis	02	0	02
6. Herpes Zoster Infections	01	0	01
7. Malignancies	0	0	0

## Discussion

In present study, we evaluated the two formulations of mycophenolate, i.e. mycophenolate mofetil (MMF) and mycophenolate sodium (MPS). Both formulations of Mycophenolate were well tolerated, have no discontinuation due to adverse drug reactions and were associated with low-dose corticosteroid use, and showed good clinical efficacy. The most preferred dose for MMF was 1000 mg BID (n=12) and for MPS was 720 mg BID (n=36).

The adverse reactions reported in the study were mainly GI related and more with MPS, i.e. nausea (n=10) and diarrhea (n=11) where in MMF it was comparatively much less, i.e. nausea (n=2) and diarrhea (n=3). Other adverse events reported in MPS group were cytopenia (n=2), tuberculosis (n=2) and herpes zoster infection (n=1). In the current study, infection rate

was lower compared to other clinical trials involving mycophenolate mofetil and mycophenolic acid.<sup>7,9</sup>

The hospitalization due to severity of ILD or any other co-morbidity condition was less, only five patients required hospitalization due to disease other than CTD-ILD. Amongst other events reported, two patients developed tuberculosis and one of them had miliary tuberculosis, one of the diabetic patient developed herpes zoster infections while two patients reported with cytopenia in the form of leucopenia within the preceding one year. Throughout the follow-up period, no malignancies were reported in any of the patient's record. Hospital admissions due to any cause during the course of mycophenolate therapy was also found to be quite low in the current study which is also evident in other reported studies done by Mendoza et al, Derk et al.<sup>10,11</sup>

The GI side effects were more in MPS group than in MMF group in our study which is in contrast to findings by Chan et al<sup>12</sup>, which may be related to concomitant co morbidities like reflux disease and short bowel syndrome, other medications use. Overall the tolerability of mycophenolate was found to be good in this study in contrast to that done by Stratton et al, where as many as 43% of patients had developed some adverse effects of mycophenolate.<sup>13</sup>

Immunosuppressive therapy including biologics such as Rituximab and anti-TNF drugs in CTD-ILD is difficult only with partial response to therapies. In comparison to cyclophosphamide, mycophenolate is a safer therapeutic option. Mycophenolate is a pro-drug for mycophenolic acid, which is a potent and selective uncompetitive and reversible inhibitor for the enzyme IMPDH (inosine monophosphate dehydrogenase). This results in inhibition of *de novo* pathway of guanosine nucleotide synthesis without incorporation into DNA. T and B lymphocytes, which are dependent upon the *de novo* purine synthesis; are selectively inhibited by MPA compared to other cells which can utilize salvage pathways.<sup>14</sup>

Our study highlights that, both the salts of Mycophenolate are well tolerated for CTD-ILD patients, the major drawback of the study being variability in dose of mycophenolate used, heterogeneity of the study population, concomitant use of steroids.

### Conclusion

Mycophenolate appears to be a safe inpatients with CTD-ILD, usually well tolerated although gastrointestinal adverse effects in the form of diarrheal attacks, infectious disease and cytopenia in very few cases remain a point of safety concern. A randomized safety clinical trial may be undertaken to confirm these findings.

**Conflicts of Interest:** Nil

**Funding:** Nil

**Ethical Consideration:** Nil

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# Assessment of Awareness of Parents on Importance of Dental Care in Pediatric Patients in Ethnic Tamil Population

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## Abstract

The character of a child is built upon his observations from the immediate environment which is basically composed of his family. Parents play an important role in not only the upbringing of the child but basically in instilling the basic principles of hygiene.

**Materials and Method:** Questionnaire study were conducted and parents of children between 3-12 years were included in the study. The Questionnaire was prepared in accordance with National Oral Health Care Survey guidelines.

**Results:** 180 participants were included in the study around 67.8% of the patients had never had any dental treatment or check up performed before. Many of the parents were not aware of the various risk factors involved in the causation of dental caries.

**Conclusion:** Parents play an important role in prevention various dental related problems in children. Lack of awareness about the various oral hygiene measures and prophylactic treatments in parents will expose their child to an increased predisposition to dental caries.

**Keywords:** *Dental caries, Pediatric patients, Awareness, Oral hygiene, Questionnaire, Dental care.*

## Introduction

It is a well acknowledged fact that the character and nature of a child is greatly influenced by his/her environment and by the people present in their environment especially the parents. A child's behaviour is greatly influenced by the parents in particular by the mother. <sup>(1)</sup> During the early growth period of the child the shaping of his/her character is greatly done by the parents especially by mother. Parents are the primary influencing factor in their life till a particular

age directing their mental growth and development. It has been proven by studies that parents with higher education who possess proper knowledge about child's general as well as oral health have better control of their social as well as demographic relationship. <sup>(2)</sup>

Parental involvement has a crucial role in a child's oral hygiene maintenance. But a large percentage of parents do not adequately pay attention to their child's oral hygiene and consider the ability of the child to maintain his/her oral hygiene. <sup>(3)</sup> There are lots of misconceptions in parents regarding oral hygiene practices and regarding dental check-ups which are main reason for increased carious incidence in children. Most of the parents wait till the child is developing a symptom especially pain to seek dental care for their child. <sup>(4)</sup> Majority of the parents are unaware that their child has dental caries or has developed gingival swelling. Ignorance or lack of proper awareness in parents can affect the quality of life of the child. <sup>(5)</sup>

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Oral hygiene or oral health not only signifies healthy dentition but also involves the role of them in the physical, social and emotional status as well as their speech, aesthetics, growth and development. Dental health professional plays an important role in the maintenance of oral health.<sup>(2)</sup> Oral health is important as lack of proper maintenance can lead to caries, periodontal disease etc, this leads to pain, swelling loss of tooth all of which eventually affects the emotional wellbeing of the person. Proper awareness about the importance of oral health in parents are thus essential in the well being of the child as that the future generation can be shaped with essential knowledge.<sup>(6)</sup> The aim of the study was to evaluate the awareness in parents of paediatric patients in ethnic Tamil population.

## Materials and Method

Ethical clearance was obtained from the Institutional Review Board of the college, SRM dental college. The study was conducted at the Pedodontics Department of SRM Dental College, Ramapuram, Chennai. The participants chosen were parents of children aged between 3-12 years of both sexes. A total of 180 participants were given the questionnaire after explaining the purpose of study and obtaining informed consent. The questionnaire was constructed following the guidelines by National Oral Health Survey and was in English language. The questionnaire comprised of 14 questions regarding the oral hygiene practices and about their preference on other aids of oral hygiene, frequency of visits to dental clinic etc. The answers were then tabulated and analysed to assess the attitude, knowledge and awareness level towards child's oral health.

**Table 1: Questionnaire for assessing awareness of parents on importance of dental care in pediatric patients in ethnic Tamil population**

Sl No	Question	Option1	Option 2	Option 3
1	What method do you use for brushing your child's teeth?	Toothbrushing	Use of finger	Not started brushing my child's teeth
2	Which among these do you use to brush your child's teeth	Toothpaste	Toothpowder	Don't use anything
3	Are you aware of brushing technique to be followed for your child?	Yes	No	-
4	In a day how many times does your child brush his/her teeth?	Once	Twice	After every meal
5	Does your child rinse his/her mouth after every meal?	Yes	No	Don't know
6	Do you use mouthwash for your child?	Yes	No	-
7	Does poor brushing cause dental problems?	Yes	No	Don't know
8	Does your child have any habits?	Yes	No	If yes specify
9	If your answer is yes, what is the action taken to stop the habit	Punishment	Sitting with the child and explaining the bad effects of the habit	No action taken
10	Do you take your child for frequent dental check ups	Yes	No	We don't have a dentist
11	Has your child complained of pain or discomfort in tooth recently?	Yes	No	Don't remember
12	Do you check your child's mouth for deposits or decay?	Yes	No	-
13	Does food substances that contain sugar cause tooth decay?	Yes	No	Maybe
14	Do you floss your child's teeth?	Yes	No	-

## Results

Around 243 individuals were given the questionnaire for the study, and among that only 180 participants were willing to participate in the study. The responses were recorded in Google forms by one of the investigators and the results were tabulated in pie charts and analysed.

The percentage of parents who use toothbrush and toothpaste for brushing their child's teeth were 96% and 97% respectively. Around 63% of the parents were not aware of a proper brushing technique to be followed for brushing their child's teeth. Around 67% of children brush their teeth only once a day with around 30% brushing twice daily and only 3% of the children brush after every meal. When asked the question of whether your child rinses her/his mouth after eating around 43% were unaware of it with 55.3% answering yes and remaining 2% answering no to the question. More than 50% of the parents reported that their child has a habit with tongue thrusting and nail biting being the most common one.

When asked whether any action was taken against it, 83% of the parents said no with 17% having used punishment as a resort for doing it. Around 67.8% of the parents reported to have never visited a dentist before for their child's oral care. 70% of the participants reported that their child had recent complaint of discomfort or pain in their tooth less than 20% of the parents have admitted to frequently inspect their child's oral cavity for caries and deposits.

## Discussion

The main aim of our study was to assess the awareness of parents in maintenances of oral health in their children and whether they play a role in the increased incidence of dental caries in children. Proper oral hygiene is one of the essential factors in prevention of dental caries and this care begins at home and should be implemented on the child at a young age.<sup>(7)</sup> It is the duty of the parent to ensure that the child maintains oral health effectively and they should take responsibility in keeping it that way.<sup>(8)</sup> From our study, it can be inferred that there are more negative responses than positive responses which shows that there is lack of proper awareness in parents for maintaining oral hygiene in children. This is one of the causes of increased caries incidence in developing as well as undeveloped countries. There is lack of a proper system which ensures that proper oral health care is provided to all with equal weightage regardless of their

caste, class, gender etc.<sup>(9)</sup>

In a study conducted by Khanal et al (2015), they assessed the knowledge of oral hygiene measures in parents of pediatric patients and found that parents had sufficient knowledge on oral hygiene measures were satisfactory which was contradicting the results obtained from the current study.<sup>(2)</sup>

Torabi et al (2016), conducted a study assessed SIC, DMFT and plaque indices in pediatric patients were assessed and parents role in maintaining oral health in children was assessed using questionnaire. They inferred that the oral hygiene knowledge of the parents directly influence the prevalence of dental caries in pediatric children.<sup>(10)</sup>

Elham et al (2013), after analysing over 222 children and their parents concluded that the health behaviours of parent especially brushing habit directly influences the same in children.<sup>(1)</sup>

Gurdeepsingh et al (2014), conducted a cross sectional study on 322 children between 6-12 years of age and dental caries was assessed by visual examination and DMFT scoring was evaluated in accordance with the WHO guidelines. They inferred that children born to illiterate mothers and children with poor oral hygiene had increased prevalence of dental caries.<sup>(11)</sup>

In our study more than 90% of parents preferred to use toothpaste and toothbrush for their child's oral care whereas, less than 10% of the parents also use mouthwash and less than 5% use flossing as an adjunct to brushing habits. Only a small percentage of the parents were aware of the proper brushing technique to be followed for brushing child's teeth. Less than 35% of the children brush their teeth twice or after every meal in a day. Almost of half of the participants were unaware of whether their child rinses his/her teeth after having food.

More than 50% of the parents reported that their child has a habit with tongue thrusting and nail biting being the most common one. This shows that majority of the children participated in the study have various habits like nail biting, tongue thrusting, lip biting, mouth breathing etc. but owing to lack of proper management of this habit by the parent it is being continued and on clinical examination most of the children has changes in the oral cavity as a result of the habit. More than 80% of the parents have reported to have not taken any actions against quitting this habit and though a

smaller percentage, few of the parents actually preferred punishment as an effective method in stopping the habit.

More than half of the participants have never visited a dentist before for their child's oral care. This shows high level of negligence towards the child's oral care and points at the lack of awareness of the importance of oral health in the child's quality of life and health.

Though more than 70% of the participants reported that their child had recent complaint of discomfort or pain in their tooth less than 20% of the parents have admitted to frequently inspect their child's oral cavity for caries and deposits. This actually tells us that parents of pediatric patients lack the general awareness regarding the basic steps required in maintaining the child's oral health as well as of the essential steps in preventing decay and other common dental and related problems in them. This can be overcome by conducting camps in schools and housing complexes which emphasise on the importance of oral health and the essential factors that will both help in prevention and to manage such conditions. They should also be made aware of how this negligence can affect the quality of life of their child. Further studies in a larger population with diverse ethnicity should be done to evaluate whether the ethnicity plays any role in affecting the oral health of the child.

**Conflicts of Interest:** Nil, the authors have no conflicts of interest

**Funding:** Self funded study

### Conclusion

Parents have an indispensable role in the development of a child. Their behaviour is highly influenced by the parent. Lack of awareness of complications of oral health and of proper method for management of oral health has led to increased incidence of dental caries in pediatric patients in the country. From our study it has been inferred that there is a lack of awareness in parents of pediatric patients regarding the maintenance of oral health and should be given guidance in providing oral care for their child.

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# Study of Total Time Taken for OPD Billing Process in a Multi-Specialty Hospital

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## Abstract

Patients' waiting time for OPD billing has been defined as "the length of time from when the patient gets the token in the outpatient clinic to the time the patient actually reaches the OPD billing counter". Total billing time includes the waiting time and the time taken at the counter till the process is completed.

Waiting times act as barrier to efficient patient flows thus have been considered a serious problem in many health care systems.

OPD is considered as the window to hospital services and a patient's impression of the hospital begins at the OPD. Therefore, it is essential to ensure that OPD services provide an excellent experience for customers.

This was the undertaken for assessing the waiting time and total time taken for billing in the outpatient department and recommending suggestions to reduce the waiting time for billing process.

The Waiting time and total time taken for the billing process was calculated using direct observation study. It was found that there was a significant increase in the total time and waiting time for the billing in the outpatient department after 11 AM and till late afternoon; it varied from 8 minutes to 27 minutes and from 4 minutes to 23 minutes, on an average respectively.

Reducing the waiting time for OPD billing will help to retain the loyal patients.

**Keywords:** *Waiting time and total time taken for the billing process, Outpatient Department.*

## Introduction

Outpatient service is the most important service provided by all the hospitals as it is the point of contact between a hospital and the community. It is an ambulatory care centre which provides to all members of a community the whole scope of services that are needed

to keep them in good state of health directly or by referral to more qualified institutions. OPD in a hospital serves the facility for diagnosis and treatment of patients. Many patients gain their first impression of the hospital from the OPD. In other words, the first impression will have lasting effects. A well-managed, neat and clean hospital with necessary information boards and proper directions generally provide good image. Successful and efficient management of OPD can lighten the burden on the patient wards<sup>1</sup>.

The hospitals tend to judge themselves entirely on formal, non-psychological levels, the number of beds, specialist, procedures, modernity of buildings and equipment, the size of the budget and so forth. Yet the fact is that the patient almost never reacts to such

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statistical aggregates. The key to solving this dilemma may be for health sector to focus on health service quality by considering specific concept and modality found in the services marketing literature<sup>2,3</sup>. Every day, healthcare providers make decisions that directly impact people's health and safety. A single error on their part could cause irreversible damage to a patient's life, and lead to expensive lawsuits, billions of dollars in damages, and a permanently tarnished reputation. Health care providers need new ways to manage risk that combine innovative solutions with a deep understanding of the industry's issues and requirements<sup>4,5</sup>. Efficiency and innovation are perhaps the most important goals of a health system and quality of care measurement is the biggest challenge in that effort<sup>6</sup>.

Satisfaction is achieved when patient/client's perception of quality of care & services that they receive in Health care settings has been positive, satisfactory & meets their expectation. Customer feedback is recognized method of available health services<sup>7</sup>. The high patient satisfaction is certainly indicative of good treatment. Return of customers is a fundamental marketing principle that is becoming increasingly important for health care providers in today's competitive environment. Second, by identifying the sources of patients' dissatisfaction, the organization can address system weaknesses, thus improving its risk management. Thirdly, satisfied patients are more likely to follow the specified medical regimens and treatment plans<sup>8</sup>.

Out Patient services are the most important service provided by the hospital as it provides services to a large number of patients at affordable cost. OPD is considered as the window to hospital services and a patient's impression of the hospital begins at the OPD. This impression often influences the patient's sensitivity to the hospital and therefore it is essential to ensure that OPD services provide an excellent experience for customers. The utilization of many of the other services provided by the hospital, often depend on how satisfied the patient is with the outpatient services provided. It is also well-established that 8-10 per cent of OPD patients need hospitalisation. When well organised and professionally run, not only can such OPDs help avoid confusion, frustration and overspending by fearful patients, but can also regulate the flow of inpatients to the hospitals. Patient waiting time has been defined as "The length of time from when the patient enters the outpatient department to the time the patient."<sup>9</sup>

Usually it is observed that patients at the hospital OPDs have to wait for a disproportionately long time before they can get medical treatment or advice by professional healthcare workers. Long waiting time in hospitals causes discontent among patients. In a competitively managed healthcare environment, long waiting time of patients in an OPD adversely affects the hospitals ability to attract new increased business. It is difficult to sell services if individuals are dissatisfied with the delayed process and increased waiting time<sup>10</sup>. Because of great volume of ambulant patients in most communities, an efficient outpatient department (OPD) in hospital is clearly of critical importance. This is more because of lower cost of outpatient services compared to inpatients<sup>11</sup>. Health care, it turns out, is simply a tough problem to "solve. "In many countries, Sweden, for example, the problem is long wait times for care.

There are many indicators of quality assurance in hospitals. In outpatient departments, one of the important indicators of quality assurance for patients is "waiting time". Hence it is detrimental for a hospital on the whole to have long OPD waiting time.

Nowadays OPD services of the majority of hospitals are having queuing and waiting time problem.

Common problems to be encountered in OPD system are as follows<sup>10</sup>:

- Patients waiting time occur long at the front desk of the hospital.
- Patients might be directed to wrong services
- Large number of patients waiting to be served at the OPD will result in uncomfortable conditions such as congestion, noise, and poor ventilation.

Thus, the main objectives of the Out-patient department of a hospital should include the reduction of patients' time in the system, improvement on the services given, and better resource utilization.

The advantages of study in hospital OPD are to improve the method/procedures of various jobs. Out Patient Department should improve both Clinical and non-clinical facilities such as overall OPD layout that can decrease the overcrowding and delay in consultation. In hospitals this can also include reducing the efforts patients need for treatment as well as for their routine hospital check-up.<sup>11</sup>

**Aim and Objectives:** Aim : To study the total time taken for billing in the outpatient department of a Multispecialty Hospital and suggesting recommendations to improve the workflow of the OPD.

#### **Objectives:**

- To determine the average waiting time for the billing process in the OPD.
- To determine the total time taken in the billing process in the OPD.
- To identify the factors responsible for prolonged waiting time for billing process in the OPD and suggest interventions.

#### **Scope:**

- The immediate and major cause for increased waiting time for billing in the OPD can be assessed and rectified.
- The idle time of OPDs can be ascertained and means to schedule OPDs accordingly with a view to reduce peak workload can be done.

**Limitation:** OPD billing for ECHS and CGHS patients and for patients coming in the late evening could not be included.

**Review of Literature:** Out Patient Department (OPD) is defined as a part of the hospital with allotted physical facilities and medical and other staff in sufficient number, with regular scheduled hours, to provide care for patients who are not registered as in patients. It witnesses maximum footfall daily when compared to any other department in the hospital. The waiting period is one of the most important indicators of quality of service. Long waiting periods are found to be one of the key challenges in the healthcare system. A prolonged waiting time directly reflects on the quality of service being provided. Keeping patients waiting unnecessarily can be a cause of stress for both patient and doctor. Waiting time is a tangible aspect of practice that patients will use to judge health personnel, even more than their knowledge and skill. Waiting time is the time required just after patient's arrival at the OPD to meet his health needs. Patient's waiting depends on many factors including efficiency, sincerity and punctuality of the health care providers as well as the existing facilities of the institution. The Institute of Medicine (IOM) recommends that, at least 90% of patients should be seen within 30 minutes of their scheduled appointment. Several studies have documented the negative association between increased

waiting time and patient satisfaction. This type of feedback triggers a real interest that can lead to a change in their culture and in their perception of patients.

Improving patient's satisfaction towards healthcare services by reducing their waiting time, attending the patient in time and sympathetic approach will create a positive image of hospital in the minds of people and will also help the hospital to build an image in the community. By decreasing waiting and treatment times, costs can be reduced, while increasing accessibility. Three goals that benefit from healthcare delay reduction are: waiting time reduction for needed service, timeliness for reaching the service, and elimination of inefficient activities. The operational cost is reduced. One of the reasons for long waiting times found was that there are too many patients who come in at the same period of time. Queue and delay analysis can produce dramatic improvements in medical performance, patient satisfaction and cost efficiency of healthcare. A proper appointment system is necessary to reduce the congestion of patients which can be done by examining the OPD system. An optimal policy must balance the risks of patient waiting, staff overtime and clinic under-utilization.

### **Methodology**

**Study Design:** The study was an exploratory and descriptive in nature. It was conducted in a 200 bedded Multi-specialty hospital in Noida. The study began with mapping the process of the OPD patient flow and collecting retrospective data from the HIS, (Hospital Information System) and then continued as a concurrent study, wherein simultaneous observation and data collection was carried out at the OPD sector. The token generation time of each patient was noted and manually entered into an Excel sheet, following the display of the patient ID number on the screen within the OPD premises. The waiting time for each patient was then calculated from the difference between the timings of the patient reporting at the counter and the token generation time. Then the time taken by the coordinator to complete the billing process was noted.

**Study Procedure:** The study is carried out in three phases.

#### **Phase 1: Included data collection**

- a. Retrospective data collection from the HIS to determine the token generation. Other figures asked by the supervisors to improve the resource

management like idle time of the coordinator, waiting time of the system, time taken to complete the process by different coordinators were also noted for the organisation's requirement.

- b. Concurrent data collection by observation of the required parameters within the OPD processes.

**Phase 2:** Involved compilation of the data collected, calculation and analysis of the findings to arrive at the results of the study.

**Phase 3:** Was the final phase that involved, discussion of the findings of the study, making recommendations.

A Patient Experience Feedback questionnaire was administered to the OPD patients

Process Mapping-  
For a complete understanding of the OPD system an in-depth knowledge of the Outpatient billing process flow is essential. This should include the activities occurring at each step and the waiting time and other information which can identify factors which are hindering the flow charting or process mapping..

A fishbone diagram can be helpful in identifying possible causes for a problem that might not otherwise be considered by directing the team to look at the categories and think of alternative causes.

**Measurable:**

- Total time taken for the billing process.
- Waiting time for the billing.

**Sample Size:** 200

**Study Population:** All patients who came for OPD visit.

**Inclusion Criteria:**

- All the patients visiting the OPD for either consultation by the doctor or for investigations.
- Willingness to participate

**Exclusion Criteria:** CGHS/ECHS patients

**Tools:**

- Process mapping
- Root cause analysis
- Questionnaire

**Data Analysis:** Analysis of the workflow of the OPD billing section, waiting time and reasons for

increased waiting time for the billing and total time taken for billing at different workload hours.

**Findings and Discussion**

As per the information and briefing given by the OPD head and staff, there was a rise in the complaints regarding the workflow of the OPD billing section. Hence, a study was conducted to identify the bottlenecks and peak workload hours. The increased waiting time for billing was identified as a major factor for patient dissatisfaction.

Process flow of an Outpatient billing begins with the Registration process in the case of a new patient and from Acknowledgement of the UHID number into the system in the case of an existing patient and ends with the patient getting the bill payment receipt, either for a prescription for medication/treatment or for laboratory/radiological investigations.

The series of events occurring in the Process flow of an Outpatient billing from the time a patient enters the hospital OPD billings section till he exits are as follows:

**Step 1:** Taking the token

The patient need to get a token from the token vending machine placed near the billing counters and waits for display on the LCD screen put in the premises.

**Step 2:** Acquiring hospital UHID number

In the case of a new patient, at the billing counter, the registration form is completed and submitted following which the registration staff enter the details of the patient into the system and prints the UHID card.

**Step 3:** Acknowledging the patient

In the case of a new patient, after the registration process is completed, the UHID number of the patient is acknowledged. On the other hand, a known patient who already holds a UHID number proceeds directly for UHID acknowledgement.

**Step 4:** Billing for Consultation

After acknowledgement, the patient is billed for consultation depending on whether it is a first visit or a follow-up. A follow up consultation within 7 days of the first consultation, with the same consultant is not billed and this is confirmed by checking the patient history in the HIS. Once the patient is billed, a printout of the bill is handed over to the patient



**Step 5: Billing for investigation**

In case the patient has come directly for the investigations, he follows the same process of billing as mentioned in the above steps. However, the process takes more time at the billing counter because of code search, code identification, informing the patient about the amount of each investigation/procedure, and billing as per different codes for various investigations.

If the doctor prescribes investigations/diagnostic procedure to the patient after consultation, the patient undergoes the same cycle from getting the token again, waiting for his/her turn for the billing, and payment of the investigation/diagnostic procedure.

**(Patient waiting time) in the Process flow**

Idle time was observed in the process flow of an Out Patient where Queuing occurs indicating waited time for patients are:

1. In the OPD waiting area for the announcement and display of their token number.
2. At the billing counter to obtain UHID number and acknowledgement of UHID number.
2. Billing for the consultation fee at the counter.
3. Getting the information on the charges of various investigations.
4. Billing of investigations, post consultation or general.

The token system did help in queuing the patients on first come first served basis. But it was observed that the billing for investigations take more time than the billing for consultation as showed in figure 1. This was because of the different codes for different investigations and procedures. Some were available on the HIS but for some the coordinator had to reach the lab department. Also, some of the new staff was not that well acquainted

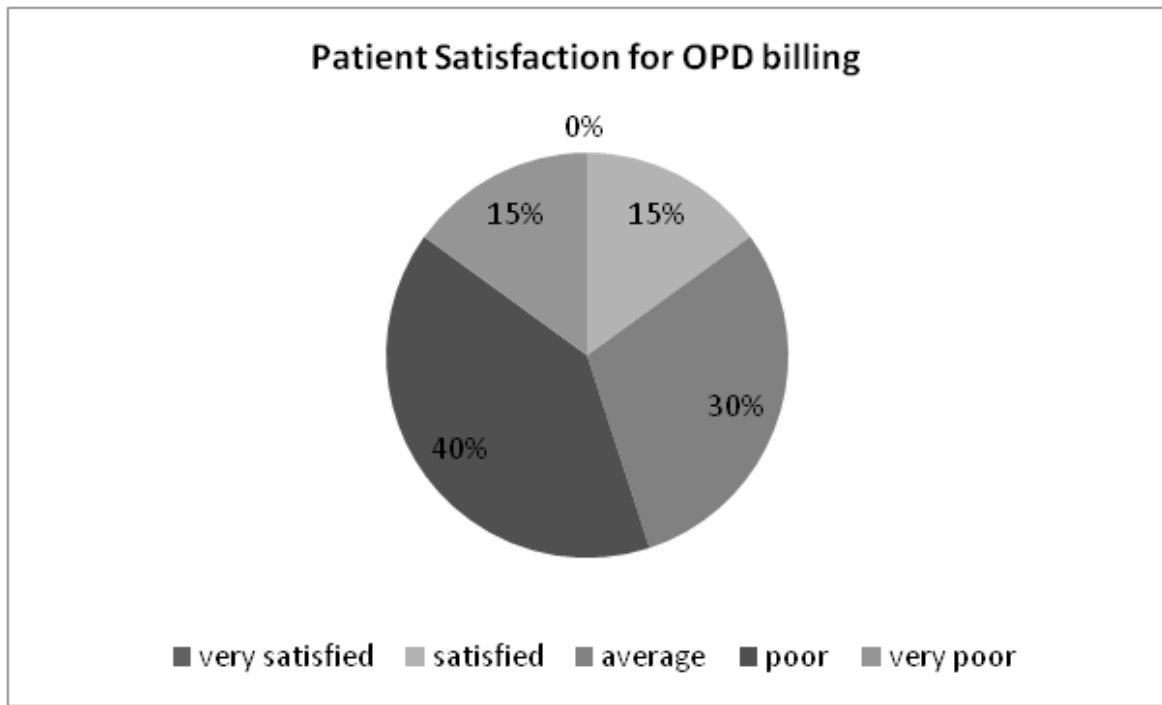
with the various codes. The time required for the billing for investigations used to increase with the number of tests the patient needs to get done.

Because the counters for the billing for investigations and consultations were common, the patients who need to consult a doctor had to wait that long. Also, registration before the billing of the new patient used to increase the total time of the process. Because of improper communication between the patients and the staff, problems like improper scheduling leading to overcrowding and increased waiting time, patients could not see the doctor for consultation. Because of longer durations of waiting, patients used to get late for their appointment with the doctor or for the investigative procedures which again used to lead to obstacles in the process flow of the OPD.

The registration process involves filling up of the registration form by the patient and submission of the same to the billing coordinator. The coordinator then fills the details of the patient in the HIS and registers the patient after which a unique identification code for the patient is generated. The number of staff when this study started was very less as compared to the need. This used to lead to a chaotic situation in the peak workload hours which were identified during the day in this study.

The waiting time and the total time taken for the whole billing process was noted and recorded. There was a significant increase in the total time taken and waiting time for billing in the out-patient department after 11 am till late afternoon. Table 1 and table 2 shows the data.

To solidify the need of this study, a simple questionnaire was designed for the patients to understand their need in a better way. This gave a qualitative idea of the patient satisfaction regarding the OPD billing process and staff service.



**Figure 1: Patient satisfaction was determined with the help of questionnaire**

It was found that about 40 percent of people were poorly satisfied with the OPD billing service whereas the percentage of patients who were highly satisfied was zero.



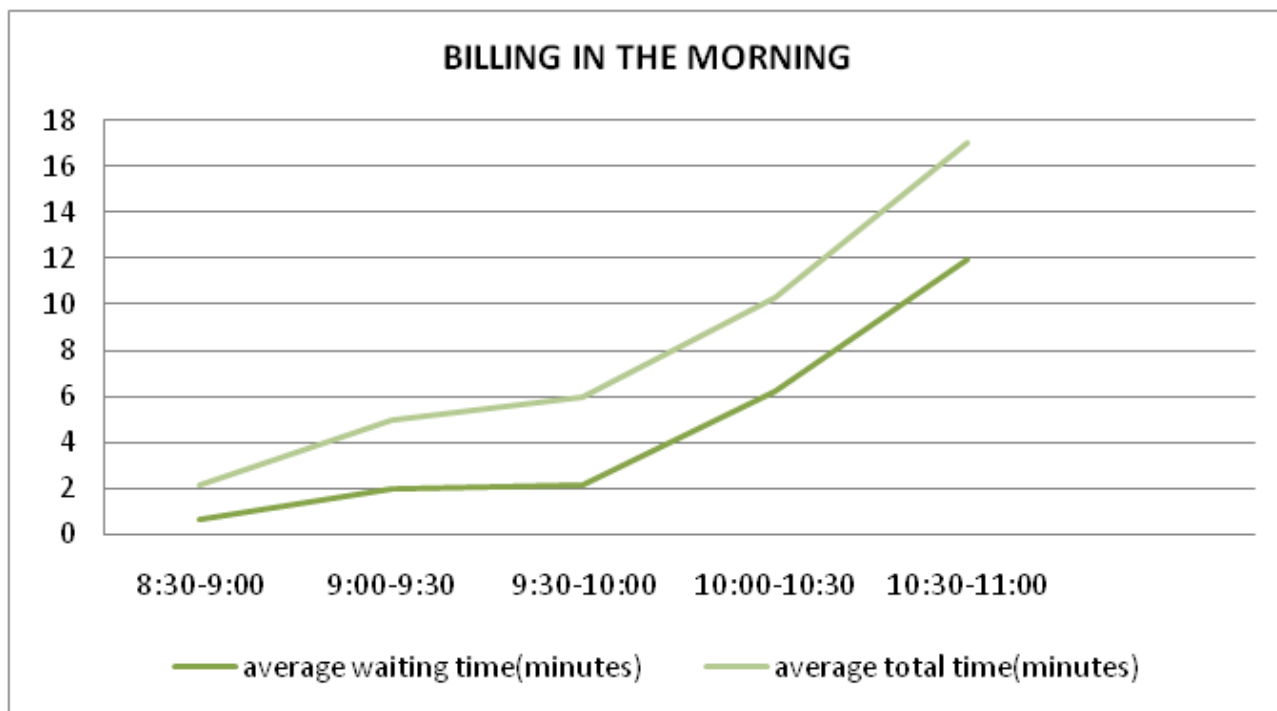
**Figure 2: The time taken for the billing process for ten investigations and ten consultations.**

The registration process (if the patient is new to the hospital) was excluded as that usually takes same amount of time on an average. It was observed that billing for investigations takes more time than billing for doctor’s consultation.

**Table 1: Billing in the early morning**

Time interval	Average waiting time(minutes)	Average total time (minutes)
8:30-9:00	0:7	2:15
9:00-9:30	2	5
9:30-10:00	2:17	6
10:00-10:30	6:30	10:30
10:30-11:00	12	17

This table shows the average waiting time and total time taken in the billing process of the hospital OPD in the time interval of 30 minutes from the time the OPD is open till the peak hours as showed in Graph below.



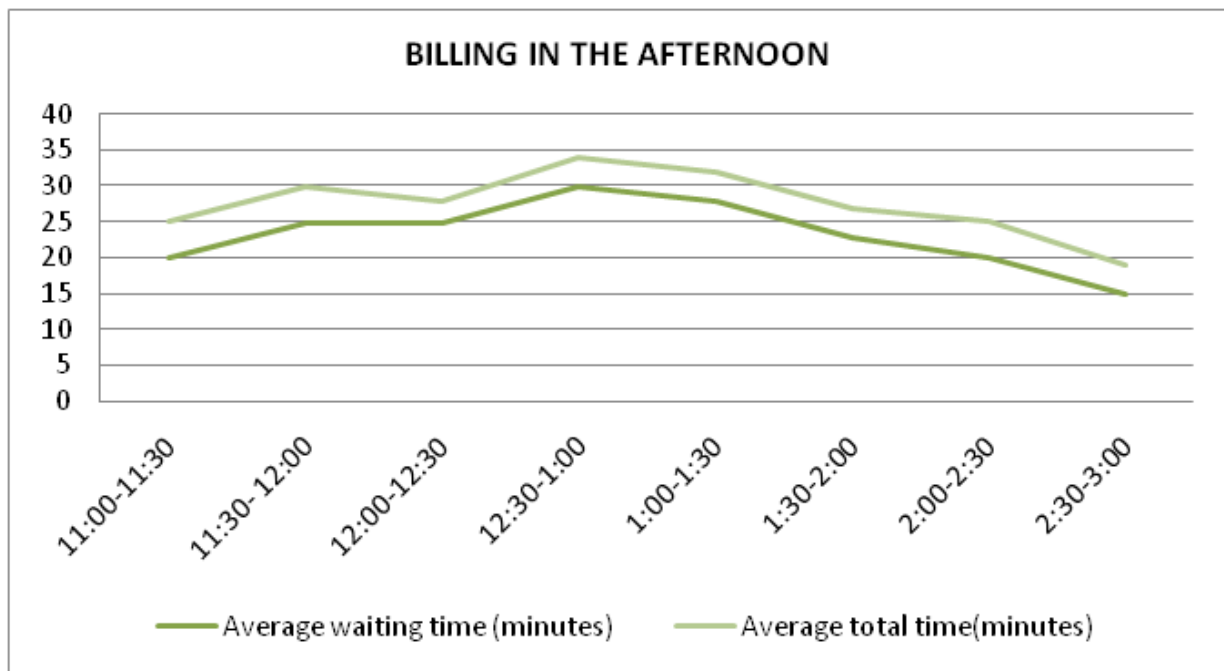
**Figure 3: The average waiting time for billing before 11 am .**

It was observed to be 4 minutes. The total time taken to complete the whole billing process at the hospital OPD was found to be 8 minutes on an average.

**Table 2: Billing after 11 am.**

Time interval	Average waiting time (minutes)	Average total time (minutes)
11:00-11:30	20	25
11:30- 12:00	25	30
12:00-12:30	25	28
12:30-1:00	30	34
1:00-1:30	28	32
1:30-2:00	23	27
2:00-2:30	20	25
2:30-3:00	15	19

This table depicts the average waiting time and total time taken in the whole billing process in the hospital OPD with a time interval of 30 minutes.



**Figure 4: After 11 am the average waiting time for billing in the hospital OPD.**

It was found to be 23 minutes with total time taken to complete the whole process of OPD billing was found to be 28 minutes. This shows the significant rise in the waiting time and total time taken for the whole billing process in the hospital OPD.

It depicts that during the day; the hours after 11:00 am were of peak workload and needed an increase in the staff at least for the peak hour

**Recommendations:** Bottlenecks in the present process flow were identified which were, mainly crowding of the patients at the Registration desk and OPD reception and unnecessary movement of the patients for billing, investigation and report collection. The primary changes recommended were to decentralize billing and make outpatient laboratory reports available at all counters to ease the patient flow and disperse the crowd at the front desk.

The billing for investigations and consultations both are done at the OPD front office. Investigations are billed by entering the UHID number of a patient and selecting the respective investigations to be billed. This on an average takes 5-6 minutes for each patient, varying according to the number of investigations that need to be billed.

The room for laboratory room testing and collection was located close to the billing counters. Thus, limiting the investigation billing and laboratory report collection to the front office, resulted in amassing of people.

Therefore, it was recommended that the hospital OPD should have well trained staff to enable decentralized billing for investigations at respective OPDs. Laboratory investigation report printouts should be made obtainable at respective OPDs as well, to further reduce patient movement. Billing counters for investigation billing could be separated from the counters for consultation billing along with modification in the token system.

The registration for new patient coming to the hospital was also done at the OPD billing counter. Starting from the time the Registration file is taken to fill in details, till the UHID number is generated, the average time to register a patient varies from 1-2 minutes. This adding to the billing done for the service increases the total time taken for and the waiting time for the billing process. At times, a few patients have difficulty in filling the registration form and complying with the Registration process.

There can be floor navigators, easing the process flow for those patients who have difficulty in complying with the outpatient process.

Introducing online registration was suggested for new patients so that they can fill the form online and bring it along to cut down on their waiting time for registration, thus total time taken for the billing.

This on other hand will avoid long queues at the registration desk. A suggestion to Introduce iPads/ Tablets with staff who can walk amongst the queues and register patients while they wait, quickly dispersing the crowd was also made.

The security staff in the OPD should guide the patients regarding the counters and guards must be trained for the same. Regular training sessions should be conducted for all the staff.

A suggestion to implement OPD reception and consultation room checklist to make sure all necessary resources are available at all times. The receptionist staff must be trained to attend phone calls efficiently. A system generated SMS can be sent to the patient confirming his/her OPD timing.

Proper display of the consultant's timings in the OPD, as well as online, will reduce the number of enquiries made by the patients. OPD coordinators should be trained for proper scheduling of the appointments to decrease the overcrowding. There should be a fixed schedule allocation by which the patients with appointments and Walk-in patients are called for consultation. This means that the Walk-in can be informed of an approximate waiting time period (arbitrarily 2 patients with appointments followed by one Walk-in patient for those consultants who have greater numbers of patients with appointments).

### Conclusion

Patients coming to the hospital if satisfied will help in developing the good image of the institute and waiting time is one of the important indicators of patient satisfaction. The study reveals the average time taken for the whole billing process both for investigations and consultations. It also mentions their view towards the OPD billing process.

The investigations took more time than the consultation for billing. This was due to the time taken for identification and application of different codes for different investigations. The staffs were not well

equipped with all the codes for different investigations and diagnostic procedures.

There is no Conflict of Interest.

**The study was not funded by any agency:** Since the study was done as a part of Project by MBA (HHM) students, there were no Ethical issues involved. There were no human or animal experiments or interventions.

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# Sleep Quality and Glycemic Control among Patients with Type II Diabetes Mellitus

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## Abstract

**Background:** Diabetes Mellitus is one of the most serious health problem that arise from poor sleep quality.

**Objective:** Objectives of the study were

1. Identify relationship between the sleep quality and glycemic control among patients with type II Diabetes Mellitus.
2. Determine association of sleep quality and glycemic control with selected socio demographic and clinical variables.

**Materials and Method:** A Non-Experimental descriptive study was conducted among 200 Type II diabetic patients attending Endocrinology OPD at a tertiary care hospital, Kochi. Subjects were selected using convenient and purposive sampling. Data were collected by using Tool 1: Structured Questionnaire and Tool 2: Pittsburgh Sleep Quality Index and Tool 3: Recent FBS and HbA1C Scoring

**Results:** The study found that there is a borderline significance (p value of 0.046) ( $\chi^2=6.1773$ ) with uncontrolled diabetes (HbA1C >6.5) and poor sleep quality (PSQI >5) but the correlation of FBS and PSQI was insignificant (p value of 0.319) ( $\chi^2=2.283$ ). Moreover females were the groups with poor sleep quality when compared to males (p value of 0.022) ( $\chi^2=5.227$ ) and the co morbidities (P=0.049) ( $\chi^2=3.885$ ) and duration of illness within 4-8 years (p value =0.027) ( $\chi^2=7.217$ ) presents positive correlation with the PSQI values.

**Conclusion:** Diabetes Mellitus being a metabolic disorder, it affects various physiologic process. The one among being sleep. So by better glycemic control, it will pay a way to have good sleep quality.

**Keywords:** Sleep Quality, Glycemic Control, Type II Diabetes Mellitus.

## Introduction

Diabetes Mellitus is a chronic multisystem disease related to abnormal insulin production, impaired insulin utilization, or both. Diabetes Mellitus is a serious health problem throughout the world, and its prevalence is rapidly increasing.<sup>1</sup> It is associated with damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart and blood vessels<sup>2</sup>. Management of type 2 diabetes requires considerable dexterity on the part of the patient to manage drugs, diet and exercise.<sup>3</sup>

In 2017, an estimated 8.8 percent or 451 million of the adult population worldwide had diabetes and is expected to raise to 9.9 percent, which will be 693 million by 2045. Moreover, in 2017

5 million deaths among 20-99 years of age was attributed by Diabetes Mellitus and health care expenditure was estimated to be 850 billion.<sup>4</sup> WHO projects that diabetes will be the 7<sup>th</sup> leading cause of death in 2030. American Diabetes Association reports 62 million Indians currently being affected with diabetes<sup>5</sup> and Kerala stands at the top list among Indian states

with a score of 19.4% with an age group of 45-69 years comparing with Chandigarh (13.6%), and Tamil Nadu (10%).<sup>6</sup>

According to WHO, Diabetes Mellitus is being classified into Type I, Type II, Pre-Diabetes, Gestational Diabetes and other specific types of diabetes.<sup>7</sup> Type II diabetes is a complex and demanding chronic condition resulting from the body's inability to adequately produce and or effectively utilize insulin.

India is the 'Diabetes Capital' of the world. The number of cases of diabetes is sharply increasing and so are the complications from diabetes.<sup>8</sup> The prevalence of type II diabetes in Ernakulum district in 2017 that was reported in the Journal of endocrinology and diabetes is about 7.4% among adults. The mean age of the population was 42.7 years (16.03) with males and females equally distributed at a ratio of 48.9: 51.<sup>9</sup> The main risk factors for the development of type II Diabetes Mellitus is family history, race/ethnicity, age, lifestyle changes: less physical activity, consuming more calories, being overweight. The most neglected risk factor according to the studies is sleep disruption.

Diabetes is one of the most serious health problem that arise from poor sleep quality. The evidences shows that there is a powerful connection between body's metabolism, hormones that regulate appetite and eating patterns and the body's use of blood sugar and insulin with sleep.<sup>10</sup>

A hospital based descriptive cross-sectional study at International Archives of Integrated Medicine, Hyderabad assessed the prevalence of poor sleep quality and factors influencing it in type II Diabetes Mellitus patients along with the impact of sleep quality on glycemic control among 100 patients with PSQI and HbA1c level. The study findings revealed that sleep pattern (PSQI global score > 5) was poor in 64% where they conclude on the high prevalence of poor sleep quality in diabetic patients and is strongly associated with diabetic neuropathy<sup>11</sup>.

Sleep is an active biologic function that is essential for life and is critical for physical, mental and emotional well-being<sup>12</sup>. Most adults require 7-8 hours of sleep within 24-hour period. Any defects in sleep quality and quantity may lead to several complications including metabolic errors. This includes impaired glucose tolerance, increased cortisol concentration, insulin resistance contributing to type II Diabetes Mellitus;

higher leptin levels resulting in weight gain-obesity<sup>13</sup>. Studies show that glucose intolerance in the body which may contribute to type II Diabetes Mellitus and vice versa. The average sleep hour for diabetic adults is about 6 hours or less. Research findings shows role for circadian rhythm in the development of diabetes.<sup>14</sup>

Study findings reveals that insulin operates on a daily cycle and the circadian clock of the body directs the production and release of insulin from pancreas where any disruption in this clock often leads to sleep problems and thereby reducing the effectiveness of insulin, which with time leads to insulin resistance.

Another contribution of poor sleep on diabetes is the stress created on pancreatic cells due to sleep disruption which impairs the blood glucose levels in turn leading to decreased insulin sensitivity and decreased glucose tolerance.

### Objectives

1. Identify relationship between the sleep quality and glycemic control among patients with type II Diabetes Mellitus.
2. Determine association of sleep quality and glycemic control with selected socio demographic and clinical variables.

### Materials and Method

**Study design, sample and setting:** The present study is a hospital based Non-Experimental descriptive study conducted among the Out patients visiting the Department of Endocrinology at a tertiary care hospital, Kochi. The sample consisted of 200 Type II Diabetes Mellitus patients attending the Outpatient department with their recent FBS and HbA1c values were randomly recruited to the study after considering the inclusion and exclusion criteria. The study was initiated after obtaining Ethics committee permission. Informed consent was taken from the participants those who meet the inclusion criteria.

#### Data collection instruments:

**Tool 1:** Structured Questionnaire: It had two sections. Section A: Socio demographic variables and Section B: Clinical variable

**Tool 2:** Pittsburgh Sleep Quality Index which is a subjective measurement of sleep. A PSQI global score of >5 is considered to be suggestive of significant sleep disturbance.

**Tool 3:Recent FBS and HbA1C Scoring.**

**Data Analysis:** The data were optically scrutinized and entered into SPSS and data were analyzed using descriptive and inferential statistics.

**Results**

**Section 1: Socio demographic data of the subjects:** Out of the 200 subjects, majority of the subjects 132(66%) belongs to the age of less than 55 years and both male and female found to be in equal frequency (50%). The highest percentages of samples were having education up to higher secondary level (50%). Majority were married (87.5%). 33.5% of samples were retired and 33% were unemployed. Most of the samples 127 (63.5%) belonged to urban area.

**Section 2: distribution of subjects based on clinical data:** By assessing clinical variables, it was found that out of 200 data's collected, 108 (54%) of them were of normal and underweight BMI category. And 195

(97.5%) of them having higher waist circumference and 180 (90%) of them with higher neck circumference. But neither of them showed any significance with poor sleep quality. Among the collected data's, 146 (73%) of them showed family history of type 2 DM. It was found that 25 (12.5%) of the patients who were being diagnosed with type 2 DM was in the range of 4-8 years and is having a significant correlation of 80.60% (p value 0.027) with poor sleep quality. 90 of the total patients were having their age of onset of illness <45 years. Among these diabetic patients, 93 (46.5%) of them are on Oral Hypoglycemic Agents (OHA) and 66 (33%) of them on both OHA and insulin and out of which 146 (73%) of them are on diabetic diet. Out of 200 diabetic patients, 14 (7%) are taking sleep medications. 86 (43%) out of 200 are doing daily walking exercise and 57 (28.5%) are doing yoga. 185 (92.5%) are having the habit of tea or coffee intake. Among these patients, 19 (9.5%) and 9 (4.5%) are having the habit of alcoholism and smoking respectively. Within the selected patients, 195 (97.5%) are on continuous medications.

**Section 3: Relationship between the sleep quality and glycemc control among patients with type II Diabetes Mellitus**

**HbA1C and PSQI:**

HbA1C	Total	PSQI		df	Chi square value	P value
		Poor Sleep Quality				
		Number	Percentage (%)			
Normal	9	6	66.70%	2	6.1773*	0.046
Prediabetic	28	16	57.10%			
Diabetic	163	128	78.50%			

The above table shows that out of 163 diabetic patients, 128 (78.5%) of them were presented with poor sleep quality. Where it gives p value of 0.046 ( $\chi^2=6.1773^*$ ) showing border line significance.

**FBS and PSQI:** The research analysis reveals that out of 117 diabetic patients, 92 (78.6%) of them were

having poor sleep quality. But on p value estimation it gives a value of 0.319 ( $\chi^2=2.283$ ) showing no significance.

**Section 4:** Association of sleep quality and glycemc control with selected socio demographic and clinical variables.



**Sex and PSQI:**

Sex	Total	PSQI		df	Chi square value	P value
		Poor Sleep Quality				
		Number	Percentage (%)			
Male	100	68	68.00%	1	5.227	0.022
Female	100	82	82.00%			

Above table shows that out of 100 females, 82 (82%) of them were presenting with poor sleep quality. P value of 0.022( $\chi^2=5.227$ ) depicts that poor sleep is more among females as compared to males.

**Comorbidities and PSQI:**

Comorbidity	Total	PSQI		Df	Chi square value	P value
		Poor Sleep Quality				
		Number	Percentage (%)			
Yes	156	122	78.20%	1	3.885*	0.049
No	44	28	63.60%			

The above table shows that out of 156 diabetic patients with comorbidities, 122 (78.2%) of them were having poor sleep quality. Where p value of 0.049( $\chi^2=3.885^*$ ) is suggestive of considerable significance.

**Duration of Type II DM and PSQI:**

Years	Total	PSQI		df	Chi square value	P Value
		Poor Sleep Quality				
		Number	Percentage (%)			
1-3	29	16	55.20%	2	7.217*	0.027
4-8	31	25	80.60%			
>8	140	109	77.90%			

The above table shows that for the patients diagnosed of being diabetic for 4-8 year duration was found to have poor sleep quality (80.60%). Where giving a p value of 0.027( $\chi^2=7.217^*$ ) indicates positive correlation between duration of illness and sleep quality.

**Discussion**

The present study was conducted among 200 diabetic patients visiting Endocrinology OPD at a tertiary care hospital Kochi. Ideally it would have a better result if there were a control group of non diabetic population. But it was not possible in the study situation. As the present study result shows that there is a borderline significance among diabetic patients HbA1C values and poor sleep quality ( $p=0.046$ ) ( $\chi^2=6.1773$ ), this shows a congruency with the study conducted by Abdulilah M, among 400 diabetic patients in Saudi where patients with uncontrolled diabetes (HbA1C >7%) had significant

prevalence of poor sleep quality (p value of <0.001%), however there were no correlation with sleep quality and age, smoking status<sup>15</sup> where the present study too shows no significant correlation.

A study conducted by Lou et al, showed a significant congruency with the present study which states that poor sleep quality can be observed among older females and among illiterate, the study result also finds that females have significant correlation with poor sleep quality. But without significance, it was identifies that poor sleep quality is more in low literate population but within <55 year groups.<sup>16</sup> The present study reveals that out of 100 females, 82 (82%) of them were presented with poor sleep quality. P value of 0.022( $\chi^2=5.227$ ) depicts that poor sleep is more among females as compared to males.

On a study conducted by Gozashti MH, among diabetic patients in Kerman, showed that there were a

significant correlation among patients with higher BMI (more among females)(p value of 0.03%) and poor sleep quality.<sup>17</sup> No such significant correlation were identified in the present study with the above mentioned variable.

The present study shows that out of 156 diabetic patients with co morbidities, 122 (78.2%) of them were having poor sleep quality. Where p value of 0.049( $\chi^2=3.885^*$ ) is suggestive of considerable significance. Another study conducted among Osaka diabetic patients revealed that there is a significant correlation between co morbidities specially with BP (p value of 0.010)<sup>18</sup> which makes high congruency with the present study.

### Conclusion

The study has showed that there is a considerable significance between the HbA1c values and the Sleep Quality Index (p value of 0.046)( $\chi^2=6.1773$ ) of the patients with type II Diabetes Mellitus, while the FBS values are far less to concern with the PSQI values (p value of 0.319)

( $\chi^2=2.283$ ). Mostly women being the troubled sleepers as revealed by the study (p value of 0.022) ( $\chi^2=5.227$ ), they lie within the age group experiencing menopausal to post-menopausal metabolic dynamics. It is also identified that in the present study, there is positive correlation between duration of illness and sleep quality (p value =0.027) ( $\chi^2=7.217$ )

**Ethical Consideration:** The research proposal was approved by the committee of ACON and Thesis Review Committee of a tertiary care hospital, Kochi on 2018. Formal administrative permission was obtained from the Head of Department of Endocrinology unit to conduct the study within selected setting. The voluntary nature of participation and confidentiality of the data was explained and consents were obtained from the participants.

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**Conflicts of Interest:** There is no conflict of interest among the authors

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# A Comprehensive Break Even Analysis of MRI and CT Unit of a Tertiary Care Hospital in Sikkim

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## Abstract

Break Even Analysis has wide application in most of the industries but its application so far is limited in hospital industry, this study attempts to perform break even analysis of both MRI and CT unit of a tertiary care hospital in North Eastern state of India, Sikkim. In this study the MRI machine was found to be underutilized with a utilization coefficient of 48%, whereas the CT machine utilization was acceptable with a utilization coefficient of 73%. In this study the MRI unit was incurring a loss of Rs 1837.39 per scan whereas the CT unit was making a profit of Rs 891 per scan. Moreover, the break-even point for MRI is found to be 203 scans per month, the current average scan per month was 138, similarly for CT the calculated break even point was 308 scans and the current average CT scans done were 550 scans per month. This study also uses the break-even selling price calculation to determine the price revision for MRI assuming that the number of MRI scans per month will remain 138 only and after doing the calculation it was found that the average selling price per MRI scan should be Rs 6231 i.e. an increase of Rs 1837 per scan from the existing average selling price of Rs 4394. However, revision of price should not be seen in isolation but together with the competitor's prices, and anticipated reduction in cases because of price elasticity.

**Keywords:** Break Even Analysis, MRI, CT, Utilization Coefficient, Variable Cost, Fixed Cost

## Introduction

In India the private sector fulfils almost seventy percent healthcare needs of Indian citizens<sup>(1)</sup>. Hospitals otherwise are labour and cost intensive organizations with a long gestation period for giving back profits or attaining Break Even Point. This is due to the fact that almost 60 percent of the expenditure in setting up a hospital goes to the equipment's section and only radiology department consumes around 10 percent of the budget in the teaching hospitals<sup>(2)</sup>. Hence it becomes imperative for the hospital administrators to exercise cost control especially in the radiology department. Break even analysis also called as cost volume relationship basically helps managers by serving three functions i.e. determining the number of units to be produced to reach no profit no loss situation, the price to be charged, and to determine the volume to achieve a target profit. It also helps in determining whether the current performance of a service in the long run will be profitable or not? The fundamental concept of break-even analysis is that profit

changes with changes in volume, costs and revenue<sup>(3)</sup>.

Radiology department comes under clinical supportive services in a hospital<sup>(4)</sup>. Regardless of whether the hospital is not-for-profit or for-profit, an optimally functioning radiology department would surely increase the profitability of the hospital.

This study was carried out in a 500 bed tertiary care teaching hospital which was having one CT machine 64 slice of and one MRI machine of 1.5 Tesla. The study was carried out for a period of two months i.e. from April 2019 to March 2019. The aim of the study was to do the Break-Even Analysis of MRI and CT scan units in radiology department of the tertiary care hospital of Sikkim. The objectives were:

1. To calculate the utilization coefficient of both MRI and CT units.
2. To calculate the unit cost of CT and MRI scan
3. To do the Break-Even analysis of CT and MRI units.

**Literature Review:** Nowadays radiology department in most of the hospital is also known as imaging department and this has happened with the wide acceptance and reliance on Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). However, these facilities are mostly associated with only tertiary care hospitals or hospitals with adequate patient load otherwise installation of these imaging equipment's won't be profitable for the hospital<sup>(4)</sup>. CT is a specialised X ray which provides detailed anatomical information of the patient's body whereas MRI helps in differentiation of white and grey matter.

To calculate the utilization coefficient the formula<sup>(5)</sup> used was,

$$\frac{N}{M} \times 100$$

Where,

N = Average number of hours the equipment is used per day.

M = Maximum number of hours the equipment can be used per day

Similarly, to calculate break-even analysis contribution margin needs to be calculated first, with the help of the formula

To calculate the Break Even point the formula used was,

To calculate the Break Even selling price i.e. the price that should be charged to achieve break even is the formula used is,

Break Even Price = (Fixed cost X Number of Scans in one month) + ( Variable cost per scan X Number of Scans in one month)/Number of Scans in one month

## Methodology

The retrospective study was conducted using the data of four months, i.e. (January 2019-April 2019) for calculating Unit Cost and Break Even Point of MRI and CT units. First of all, the unit cost was calculated to find out the cost, the hospital puts in for one MRI and CT scan. The unit cost was then calculated by classifying the costs into Fixed and Variable cost.

### The fixed cost included:

- Manpower Cost
- Comprehensive Maintenance Contract (CMC)
- Area used for the procedure
- Depreciation

### The variable cost included:

- Electricity Cost
- Consumable Cost

Each cost was considered by taking the average of the cost during the study period (i.e. Jan 2019- Apr 2019). Cost summary per unit scan was calculated by dividing the monthly costs (fixed and variable) with the total number of scans in a month.

## Results

Scans per month for MRI and CT was calculated by taking the average of scans done for four months i.e. (Jan 2019 -Apr 2019). On an average there were around 138 MRI scans per month and 550 CT scans per month, similarly the average time per MRI procedure on an average was 50 minutes and for CT scan it was 20 minutes below

**Table 1: Average Monthly performance of MRI and CT uni**

Description	MRI	CT
Scans per month	138	550
Yearly scans	1656	6600
Average time per procedure(minutes)	50	20
Total machine hours per month	175 (7*25)	250 (10*25)
Total machine hours per year	2100	3000

**Table 2 Calculation of utilized Machine Hours per month for MRI and CT units**

MRI	CT
Average per day scan = 4 Average procedure time = 50 mins 4*50 = 200 min 200/60= 3.33 hrs per day 3.33*25 =83.3 utilized machine hours per month	Average per day scan = 22 Average procedure time = 20 mins 22*20 = 440 min 440/60 = 7.33 hrs per day 7.33*25 = 183.3 utilized machine hours per month
1000 machine hours utilized per year	2199 machine hours utilized per year

Hence the utilization coefficient calculated for MRI unit it was 48% whereas for CT unit it was 73%, see below

**Table 3 Utilization Coefficient**

MRI	CT
3.33/7 Hrs = 0.47 0.47*100 = 48%	7.33/10 Hrs = 0.73 0.73*100 = 73%

Moreover, the revenue per scan was calculated by dividing the revenue earned by each month of the study period with the number of scans done in each month and their average was taken.

Hence the average revenue per scan for MRI = 4394.1 and the average revenue per scan for CT = 2258.3

Revenue per month is then calculated by multiplying average revenue per scan with average scans per month.

Therefore, Average scans for MRI = 138

Revenue per month for MRI Unit = 4394.1\*138 =6,06,385.8

Average scans for CT = 550

Revenue per month from CT unit = 2258.3\*550= 12,42,065

The calculation of cost summary per unit scan for MRI and CT unit is given below

**Table 4: Calculation of Cost per Scan for MRI and CT**

Fixed Cost	MRI	Percentage of Total Cost	CT	Percentage of Total Cost
Manpower Cost	2,249.07	54.41%	505.83	36.69%
Depreciation	2208.12	34.82%	344.1	24.96%
CMC	1,268.11	30.68%	286.45	20.78%
Area used for the procedure	29.41	0.47%	3.07	0.22%
TOTAL	5754.71	92.35%	1139.45	83.34%

Variable Cost	MRI	Percentage of the Cost	CT	Percentage of the Cost
Electricity	200.87	3.17%	43.93	3.19%
Consumable Cost	275.91	4.35%	183.93	13.34%
TOTAL	476.78	7.52%	227.86	16.53%

Total Cost Per Scan	6231.49	100%	1,367.31	100%
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Manpower cost of MRI and CT includes the monthly salaries of the technicians, radiologists, HOD, clerk and the general duty workers. The cost per scan was calculated by dividing the salaries with number of scans in a month. The manpower of MRI contributes 54.41% of the total cost and CT contributes 36.69% of the total cost. Similarly, the depreciation of MRI and CT was calculated using the Write down Value (WDV) method as Income tax authorities recognize this method and 20% is used as the depreciation rate. The cost per scan was calculated by dividing the depreciation per month with number of scans in a month. Depreciation of MRI contributes 34.82% of the total cost and CT contributes 24.96% of the total cost. The cost per scan was calculated by dividing the monthly CMC with the number of scans in a month. CMC of MRI contributes 30.68% of the total cost and CT contributes 20.75% of the total cost. The area used for the procedure by MRI was 1075 sq. ft. and

area used for the procedure by CT was 520 sq. ft. The cost of 1 sq. ft. was Rs.631. The cost of area was then calculated after taking the depreciation at the rate of 10% for a period of 25 years. The area of procedure for MRI contributes 0.47% of the total cost and CT contributes 0.22% of the total cost. The electricity cost of MRI contributes 3.17% of the total cost and CT contributes 3.19% of the total cost. Consumables contributed 4.35% of the total cost and CT contributes 13.34% of the total cost. Total cost per scan was calculated by adding fixed cost and variable cost. Hence the unit cost of an MRI scan came as Rs 6231.41 and unit cost per CT scan was Rs 1367.31. Lastly to determine the profit and loss situation of both the units the total revenue per scan was subtracted from total revenue and it was found that the hospital was losing Rs 1837.39 per MRI scan and was generating a profit of Rs 890.99 per scan.

**Table 5 Calculation of Profit and Loss per scan for MRI and CT**

Description	MRI	CT
Total Cost Per Scan (Fixed Cost + Variable Cost)	6231.49	1367.31
Total Revenue Per Scan	4394.1	2258.3
Net Profit Per Scan (Total Revenue – Total Cost)	-1837.39	890.99
Net Profit%	- 41.81%	39.45%

**Break Even Analysis:** The break-even analysis of MRI revealed that that break-even point for MRI unit is 203 scans per month, see below. Whereas the break-even point for CT unit is 308 scans per month, see below.

**Table 6 Break Even Analysis for MRI and CT**

Variable	MRI	CT
Total Fixed Cost	(5754.71*1656) 95,29,799.76	(1139.45*6600) 75,20,370
Total Variable Cost	476.78	227.86
Sales Revenue	4394.1	2258.3
Contribution Margin (Sales revenue- Variable cost)	3917.32	2030.44
Breakeven Point (Fixed cost/Contribution Margin)	2432.73 scans per year 203 scans per month	3703.81 scans per year 308 scans per month

**Loss of MRI is calculated by using the formula,**

$$\begin{aligned} \text{Profit} &= \text{Sales Revenue} - \text{Total Cost} \\ &= (4394*138) - [(5754.7*138) + (477*138)] \\ &= 6,06,372 - [7,94,150 + 65,826] \\ &= 6,06,372 - 8,59,976 \\ &= \text{Rs. } 2,53,604 \text{ Loss per month.} \end{aligned}$$

**Profit of CT scan is calculated by using the formula,**

$$\begin{aligned} \text{Profit} &= \text{Sales Revenue} - \text{Total Cost} \\ &= (2258*550) - [(1139.5*550) + (228*550)] \\ &= 12,41,900 - [6,26,725 + 1,25,400] \\ &= 12,41,900 - 7,52,125 \\ &= \text{Rs. } 4,89,775 \text{ Profit per month.} \end{aligned}$$

From the above calculation it can be seen that the on an average the MRI unit is in the loss of Rs 2, 53,604 per month, on the other hand CT unit is generating a profit of Rs . 4, 89,775 per month.

**Discussion**

In this present study the calculated cost incurred per MRI came to Rs 6231.49 which is higher than other twostudies, in first study<sup>(6)</sup> it came to Rs 4447.30 whereas in the another one it was Rs 3500, the same is for CT also as in the present study it came as Rs 1367.31 whereas it was Rs 581.40 in the same study discussed earlier.This difference is there due to the difference in the manpower cost which is in the present study is 36.6% of the total cost whereas in the study done by Rehana et al <sup>(6)</sup> the manpower cost was only 13.8 percent of the total cost. Moreover the breakeven point for MRI and CT scans in this study came to 203 and 359 respectively whereas in another study it came to 135 scans per month for MRI with a cost of Rs 5339.67 per MRI scan <sup>(7)</sup>. However the direct labour cost in the study done by satyashanker et al <sup>(7)</sup> was only 4.54 percent. However, the satyashanker et al studywas done in 2008, nearly 11 years earlier and since then there is a great change in the salary packages of the radiology and imaging staff, In addition to that this hospital is situated in hilly terrain where the availability of qualified medical professional and technicians is a challenge hence the salary packages are also on the higher side. Lastly in the study done by Chakravarty and Naware <sup>(8)</sup> the break-even point for MRI scan per month came to 153 scans with Rs 4129 cost per scan for MRI scans with contrast. Again, this study was done in 2008 and is from a non-hilly terrain.

We suggest that the hospital administrators should not stop at the calculation of break-even point only, they should also calculate the required selling price to be charged to achieve the break-even point for example in this study it was found that the current MRI scans per month are 135, whereas to achieve break even the hospital needs to do 203 MRI scans per month, In case the increase in volume is not possible then the only way left is increase in the selling price, the hospital should calculate the Break Even selling price for MRI unit with the help of formula

$$\begin{aligned}
 &\text{Break Even Price} \\
 &= \frac{(\text{Fixed cost} \times \text{Number of Scans in one month}) + (\text{Variable cost per scan} \times \text{Number of Scans in one month})}{\text{Number of Scans in one month}} \\
 &= [(5754.7 \times 138) + (477 \times 138)] / 138
 \end{aligned}$$

$$\begin{aligned}
 &= [7, 94,150 + 65,826] / 138 \\
 &= 859976 / 138 \\
 &= \text{Rs.6231 per scan}
 \end{aligned}$$

Current average selling price of MRI in the hospital is Rs. 4394. Therefore, to achieve the break even with the existing number of scans the hospital administration need to ponderupon increasing the price by Rs.1837 to the existing selling price to recover the cost per scan. While taking the decision administration also needs to consider the competitive price in the nearby market and the likely impact of increased price on the volume after considering all this only they should take a final call on price increase.

**Conclusion**

The application of break-even analysis in hospitals is very limited and it is mostly used only for ascertaining the profit and loss situation of the unit, however there are additional utility of break-even analysis such as used in this study in determining the break-even selling prices and for calculation of target profit. The authors would like to again emphasize that break even analysis should not be seen in isolation and healthcare being a unique industry dealing with human life’s there is no room for unethical practises but still break even analysis gives a valuable insight to the hospital administrators especially working in private sector in evaluating their current performance and in determining the future course of action.Lastly, it should be remembered that break even analysis although being a very useful tool haslimitations as well such as difficulty in distinguishing fixed and variable cost, unrealistic assumptions such as the selling price should be constant, when the organization sells more than one product the difficulty in performing break even analysis.

The study is not funded by any agency.

There is no conflict of Interest.

The study was conducted as a part of Internship of healthcare management students and hence there was no Ethical Issues involved, as there was no direct/indirect intervention with any patient or animals.

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# A Descriptive Survey on the Consumption of Sweetened Beverages and Contributing Factors among Adolescents in Selected PU Colleges at Mangaluru

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## Abstract

**Objectives:** The objectives of the study were to identify the consumption rate of sweetened beverages among adolescents, to identify the factors influencing the consumption of sweetened beverages and to find out the association between consumption rate and the selected demographic variables.

**Method:** A descriptive survey was conducted among 100 adolescents from Pre University Colleges at Mangaluru from August to January 2019. Probability simpler and om technique was used in the study to select the sample. The criteria checklist was used as the tool for finding the consumption rate and factors influencing consumption rate.

**Result:** The result showed that 69% percentages of head ole scents were extensively consuming sweetened beverages and the factors that have an effect on the se consumption rates are peer pressure, encouragement of the family, advertisements, availability, taste, color and climatic condition. The study also shows that there no association between the consumption rate and the selected demographic variables.

**Conclusion:** Increased consumption rate of sweetened beverages among adolescents was associated with taste, easy availability of sweetened beverages, peer pressure, climatic conditions etc.

**Keywords:** *Adolescents, sweetened beverages, consumption rate.*

## Introduction

A sweetened beverage is also known as liquid candy.<sup>1</sup> It consists of sugar, fat, and carbohydrates.<sup>2</sup> Some of the sweetened beverages are Pepsi, bear, cococola, slice, sprite, seven up, coke etc. The increase in consumption of sweetened beverages can be described as a worldwide health problem. Now a day, adolescents are mostly prompt to have sweetened beverages due to their life style pattern, financial background, peer group involvement and food habits. Taste preference, eating behavior and advertisement have a significant influence on the consumption of sweetened beverages. In most of the families both parents may be working so they may not be have enough time to look after their children and provide homely food. They may provide junk food and sweetened beverages to their children and it becomes

first preference to adolescents. According to the World Health Organization (WHO), over 340 million children and adolescents aged 5-19 were overweight or obese in 2016<sup>3</sup>. The result of the study conducted in India to identify the factors associated with soft drink consumption among adolescents in age group of 16-18 shows that majority of the adolescents 71.6% had habit of consuming soft drinks. About 22% agreed that soft drinks provide sort of fun.<sup>4</sup> Media plays an important role in contributing to eating behaviors and food choice in children through food advertisements.

Now a days the consumption of sweetened beverages has been increased. The rise consumption may be due to the taste, color, availability and accessibility of sweetened beverages today. The effort to decrease the consumption of sugar sweetened beverages is very critical because

adolescents are the highest population who is consuming sugar sweetened beverages.<sup>5</sup> According to the World Health Organization (WHO), over 340 million children and adolescents aged 5-19 were overweight or obese in 2016<sup>6</sup>. Limiting the amount of sweetened beverages intake and help individuals to maintain a healthy weight and have a healthy diet. Examples of sweetened beverages include, regular soda (not sugar free), fruit drinks, sweetened waters, energy drinks, coffee and tea beverages. The students who are eating fast food of tenly and who do not eat fruits regularly are most likely to be frequent consumers of sweetened beverages.

### Materials and Method

The study was conducted in a school at Mangaluru and the school were selected based on the feasibility of conducting the study and the availability of samples.. The probability simple random technique was used for the selection of samples. The study samples were consisting of 100 adolescent students. The checklist was used to assess the consumption rate and factors influencing the consumption of sweetened beverages. The data were analyzed using descriptive statistics.

### Findings:

#### Section I: Factors influencing the consumption of sweetened beverages

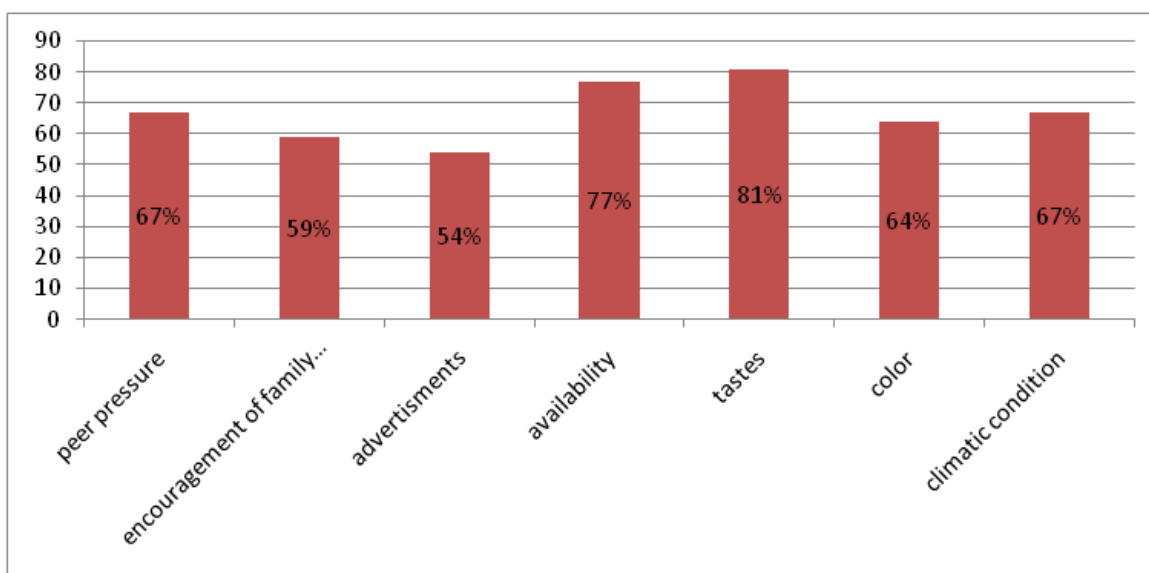


Figure 1: Bar diagram depicting the factors influencing consumption of sweetened beverages

The result shows that tastes of the sweetened beverages are the major influencing factor among adolescent students (i.e. 81%). Availability of those sweetened beverages (77%) peer pressure (67%), climatic condition (67%), color(64%) are the other

factors that influence the consumption of sweetened beverages.

#### Section II: Distribution of subjects according to their consumption rate

Table 1: Frequency and percentage distribution of subjects according to their consumption rate n = 100

Consumption Rate	Frequency (f)	Percentage (%)
Extensive consumption	69	69
Moderate consumption	31	31
Poor consumption	-	-

The data presented in Table 2 shown that, many of the subjects had extensive consumption rate (69%), followed 31% had moderate consumption rate.

**Section III: Association between consumption rate and demographic variables**

In order to find out association between consumption rate and selected demographic variable, the following null hypothesis was stated.

**H<sub>1</sub>:** There will be a significant association between consumption rate of sweetened beverages among adolescence with their selected demographic variables.

**Table 2: Association between consumption rate and selected demographic variables. n=100**

Sl. No	Demographic variables	Consumption rate			Df	Chi-square value	Association
		Extensive consumption	Moderate consumption	Poor consumption			
1	Age in years						
	16	26	15	-	3	.279	NS
	17	31	12	-			
	18	9	2	-			
	19	5	0	-			
2	Gender						
	Male	28	8	-	1	.263	NS
	Female	43	21	-			
3	Educational qualification						
	PU-I year	36	15	-	1	.926	NS
	PU-II year	35	14	-			
4	Family income per month						
	≤10,000	19	8	-	3	.349	NS
	10,001-15,000	12	9	-			
	15,001-20,000	18	4	-			
	≥20,000	22	8	-			
5	Pocket money per month						
	≤500	53	19	-	3	.305	NS
	501-1000	11	3	-			
	1001-1500	2	2	-			
	≥1500	5	5	-			
6	Working status of mother						
	Private employee	12	2	-	1	.340	NS
	Government employee	0	0	-			
	Unemployed	59	27	-			
7	Working status of the father						
	Private employee	69	27	-	1	.577	NS
	Government employee	2	2	-			
	Unemployed	0	0	-			

The Table 3 shows that there is no significant association between the consumption rate and demographic variables. For these the null hypothesis is rejected and research hypothesis is accepted.

**Conclusion**

The study result shows that the sweetened beverages is highly consumed by the adolescent students (16-19) and there are some factors that affect these consumption

rates that are taste, availability of SSB, peer pressure, climatic condition etc.

**Ethical Clearance:** Yenepoya Ethics Committee-1 approved our study protocol number 2018/064 titled "A descriptive survey on the consumption of sweetened beverages and contributing factors among adolescents in selected Pre University College at Mangluru" On 18/6/2018 under the chairmanship of Dr Vikram Shetty.

**Source of Funding:** Self

**Conflicts of Interest:** Nil

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# Effect of Smoking and Tobacco Chewing on Superoxide Dismutase Activity

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## Abstract

**Background:** Tobacco either in smoke or smokeless form is a significant source for free radicals that induces neoplastic changes in the body. Saliva is the first fluid that is exposed to tobacco and its anti-oxidative system consists of many enzymes like superoxide dismutase which play an important role in cancer prevention. The present study has been conducted to investigate the effect of tobacco on the antioxidative system of saliva in individuals indulging in the habit of tobacco consumption either in the form of smoking or chewing and compare it with changes if any among healthy individuals.

**Materials and Method:** A cross sectional study comprising of 100 patients were enrolled for the study and was divided into two groups- Group A and Group B. Fifty healthy individuals who were age and gender matched, and with a negative history of smoking or chewing tobacco & without the presence of any periodontal disease were assigned to group A. The remaining fifty were allocated to group B who had a history of smoking cigarettes/chewing tobacco daily. Unstimulated saliva samples of these subjects were investigated for activity of salivary superoxide dismutase (SOD). Data was analyzed using SPSS (11.5) and running Kruskal-Wallis test. Statistical significance was set at  $p < 0.05$ .

**Results:** There were significant differences in the activity of superoxide dismutase and was consistently seen to be low in patients with no history of pan chewing/smoking and there was an increase in the mean SOD levels among pan chewers and a decrease in the mean SOD levels in patients with the habit history of smoking 5-10 cigarettes.

**Keywords:** Tobacco, saliva, superoxide dismutase, smoking, pan chewing, cigarettes.

## Introduction

Smoking and chewing of tobacco is an abusive habit practiced by millions of people all over the world. Tobacco is a major etiological factor for oral cancer accounting for 30-40% of deaths in India. Cigarette

smoke contains many toxic components such as carbon monoxide, cyanide hydrogen, benzopyrene and oxygen radicals.<sup>1,2</sup> These components can predispose to systemic disorders: cardiac diseases, cancer, and pulmonary disorders.<sup>3, 4-6</sup>

Smokeless tobacco can produce free radicals.<sup>7</sup> These include super oxideanion ( $O_2^-$ ), hydroxyl radical ( $HO\bullet$ ), peroxy radicals ( $ROO\bullet$ ), and hydrogen peroxide ( $H_2O_2$ ).<sup>8</sup>

Free radicals can change the structure of intracellular and extracellular components such as proteins, lipids, and DNA and interfere with cell function.<sup>9</sup>

Antioxidants are the body's defense system that neutralizes the destructive effects of reactive oxygen

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species (ROS) and minimize damage to cells. As the first defensive line, saliva has a protective antioxidant system that fights against oxidant-induced damage.<sup>10</sup> One of the most important antioxidant enzymes which regulate oxidation-reduction process of cells in normal and tumorigenic conditions is superoxide dismutase (SOD).<sup>11</sup>

There are three types of superoxide dismutase including Fe-SOD, Mn-SOD and Cu-Zn SOD. SOD contains copper and zinc and is found in all body tissues as well as in some body fluids, especially in saliva.<sup>12</sup>

SOD converts O<sub>2</sub> to H<sub>2</sub>O<sub>2</sub> during its catalytic activity.<sup>13</sup> The present study was undertaken to evaluate the effect of tobacco use on the antioxidant system, predominantly superoxide dismutase activity

1. To study the levels of antioxidant enzymes superoxide dismutase in saliva of healthy individuals with the habit of tobacco usage either in the form of smoking or chewing.
2. To compare these levels with healthy controls without any tobacco habit.

### Materials and Method

The protocol of the present cross-sectional case-control study was approved by the Ethics Committee of our institute. Informed consent was obtained from all the participants. Out of 100 participants, 50 healthy individuals were assigned to group A. Participants in group A had no periodontal disease and never smoked. 50 participants were allocated to group B, these were cases with the habit of smoking, pan/gutkha or both. Cases were selected if they had a positive habit history

(smoking/chewing of tobacco) and without any systemic diseases, periodontitis or pre-malignant lesions.

All our participants were homogenous in terms of age and gender and their salivary samples were collected in the morning. All the participants rinsed their oral cavities with physiologic Salivary before the sampling procedure. Then, each subject's non-stimulatory saliva was collected in special containers for 5 minutes. The salivary samples were immediately centrifuged and transferred into freezer at -20°C. The plastic containers were coded and sent immediately to Biochemistry Lab. Then in the laboratory, they were centrifuged for 10 minutes at a speed of 2000 rpm.

**Estimation of Salivary Superoxide Dismutase:** Superoxide dismutase was assayed in all the study groups by the method devised by Marklund S, Marklund G modified by Nandi and Chatterjee.<sup>14, 15</sup>

**Principle:** Pyrogallol autooxidises rapidly in aqueous or alkaline medium solution and this has been employed for the estimation of superoxide dismutase. SOD inhibits the auto oxidation of pyrogallol. This principle was employed in a rapid and convenient method for the determination of the enzyme concentration.

Reagents used as seen in figure 1

1. **Tris Buffer:** 50 ml of Tris buffer (containing 50 mM of Tris buffer and 1 mM of EDTA) was prepared. To this, 50 ml HCL was added to adjust the pH at 8.5 and volume was made up to 100 ml.
2. **Pyrogallol (20 mM concentration):** 25 mg of pyrogallol was dissolved in 10 ml of distilled water.



Figure 1: Reagents used

**Procedure**

**For Control:** To 2.9 ml of Tris buffer, 0.1 ml of pyrogallol solution was added, mixed and reading was taken at 420 nm, exactly after 1 minute 30 seconds and 3 minutes 30 seconds. The absorbance per two minutes was recorded and the concentration of pyrogallol was adjusted (by diluting the pyrogallol solution) so that the rate of change of absorbance per minute was approximately 0.020 – 0.023 nm.

**For Sample:** To 2.8 ml of Tris buffer, 0.1 ml of Salivary sample was added, mixed and started the reaction by adding 0.1 ml of adjusted pyrogallol solution (as per control). It was read at 420 nm exactly after 1 minute 30 seconds and 3 minutes 30 seconds and absorbance per 2 minutes was recorded. The absorbance of each sample was measured with a spectrophotometer (Spectrophotometer -106) at 420 nm wavelength as shown in figure 2.



**Figure 2. Spectrophotometer -106**

**Calculations**

Absorbance reading of control - A  
 Absorbance reading of sample - B  
 Units of SOD/3 ml of assay mixture = [(A-B)/(A×50)] ×100  
 Unit×10 = Units/ml of sample solution.

**Definition of Unit:** One unit of superoxide dismutase is described as the amount of enzyme required to cause 50% inhibition of pyrogallol auto oxidation per 3 ml assay mixture

**Statistical analysis:** The data obtained from tobacco consumer and non-consumer groups were analyzed by One Way ANOVA Power Analysis.

**Results**

Out of 50 cases and 50 controls, 61 were males and 39 were females.

**Bar diagram 1-** Showing mean SOD levels varying with different age groups

**Inference:** Correlating the mean SOD levels with the age group, it is noted that the mean SOD levels are increasing from <20 years of age group to 31-40 years of age group and its decreasing in the age group 41-50 years.

**Bar diagram 2:** Showing mean SOD levels in males and females.

**Inference:** Correlating the mean SOD levels with gender, it is noted that the mean SOD levels are higher in females when compared to males.

**Bar diagram 3:** Mean SOD levels with increasing frequency of pan chewing

**Inference:** Correlating the mean SOD levels with increasing frequency of pan chewing, it is noted that the mean SOD levels are low in patients with no history of pan chewing and there is increase in the mean SOD levels in patients who are chewing 1-5 pans per day. There is a decrease mean SOD levels in patients who are chewing 5-10 pans per day.

**Bar diagram 4:** Mean SOD levels with increasing frequency of smoking

**Inference:** Correlating the mean SOD levels with increasing frequency of smoking, it is noted that the mean SOD levels are low in patients with no history of smoking and there is decrease in the mean SOD levels in patients who are smoking 1-5 cigarettes per day. There is an increase in mean SOD levels in patients who are smoking 5-10 cigarettes per day.

**Bar diagram 5:** Mean SOD levels with increasing frequency of guthka chewing

**Inference:** Correlating the mean SOD levels with increasing frequency of guthka chewing, it was noted that the mean SOD levels are high in patients with no history of guthka chewing and there is decrease in the mean SOD levels in patients who are chewing 1-5 guthkas per day.

**Bar diagram 6:** Mean SOD levels in a decreasing order seen in patients with no habits, patients having both smoking and tobacco chewing habit, patients with tobacco chewing habit and patients with smoking habit



**Inference:** The mean SOD levels in decreasing order were seen in individuals with no habit history, individuals having mixed habit history followed by individuals chewing pan or gutkha and least seen in smokers

## Discussion

Smoking and chewing of tobacco is a vice that has been practiced by millions of people all over the world. It is estimated that among 400 million individuals aged 15 years and above in India of the 250 million kilograms of tobacco used for domestic consumption in India, 86% is used for smoking and 14% is used in the smokeless form.<sup>16</sup>

The heat (generated during smoking) as well as pH (change during chewing) of body fluids due to tobacco consumption affects the formation and stabilization of free radicals. The alkaline conditions observed in betel nut chewing are reported to favor the formation of free radicals.<sup>17</sup>

Reactive oxygen metabolites (ROMs) such as superoxide anion ( $O_2^\bullet$ ), hydrogen peroxide ( $H_2O_2$ ) and hydroxyl radical ( $OH^\bullet$ ), malondialdehyde (MDA) and nitric oxide (NO) are directly involved in multi stage process of carcinogenesis by bringing out a continuous endogenous damage to cellular DNA.<sup>18</sup>

Inactivation and removal of these reactive oxygen species depend on reactions involving the antioxidative defense system. Antioxidants have a shielding role by scavenging the free radicals.

The free radicals released by tobacco are known to bring about alterations in antioxidant levels in humans, and these free radical-associated damages are reflected through antioxidant enzyme activities in blood. Thus, it would be fundamentally important to study the biological parameters like antioxidant enzyme system, in evaluating the role of tobacco on antioxidant status in tobacco users. The salivary antioxidant system has been drawing increased attention in recent years.<sup>19</sup>

Rupali Agnihotri et.al (2009)<sup>20</sup> showed a decrease in mean SOD levels with increase in frequency of smoking. The present study showed that the mean SOD levels were seen to be reduced in patients who smoke 1-5 cigarettes per day as compared to patients who have no habit history and there is an increase in mean SOD levels in patients who smoke 5-10 cigarettes per

day. This reduction in the levels of SOD may be related to an increased concentration of cadmium in cigarette smoke. Cadmium replaces the bivalent metals in SOD, such as zinc, copper, and manganese, resulting in its inactivation. An increased accumulation of cadmium in blood and a decrease in the levels of SOD enhance the destructive process, which was reported earlier.<sup>21</sup>

The Biochemical hypothesis on this states that as the frequency of smoking increases there is an increased accumulation of undetoxified  $H_2O_2$ , which belongs to the Reactive Oxygen Species and it acts as a constant source of oxidative stress and further decreases the level of SOD.<sup>22</sup>

Chundru Venkata Naga Sirisha et.al (2013)<sup>23</sup> showed mean SOD levels were seen to be decreasing with increase in frequency of gutkha chewing which was similar to the findings of our study which showed that the mean SOD levels were decreasing with increase in frequency of gutkha chewing.

Leila Farhadmollashahi et.al (2014)<sup>24</sup> showed that the mean SOD levels were seen to be increasing with increase in frequency of pan chewing. The study stressed on the point that there is an increase of this enzyme, as a component of the antioxidant defense system in saliva, is to reduce the damaging effects of free radicals produced by the consumption of pan. The present study showed a contrary report as it showed that the mean SOD levels appeared to decrease in patients who chew 1-5 pan per day as compared to patients who have no habit history and there was a further decrease in mean SOD levels in patients who chew 5-10 pan per day.

Leila Farhadmollashahi et.al (2014)<sup>24</sup> showed no significant difference in mean SOD levels with respect to gender and age. The present study showed that the mean SOD levels are increased in case of females although no significant difference was noticed with respect to age. Studies have reported that ROS production was higher in the vascular cells from males than in the cells from females<sup>25</sup>. In addition, clinical and experimental data suggested a greater antioxidant potential in females over males<sup>26</sup>. These studies indicate that there is an apparent association between gender and oxidative stress, where women seem to be less susceptible to oxidative stress.

## Conclusion

The present study gave us an insight about the relationship between antioxidant enzyme activity &

tobacco in the form of both smoked & smokeless. This study was an attempt to establish a relationship among oxidative stress and habit among our subjects. The role of oxidative stress in the pathogenesis of Potentially Malignant Disorders (PMD) is well established and this study emphasized that the imbalance of oxidant/antioxidant system as a risk factor in the development of oral malignancies. It is important to have a regular assessment of salivary antioxidant system in patients with a positive habit history of tobacco consumption so as to promote early management of these damaging effects in oral cavity. Detecting changes in the levels of SOD can help in earlier prediction of PMD which may be used to halt further progression of the disease or follow up of its treatment and thus favoring a better prognosis and management of such conditions.

**Ethical Clearance:** Taken from the institutional ethics committee, Manipal College of Dental Sciences, Mangalore.

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**Conflicts of Interest:** Nil

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# A Study of Young Adults' Intention towards Genetically Modified Foods: Mediating Effect of Health Belief

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## Abstract

The study is an attempt to gauge intentions of Indian young adults towards purchase of GM food in three states of north India with 528 respondents as sample. The study employed questionnaire method of data collection using Likert scale. Structural Equation Modeling through AMOS is used for data analysis. Results reveal that information about GM foods, their effects, safety issues and health beliefs of young adults are significant determinants of GM food purchase intention. There is an insignificant relationship between emotional involvement and purchase intentions. Health belief mediates between the variables. Results can augment the current understanding of governments, organizations and other bodies towards the behavior of young adults towards GM foods.

**Keywords:** Adoption, Consumers, Emotional-Involvement, Health Belief, Intention.

## Introduction

After the expansion of knowledge and diffusion of information, we can view every individual in the society as a potential consumer. It is crucial to obtain insights and improve awareness towards consumers' buying behavior<sup>[1,2]</sup>. Study of user behavior requires learning specific attributes of consumers while buying known as consumption styles. Every origination has a substantial risk attached to it, and takes a significant amount of brainstorming from experts to decide about products' safety and security after considering their pros and cons<sup>[3]</sup>. These concerns are fruitful, as regulations by governments on production and sale of genetically modified (GM) foods has improved public sentience about their content, usage and benefits. However, there is an extensive research highlighting the benefits of GM foods<sup>[4,5,6]</sup> which has led to worldwide acceptance of

these modified form of food. Previous findings suggest that GM Foods shall fulfill the expectations of fulfilling the food shortage and crisis prevailing in some countries<sup>[7]</sup>. Apart from having a positive image and a hope to increase the food production capacity, there are scholarly studies that debate harmful impacts of GM foods.

Apparently, advances in Genetically Modified Foods (GMF) and technologies across the planet stirred a controversial debate on fitness of these crops for human consumption. Being on the receiving end of the cycle there is need to study the intention of users toward GM food. The present study selected young adults as respondents representing a cohort of consumers accounting for nearly half of the Indian working population. This group possesses substantial spending power and carry the potential for consumption of products and services<sup>[8]</sup>. Owing to indirect involvement of consumers in the decision-making process, the study attempts to measure intention of young adults towards Genetically Modified Foods which is amongst the world's most controversial products category.

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**Attitude towards GM Foods: A literature Review:** Researchers have shown great interest in studying consumers' attitudes towards GM Foods across different cultures and regions<sup>[9,10]</sup>. Comparative studies have indicated both positive and negative

attitudes<sup>[11,12,13]</sup>. Researchers highlighted four aspects of consumer attitudes towards GM Foods in the current study. Based on the literature and association of attitude with the aspects of adoption, the study has hypothesized:

**H1:** There is a positive relationship between Young adults’ attitude towards GM foods and their intention to use.

**Information:** There is a common notion in people’s mind that GM crops can resist pest infestations, common crop diseases and poor weather common in developing nations. We can state that GM foods can prove helpful in reducing the demand and supply gap of food in developing world. Having proper information about product under investigation proves to be a significant determinant of purchase intention. The study proposes the following:

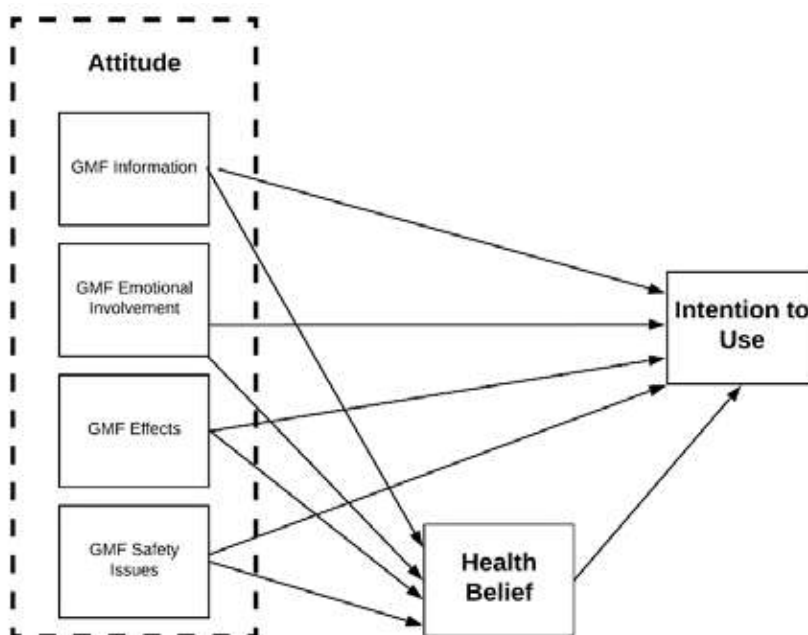
**H1a:** Information about GM foods has a significant relationship with young adults’ intention to use.

**Emotional Involvement:** Alteration in genetic composition adds new desirable traits to the plants that

help them resist from common plant problems. This association with the product gives rise to emotional attachment. Emotional involvement designates the involvement of the individual behavior with their interest in some action<sup>[14]</sup>. In case of food studies, emotional involvement is designated as a significant factor for consumers having intentions to purchase biotech products<sup>[17,18,19]</sup>. The study proposes the following assumption:

**H1b:** Emotional Involvement of young adults is positively related to their intention to use GM foods.

**Perceived Effects:** GM foods are known for their detrimental effects on human body. Some researches indicate that consumption of genetically modified foods leads to development of incurable diseases. Being new, these foods are not recognized for their long-lasting effects on human beings. It has been reported in the previous studies that consumers consider GM foods as unsafe to health and assess the effects on their health<sup>[20]</sup>. The study therefore assumes the following:



**Figure 1: Conceptual Framework**

**H1c:** Perceived effects of GM foods positively influences young adults’ intention to use.

**Perceived Safety:** Food-borne disorders have increased over the years and negatively affected the

health and economic well-being of many developing nations<sup>[19]</sup>. Many forums advocate that there is no evidence for labeling a crop as unsafe to eat just because it is genetically modified<sup>[20]</sup>. Previous studies have confirmed the role of safety issues in purchase

of GM foods suggesting consumers who perceive GM foods as safe for consumption will purchase them and *vice versa*<sup>[5,18]</sup>. Based on above discussion, the study therefore proposes the following:

**H1d:** Perceived safety issues has positive relationship with young adults’ intention to use GM foods.

**Mediating role of Health Beliefs:** Health belief remains a vital facet of an individual’s health considerations. Evidently, health belief of an individual will influence his/her health behavior<sup>[21]</sup>. The health belief model (HBM) posits that a person’s decision to engage or not to take a health-related action depends on his/her discernment about the perceived threat of avoiding the action and the benefits of taking the action. The study proposes the mediating role of health belief between attitude constructs and intention to use GM Foods. The mediating role of health beliefs can be hypothesized as:

**H5:** Young adult’s attitude and their usage intention towards GM safety issues is mediated by health belief.

**H2:** Young adult’s attitude towards GM Food Information on their usage intention is mediated by health belief

**H3:** Young adult’s attitude towards Emotional Involvement towards GM Foods and intention to use is mediated by health belief.

**H4:** Young adult’s attitude towards GM effects on their usage intention is mediated by health belief among young adults.

**Methodology**

The research was set up in Punjab (a leading GM crop producer state) and its two border states *viz.* Delhi

and Haryana. These states were singled out because of high density of young adults and presence of potential GM foods users. The data was gathered using the survey method. Investigators addressed potential respondents at various venues *viz.* Supermarkets, Retail Stores, and shopping malls located in cities of Delhi, Chandigarh, Ludhiana, Jalandhar and Panipat. Respondents were requested to give approval for cooperation in the survey. To qualify for the study, the probable respondents were asked whether they are aware about GM foods? Those who fit into this criterion were further asked whether they have purchased GM foods recently or not? All affirmative respondents were asked to fill a validated and self-administered questionnaire. In total 622 respondents were approached out of which, 528 respondents from three states Punjab, n= 198 (37.5%), Haryana, n= 172 (32.6%), Delhi, n=158 (29.9%) filled the responses correctly (85% response rate).

**Instrument validation:** To reduce dimensionality of twenty-five items used in the questionnaire factor analysis was conducted. The Kaiser-Meyer-Olkin (KMO) test of sample adequacy and the Bartlett test of sphericity were performed and it was found that the KMO measure was 0.778 and the Bartlett test of sphericity was significant at  $p < .05$ . The analysis gave factors with eigen value greater than one with a cumulative percentage variance of 74.03% satisfying the variance criterion<sup>[22]</sup>.

**Reliability and Validity Measurement:** The perfect level of standardized loadings for reflective indicators is 0.60<sup>[23]</sup>. Further, the calculated AVE was found to be within the accepted range<sup>[24]</sup>. The convergent validity was confirmed as values of Average Variances Extracted (AVEs) above the minimum accepted range and less than the Composite Reliabilities, thus approving CR<sup>[25]</sup>. The discriminant validity in the model is appropriate <sup>[26]</sup>.

**Table 1: Inter-Construct Validity and Discriminant Analysis**

	INF	EI	EF	SI	HB	IN
INF	0.777					
EI	0.145	0.823				
EF	0.063	0.246	0.837			
SI	0.057	0.082	0.294	0.776		
HB	0.045	0.221	0.055	0.318	0.834	
IN	0.172	0.184	0.286	0.264	0.093	0.796

**Measurement and Structural Model:** As per model fit statistics,<sup>[27]</sup>the values ( $\chi^2/df = 1.214$ ; GFI = 0.825; TLI = 0.912; CFI = 0.817; RMSEA = 0.026) were found to be in accordance to the threshold limit. As per suggestions,<sup>[27]</sup> the significance level of the model was

satisfactory. The proposed model showed appropriate acceptance of goodness-of-fit indices, where  $\chi^2/df = 1.532$ ; GFI = 0.988; TLI = 0.849; CFI = 0.89; RMSEA = 0.051. The analysis show that model is fit for analysis in SEM.

**Table 2: Hypotheses (Direct effects) testing results**

Hyp	Path	Estimate	S.E	t-value	Result
H1a	GMF Information→ Intention	.247	.044	3.163***	Supported
H1b	GMF Effects→ Intention	-.074	.215	-.513	Not Supported
H1c	GMF Emotional Involvement→ Intention	.253	.036	3.524**	Supported
H1d	GMFsafety issues→ Intention	.136	.019	3.120***	Supported

The hypotheses shown (Table 2) are concerned with the direct effects of young adults’ attitude and intention to use GM foods. The variables, Information about GM Foods ( $\beta = .247, t = 3.163$ ), emotional involvement ( $\beta = 0.253, t = 3.524$ ) and safety issues ( $\beta = .136, t = 3.120$ ), were significantly related to the intention and supported the hypothesis H1a, H1c and H1d . Whereas, GMG effects ( $\beta = -.074, t = -.513$ ) is found insignificant (H1b). Therefore, based on hypothesis testing result three sub-hypotheses are supported with indicates that the primary hypothesis (H1) is accepted.

individual can influence intention to adopt GM foods. Various studies related to intention of health-related products and services have pointed out the indirect effect of health belief on adoption intentions. Mediation effects were tested as suggested by previous works<sup>[28]</sup>. As a precondition to mediation analysis the independent variables should have significant effect on dependent variables. As per the direct effect analysis (Table 3) all independent variables except emotional involvement could be subjected to mediation analysis. Table 3 gives the test results and explains the type of mediation observed:

**Testing of mediation effects:** Health belief of an

**Table 3: Mediation result and hypotheses test results**

Hyp	Path Description	Direct effects	Direct effects with mediator	Indirect effects	Result
H2	GMF Information---> Health belief---> Intention	.156***(.063)	.247*** (.044)	.0171***	Partial mediation (Supported)
H4	GMF Emotional Involvement---> Health belief---> Intention	.274*** (.047)	.253***(.036)	.0457**	Partial mediation (Supported)
H5	GMF Safety issues--->Health Belief---> Intention	.594*** (.13)	.136**(.019)	0.188***	Partial mediation (Supported)

\*\* indicate Level of significance (P Value less than 0.01), \*\*\* indicate Level of significance (P Value less than 0.001)

**Note:** Bootstrapping of 5000 samples at 95% C.I.

Entries are standardized estimates (standard errors). \*\*\*= p<.001.

The results of mediation indicate three cases where partial mediation caused by health belief of young adults. The effect of Information about GM Foods, emotional involvement and safety issues related to GM foods on intention of use GF foods are mediated through health belief. The presence of health belief did not inhibit

the direct relationship between predictor variables and usage intention.

**Discussion**

Previous empirical research recommend a broader and contextual approach to substantiate the factors

affecting usage intention towards GM foods. The study aims at bridging conceptual gaps in existing models. This study obtained a measure of the intention to use GM food as measured by different researchers in varied contexts including adoption intentions<sup>[29]</sup>.

The study result extends the findings in context of young adults. With an explosion of information and availability of various mediums, young individuals seek, keep and recall necessary information about their surroundings. The agencies involved in research, production and marketing should spread useful, valuable and relevant information to intended audience. Results reveal insignificance of emotional involvement in purchase. The study is an exception to the results of the previous study<sup>[17]</sup>. The psychological association formed by young adults such as empathy, affection and fascination is likely to contribute to their usage intentions, but current study found no significant impact of emotions on purchase intentions. On one hand, young adults perceived biological and environmental effects associated with GM foods, interestingly these effects do not directly influence their intentions. This could be because young adults may have a higher regard for benefits of GM foods than harmful effects. The results suggest safety issues concerned with GM foods are important determinants of usage intention. This is in line with previous empirical investigations<sup>[5,18]</sup>. The effects associated with GM food conveyed by product manufacturers and research agencies are likely to affect the usage intentions of young adults. Notably, younger adults are better equipped to process and interpret information related to effects of GM foods at individual, societal and environmental levels.

While analyzing the mediation effect of health belief between attitude and intention, the study found that information, emotional involvement and safety issues are partially mediated by health belief. This indicates that health belief of young adults play an important role in forming GM foods usage intentions. In support of previous research<sup>[5,10]</sup> the study suggests that individuals who consider GM foods as healthier show willingness to take healthy actions shaping positive attitude.

### Conclusion

The organizations producing or are planning to produce, and market GM foods should parse uniform and quality information to intended markets. Also, governments should focus on strengthening the beliefs

of individuals by explaining the benefits and various issues associated with GM Foods. Clearly, young adults consider safety as their prime concern, and therefore authorities should focus on reprisal of safety issues of the consumers label GM foods as safe for consumption. Further, health belief of individuals is a determinant of GM food adoption is an important aspect in GM food adoption. As it is evident that younger adults hold a major potential to use and buy products, the agencies should integrate information highlighting the health-related information. Similarly, as younger adults give importance to safety issues concerned with GM food, the agencies should convey the users about mitigating efforts being undertaken by them coupled with precautionary steps to be taken while using or consuming GM foods.

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**Ethical Clearance:** Not Required

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# Assessment Of Stress Among Who Take Care Of Elderly Individuals At Home In Selected Rural Community At Kanchipuram Distrect, Tamil Nadu, India.

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## Abstract

“Care givers is any one who provides any type of physical and/or emotional care for an ill or disabled loved one at home. Stress is your body’s way of responding to any kind of demand” study topic was Assessment of stress among who take care of elderly in a selected rural community at Kanchipuram district, tamilnadu, India. the study objectives are to assess the stress level of family care givers and to associate the level of stress among caregiver with selected demographic Variables such as age, sex, education, work, reliever for care giver, presence of chronic illness. the research approach used was quantitative-research approach. the research design used was descriptive research design. The research setting was Vadakadambadi. The total sample was 90 old age care givers at home. the sampling technique was non probability purposive sampling technique. a self administered questionnaire was used for data collection. The result shows was mild stress 82 (91%), moderate stress 07 (7.77), severe stress 0 (0%). the study reveals that there is no significant association between stress of family care givers with age, sex, educational status, working status, reliever of old age care givers.

**Keywords:** *Stress, old aged people, family care givers, rural area.*

## Introduction

**Kalyani K, Mehta (2014)** In our India, there is a lack of formal long-term care facilities, responsibility of taking care of old aged in family (cultural norms). stress process modal, assessed the care givers burden among impairments of old aged .family is main source of older parents caring and also central place to security, safe area for old aged in India .family care givers are important role care chronically elderly patient in hospital also neighbours and friends help in 80%in home, when older adults are impaired with mildly or moderately means spouse or children are providing care<sup>1</sup>

**Anne Branscum (2016)** (UNFPA) united nations population fund declared that say population growth of old aged of 60 above increase from (8% to 19%)in 2015. In India expecting to growth population 56% in 60 plus age group, while the 60plus, increase in 32% and 70% in 80 plus age group<sup>7</sup>.

## Need for the Study:

**Lawton, M., Rajagopal, D., Brody, E. & Kleban, M. (2015).** In 2011 National Study on Care giving offer a window into how caregivers experience their roles some times caregivers are risk for debilitating the stress. 2011, (NHATS) National Health and Aging Trends Study), says that the entire network of care givers are taking care of older adults between 65-85 making it comprehensive than previous large studies. The studies says that 9 out of 10 informal caregivers are family members, mainly spouses or adult children. <sup>4</sup>

**Sayoko Uemura<sup>1</sup>, Keiko Sekido (2014)** care provided by family members depend on economic resources, family structure, quality of relationships, and other demands in the family members’ . Family care giving ranges from minimal assistance to elaborate full-time care. family care giving takes about 24 hours per week, 20% of the time more than 40 hours per week.

Caregivers of the elderly said that 63% of their care recipients have long-term physical conditions and 29% have cognitive impairment.<sup>5</sup>

**Background of the Study:**

**Freedman VA, (2014)** Caregivers who take care of older adults in world, care is delivered including interacting with numerous providers, back- and-forth transitions from hospital to home or rehabilitation facility, going to a senior homes,visiting their living homes, caring nursing home, end-of-life care. There is role changes in health and functional status of old people, it affect the social, physical, and emotional health of the caregivers<sup>(20)</sup>The caregivers, individual experiences the effects ranging from wide and highly, also risk for side effects on their well-being.<sup>10</sup>

**Schulz and Tompkins (2010)** caregivers have to remember about taking of elderly people. when providing in-home elderly care for long-term care facility be honest,quite straight forward,obvious health care and personal care, they are the simple things we neglect on a daily basis. They are every human’s basic inner needs; they are just needed more by older peopleElderly people can easily lose trust in a caregiver if they arrive late do not anger, many older people do not have the patience to keep trusting other promise .Most of the elderly people have lived independent lives for years. There are cases where an older person would take the chance to care for herself when the caregiver doesn’t arrive on time.<sup>11</sup>

**Statement of the Problem:** Assessment of stress among family members who take care of elderly individuals at home in selected rural community at kanchipuram district, Tamilnadu.

**Study Objectives:**

- To assess the stress level of family care givers

- To associate the level of stress among caregiver with selected demographic Variables such as age, sex, education, reliever for care giver, presence of chronic illness for old age.

**Research Methodology:**

- Research approach: Quantitative-Qualitative approach
- Research Design: Non-Experimental- Descriptive research design
- Population: The Accessible Population of the present study is who take care elderly individuals at home in a selected rural community at Kanchipuram District.
- The Sample size of 90 family care givers will be selected
- Research setting: The study will be collected in the Selected rural community at Kanchipuram District, Tamilnadu.
- Sampling Technique: Non Probability - Purposive random sampling

**Results**

**Section A:** Frequency and percentage of stress among family care givers of old aged.

**Table: 1**

Grade	Stress Level	Percentage
Mild Stress	82	91%
Moderate Stress	08	8.88%
Severe Stress	00	0%

**Section B:** Frequency and percentage of distribution of association of stress with demographic variables.

**Table: 2**

S. No.	Characteristics	Category	No.of Sample	Knowledge			X <sup>2</sup> (pvalue) <0.05
	Old Aged Profile			Mild	Moderate	Severe	
1	Age	60-70yrs	52	46	6	0	Df=1 0.8824 NS
		71-80yrs	38	39	4	0	
2	Gender	Male	34	29	5	0	Df=1.34 0.2462 NS
		Female	56	52	4	0	

S. No.	Characteristics		No. of Sample	Knowledge			X <sup>2</sup> (pvalue) <0.05
	Old Aged Profile	Category		Mild	Moderate	Severe	
3	Relation with care giver	Daughter in law	32	17	15	0	Df=0.95 0.4143 NS
		Daughter	45	30	15	0	
		Son	10	08	02	0	
		Son in law	03	02	01	0	
4	Illness	Communicable disease	05	03	02	0	Df=0.47 0.6273 NS
		Noncommunicable disease	19	15	04	0	
		Others	66	46	20	0	
<b>Care Giver Profile</b>							
5	Age	20-29yrs	26	14	12	0	Df=2 0.0407 NS
		30-39yrs	32	22	10	0	
		40-49yrs	32	27	05	0	
6	Gender	Male	12	10	02	0	Df=0.454 0.5007 NS
		Female	78	58	20	0	
7	Educational status	10 <sup>th</sup> std	46	40	06	0	Df=1.87 0.1548 NS
		Below 5 <sup>th</sup>	04	03	01	0	
		12 <sup>th</sup> std	40	28	12	0	
8	Working status	Working	41	31	10	0	Df=0.49 0.4856 NS
		Homemaker	49	40	09	0	
9	Reliever of care giver	Yes	68	68	10	0	Df=0.45 0.5007 NS
		No	22	22	02	0	

**Summary:** The primary aim of the study is to assess the stress among family members who take care of elderly individuals at home in selected rural community a selected village at Kanchipuram District TamilNadu.

Mean =13.5

Median =19

Standard deviation=2.4

A similar study can be conducted on Relaxation technique was given to reduce the stress forfamily care giver

**Conclusion**

To reduce and relieve stress among family caregivers

**Source of Funding:** Self

**Ethical Consideration:** Chettinad Academy of Research & Education- Institution Human Ethics Committee

**Conflict of Interest:** Nil

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# Life beyond the Diagnosis of Breast Cancer: A Qualitative Study on the Lived Experiences of Breast Cancer Survivors

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## Abstract

**Background:** The advances in biomedical technology that lead to an increase in early diagnosis and treatment have helped to increase the number of health breast cancer survivors in Indian as well as worldwide. Researches carried out on survivorship have focused mainly on the psychological impact and health outcome of the disease. The goal of this study was to focus on exploring the lived experiences of breast cancer survivors from diagnosis of the disease till the survivor life.

**Objective:** To explore the lived experiences of women who are breast cancer survivors.

**Design, Setting and Participants:** A purposive sampling strategy was used to recruit participants from a medical college hospital. A total of 18 women breast cancer survivors were interviewed.

**Findings:** The study concluded with four major themes that described lived experiences of women. These were factors from the diagnosis and treatment of breast cancer impacting survivorship, support system and relationships, and issues in survivor life. All the participants noted that it was so stressful journey that they went through after diagnosis till the completion of various treatment modalities. Each one found their own way to cope with the stress. Support from family was shared as the key which gave them strength and courage through the different stages of treatment. However, they found it difficult to explain what survivorship meant.

**Conclusion:** This study using in-depth interview techniques, shed light on the lived experiences of breast cancer survivors who have completed the treatment. All of them had fear and frustration during their diagnosis and treatment. They felt depressed due to body changes still the support they received from their partners and family helped them to come out of that feelings. However, they noted that they still live with the fear of recurrence of cancer.

**Keywords:** *Lived experiences, breast cancer, survivor, qualitative.*

## Introduction

Breast cancer is now the most common cancer in most cities in India, and 2nd most common in the rural areas.

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In India, we are witnessing more and more numbers of patients being diagnosed with breast cancer to be in the younger age groups<sup>1</sup>. Breast cancer has ranked number one cancer among Indian females with age adjusted rate as high as 25.8 per 100,000 women and mortality 12.7 per 100,000 women. The age adjusted incidence rate of carcinoma of the breast was found as high as 41 per 100,000 women for Delhi, followed by Chennai (37.9), Bangalore (34.4) and Thiruvananthapuram District (33.7).<sup>2</sup>

At the same time, the number of breast cancer

survivors is increasing due primarily to advances in biomedical technology leading to an increase in early diagnosis and treatment. Mortality rates also have been decreasing since 1990, and there are over 2.9 million women in the United States who have survived breast cancer.<sup>3</sup> The cancer registry data at the urban city level show that India will face a rapidly increasing number of breast cancer survivors in future. However, this survivor population has until now received very little attention.<sup>4</sup> Health professionals have low awareness of recognizing the long-term and late effects of cancer and its treatment and supportive care services specifically for cancer survivors are lacking in the country.<sup>5</sup> Under such circumstances, breast cancer survivors are often marginalized in the health-care system and have many unmet medical and psychosocial needs, requiring special attention.

There is not much research done on the various experiences Indian women are undergoing after the diagnosis and treatment of Breast Cancer. The term survivor is defined as life without cancer after treatment.<sup>6</sup> Thus, the purpose of this phenomenological study was to understand the lived experiences of breast cancer 'survivors'. The central research question was 'What is the experience to be a breast cancer survivor?'

#### **Sub questions were as follows:**

1. How did they cope with the diagnosis of cancer?
2. How did the cancer diagnosis affected their personal life?
3. How do breast cancer survivors perceive life after diagnosis and treatment?

### **Method**

**Ethics Approval:** The central ethics committee of KSHEMA has approved the study. Each participant was informed about rights to withdraw from the study anytime they want and principles of protection of human subjects, and each approved their participation with a written informed consent.

**Selection and recruitment of participants:** All the women were recruited from K.S. Hegde Medical Academy. Women those who have come for follow up after two year were considered for sampling. A purposive sampling strategy was used by researcher to recruit the participants (N = 18). The desire was to have a sample that represented a variety of perspectives but shared some common experiences. The aim of the purposive

strategy was to recruit participants that represented a range of perspectives within the follow up cases.

A diversity of experiences was based on age at diagnosis, stage at diagnosis and financial background. The goal was to get a broad cross section of perspectives within this framework. At eighteen participants, we had reached a level of saturation with the population of breast cancer survivors from our potential sample frame. There was no further new information that contributed to our analysis of the breast cancer survivor experience. The inclusion criteria were women: (i) 18-70 years of age (ii) English-speaking; (iii) a diagnosis of breast cancer; and (iv) completion of treatment, surgery, chemotherapy and/or radiation.

**Data Collection:** The data collection method was by a one-to-one semi-structured, in-depth interview with all participants in the counseling room of the Oncology OPD. Topic guides were developed based on the cancer literature and the researchers' experiences working with cancer patients. During the interview the participant's statements provoked further questions and clarifications.

**Analysis:** The research was focused to develop a set of logical and consistent understandings based on the perspectives of women with breast cancer. Data were analyzed following phenomenological coding guidelines. Analysis of data began after all tapes were reviewed by the researchers several times to get familiar with data and expressions of participants in regard to their breast cancer experience. Initially a line-by-line analysis of the data was conducted and the identified statements were highlighted. Next the overlapping statements were eliminated. From the final list of statements, the researchers created meanings without disrupting the original meaning of the participants. Codes were assigned to all meaningful units, which were then organized into categories of similar codes. Finally the themes were developed by considering all categories of codes to include the commonalities that cover several categories which gave a clear understanding of the experiences of breast cancer survivors.

**Reliability and validity of the study:** The following measures were taken by the researchers to ensure the reliability and validity of the instrument and study: (i) the first author who interviewed all participants transcribed tapes verbatim and completed the first phase of analysis (ii) the second and third authors reviewed the codes and themes to ensure the validity of the themes

and subthemes with the reality (iii) finally all the authors met to explore differences and final refinement of codes.

**Rigor:** To ensure rigor we initially established methodological coherence by ensuring the validity across the study that each part matches the research objective and also is consistent with its methodological assumptions. Secondly, we adopted the rule of purposive sampling by ensuring that 18 participants selected were able to provide a rich and in-depth understanding of survivorship experience. To enhance the reliability of the study, we used a single researcher and the same interview schedule to increase the consistency of data collection.

**Findings:** Eighteen breast cancer survivors participated in interviews that lasted from 60 to 90 min. The age of participants ranged from 32 to 69 years. Of the eighteen women, five were diagnosed at stage I, eight at stage II and five women had stage III cancer. Nine women had been cancer free between 6 and 12 months, while eight reported between 1 and 2 years cancer free. Analysis of the interviews identified three major themes that were important to the lived experiences of the women. These were (i) diagnosis and treatment of breast cancer impact on survivorship (ii) support system impact on survivorship (iii) and issues in survivor life.

**Factors from the diagnosis and treatment management impacting survivorship:** According to some of them though very little, the awareness they had about breast cancer helped them to identify early and they feel happy about it. However most of them agreed that they didn't have much knowledge about breast cancer and hence they ignored the appearance of lump as a common symptom of any infection and expected to disappear in due course. Only when it grown to severe extend where it was very much palpable they seek for medical checkup, by then it crossed first stage.

Survivor 3 explained that one day accidentally she felt 'a small lump on the left lateral side of her breast, which was of the size of a small peanut' and she could sense the danger that something is wrong with her breast. She was happy that she had enough awareness about breast cancer from the media and society and she rushed for the treatment. Although she was happy that she could diagnose her cancer in the initial stage she worries about the larger portion of society who is ignorant about the same and landing up in the late stages for the diagnosis and treatment.

Stage at diagnosis was another factor that impacted the survivorship. Survivors explained about the reaction at the point of diagnosis as 'shocked' or as 'end of life' feeling. Survivor 2 who was diagnosed stage 2 expressed as 'I thought it is going to be end of my life as the recurrence may be at any time and any form'. Though she was a health worker, she ignored the initial symptoms and postponed her screening test at the earlier stage which she is regretting very badly. Those survivors who had an early stage diagnosis were happy that their recurrence chances are less. Whereas those who had late diagnosis were more upset and fearful as they were having a fast recurrence.

The changes in their physical appearances were the major problem they had faced. None of them seemed to be bothered about the disfigurement by mastectomy; however all of them had a difficult time to cope with their emaciated body and the evident hair loss during chemotherapy. The financial burden was expressed by two of them who didn't have any insurance coverage. During treatment they had to literally sell of many things to fetch money for the treatment. Who had health insurance were thankful for that so that they could maintain a good quality of life during treatment which was difficult if they didn't have an insurance coverage.

According to them the journey after cancer diagnosis and treatment was a 'terrific one with full of anxieties and uncertainties' which was even complicated by other associated problems of family, work and financial issues.

**Support system impact on survivorship:** All of them had expressed that the support they had received during and after the treatment of cancer was the key factor for their successful completion of cancer journey. Survivor 12 said 'I was so surprised to see the overwhelming care and concern that was showered up on me by my relatives and was feeling so blessed to know my importance for all of them'.

Participants also expressed that even the friends and colleagues have turned up to be so caring and protecting in all the phases of the treatment. Emotionally, physically and financially all of them had offered themselves to these participants. Survivor 7 expressed her concern for her parents by saying 'I was feeling that I had gone back to my childhood, seeing the way my parents caring for me as if I was in my preschool period, and it was hurting me that instead of caring for them in their retirement life, they had to care for me'. All of them agreed that



the support they had received from their closed ones have gave them strength and motivation to complete the journey successfully.

### 3. Issues in survivorship

Each participant had their own way of explaining their survivor life. They agree that it was a tough journey, though were not sure what lies in future. Most of them still had a fear of recurrence at any time but said that they are ready to face anything that comes in their life. Most of them were happy that they could come back to their normal life.

Survivor 9 said ‘Now I feel I am more confident on myself and I know what I have to do in my future. I have a plan for each day and a list of things to complete before it (cancer) hits me back again..The days in my hand I feel are counted and will be grateful to God for every blessing he showered up on me’

## Discussion

This study envisaged to explore the lived experiences of a cancer survivor and various factors that are affecting the survival life of breast cancer survivors. In the analysis various factors emerged to be having an influence on the survival life and the issues that they experience during their survivorship.

Individuals who had undergone their breast cancer treatment and living a cancer free life are often called as cancer survivors. However most of the survivors are not happy to be called as cancer survivor as it brings all the painful memories to their mind. Some of them expressed that they are still not sure that they are really cancer free. Though the active medical treatment is stopped and they need not go for regular check- ups to hospital, they feel they still have some ailments for which much attention is not given.

Some of them said that the care they were receiving from family and friends have suddenly dropped caring and they found it difficult to adjust as their recovery is not complete. From this study the major problem breast cancer survivors faces is the fear of recurrence. They live their day and night thinking when it will come back. One of them even expressed her wish to surrender to death if recurrence occurs. Along with the fear of recurrence they also had concerns about body disfigurement, resuming their family and work responsibilities, sexual life post mastectomy which was supported by other studies.<sup>7</sup>

Social support was one of the key factors which helped them to cope with the stress effectively.<sup>8</sup> Support from family members, friends and co-workers motivated them and gave them encouragement to fight with cancer. Similar studies also showed the effectiveness of social support in breast cancer women.<sup>4</sup> Most of the participants also had the same experiences. Other important factors which came out in the present study were the influencing factors such as stage at diagnosis, age of women during diagnosis etc which had a greater impact on the survivorship. Young women were more depressed and worried about their future and commitments and those who diagnosed cancer at the later stages were having more fear of recurrence and death. This also was supported by similar studies. Consistent with other study findings the hair loss decreased their self esteem and self confidence to a larger extent<sup>9</sup>; in fact the mastectomy did not affect much. Financial burden came from the treatment cost had affected the quality of life of women who were not insured, however others thankful for the services they had received from the insurance.

## Conclusion

This study tried to shed some light in to the undiscovered experiences of women went through the traumatic life experiences after breast cancer diagnosis and treatment. It also tried to explore the experiences of survivorship and what it actually meant for them to live in a society with all fears of recurrence. These experiences what they have shared should be a guiding light for health care professionals to plan policies and protocols to support women to undergo the journey of breast cancer survivorship effectively. The three areas identified during the in-depth interviews can be explored further by researchers so that those areas can be focused in the management of women with breast cancer.

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**Ethics Approval:** The central ethics committee of KSHEMA has approved the study.

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# A Study of Prevalence of Type 2 Diabetes Mellitus among Adults in an Urban Population of Eluru: POT2DIE Study

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## Abstract

**Background:** Globally as of 2013, an estimated 382 million people or 8.3% of adults, are estimated to have diabetes, out of which about 46% were undiagnosed. The disease affects more than 50 million Indians-7.1% of the nation adults and kills about 1 million Indians a Year. The prevalence in south India has been reported to vary between 0.7% in Pondicherry to 19.5% in Kochi in urban areas.

**Objectives:** 1. To find out the prevalence of type 2 diabetes mellitus among adults in urban population of Eluru. 2. To study the socio-demographic variables in relation to type 2 diabetes mellitus in the study population.

**Methodology:** This was a community based cross sectional study carried out in the urban area of Eluru for a period of one year among 454 adults 30 years and above age group. WHO diagnostic criteria was used. The data was collected using a pretested semi structured questionnaire. All data collected was entered and analysis was done by using the Microsoft Office Excel 2007 and necessary statistical tests like proportions and chi square tests were applied.

**Results:** In the present study 48.9 percent of the study population were males and 51.1 percent were females. The prevalence of the type 2 diabetes mellitus was 21.1 percent in the present study. The present study showed significant association between the educational status and diabetes mellitus ( $p < 0.0001$ ). Statistical significant association ( $p < 0.05$ ) was found between different socio economic class of people and Diabetes mellitus.

**Conclusion:** Prevalence of type 2 diabetes mellitus in the urban population was showing increasing trend. Diabetics and high-risk groups should be included in the health education, IEC activities and counseling programmes.

**Keywords:** Diabetes Mellitus, POT2DIE, Urban, Eluru, Prevalence.

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## Introduction

The prevalence of type 2 diabetes is rapidly rising all over the world. Diabetes is undoubtedly one of the most challenging health problems of the 21st century. Globally as of 2013, an estimated 382 million people or 8.3% of adults, are estimated to have diabetes, out of which about 46% were undiagnosed. About 80% live

in low and middle income countries. This will raise the global burden of diabetes mellitus to above 592 million by 2035. This equates to approximately three new cases every 10 seconds or almost 10 million per year.<sup>1,2</sup>

Diabetes is leading cause of death, disability and economic loss throughout the world and it is predicted to become the seventh leading cause of death in the world by the year 2030. Diabetes and its complications are major causes of early death in most countries. Cardiovascular disease is one of the leading causes of death among people with diabetes. It can account for 50% or more of deaths due to diabetes in some populations. Approximately 5.1 million people aged between 20 and 79 years died from diabetes in 2013, accounting for 8.4% of global all cause mortality among people in this age group. Close to half (48%) of deaths due to diabetes are in people under the age of 60. The highest number of deaths due to diabetes occurred in countries with the largest numbers of people with the disease: China, India, USA, and the Russian Federation.<sup>1,3</sup>

The disease affects more than 50 million Indians-7.1% of the nation adults and kills about 1 million Indians a Year. The International Diabetes Federation (IDF) estimates the total number of people in India with diabetes to be around 65.1 million in 2013, rising to 109 million by 2035. The average age on onset is 42.5 years.<sup>4-6</sup> The high incidence is attributed to a combination of genetic susceptibility plus adoption of a high calorie, low activity lifestyle by India's growing middle class. In many regions, up to 50% of people with diabetes remain undiagnosed. Population survey is the best means to detect large numbers of hitherto undiagnosed diabetes, as well as to create awareness regarding the disease among the masses.<sup>7-8</sup>

The prevalence in south India has been reported to vary between 0.7% in Pondicherry to 19.5% in Kochi in urban areas. It is clear that in the last two decades, there has been a marked increase in the prevalence of diabetes among urban south Indians. The fact that there is a shift in age of onset to younger age groups is alarming as this could have adverse effects on the nation's economy.

### Objectives:

1. To estimate the prevalence of type 2 diabetes mellitus among adults in urban population of Eluru.
2. To study the socio-demographic variables in relation to type 2 diabetes mellitus.

### Materials and Method:

The present study was a community based cross sectional study carried out in the urban health centre area Ashoknagar, Eluru for a period of one year from May 2013 to April 2014 among adults 30 years and above age group. The urban health centre Ashoknagar, functions under Alluri Sitarama Raju Academy of Medical sciences (ASRAM), Eluru. So this field practice area was selected for this study. This urban health centre area has 2487 households with 11,065 population and got divided into 6 areas which are Ashoknagar, Ameenapeta, Yetigattu, Mothevari thota, Harijana peta and Pathebad.

**Sample frame:** There were 4536 individuals 30 years and above age group in the urban health centre area.

**Sample size:** 454 individuals 30 years and above age group in the urban health centre area.

**Sampling method:** Systematic random sampling method was used for the collection of sample in this study. Sampling interval was calculated by dividing the sample frame population with required sample size, so every 10<sup>th</sup> individual was taken in to the study.

The data was collected using a pretested semi structured questionnaire. A pilot study was conducted and tested for appropriateness of study questionnaire and the actual study was started after making necessary corrections and advises in it. Importance of the study was explained and an informed consent was taken from all the study participants before data collection and the study was approved by institutional ethical committee. The data was collected by interview method.

Pregnant women, actually ill subjects and who are not willing to give consent were excluded from the study.

**Calculation of sample size:** considering Amrita Diabetes and Endocrine Population Survey (ADEPS)<sup>9</sup> revealed a prevalence of Diabetes Mellitus as 19.5 per cent. This prevalence is considered to find out the sample size with Allowable error (L) equal to 20%

412 was the sample size estimated using above formula  $N = 4PQ/L^2$  which is added with another 10% sample to make the sample more representative. So the sample size required for the study was found to be 454.

**Study tools:** Questionnaire Proforma, Portable Stadiometer, Portable Weighing machine, Measuring Tape, Glucometer, Blood-Pressure monitor.

**Data and statistical analysis:** All data collected was entered and analysis was done by using the Microsoft Office Excel 2007 and necessary statistical tests like proportions and chi square tests were applied.

**Diagnostic criteria:<sup>10</sup>**

Diabetes diagnosis was based on the World Health Organization (WHO) definition using Fasting blood glucose of 126 mg/dl or more. Impaired fasting glucose (IFG) as a blood sugar of 110 – 125 mg/dl.

**Results**

**Table 1: Prevalence of Type 2 Diabetes Mellitus in the study Population**

Study Population	Number	Percentage
Old diabetics	74	16.3%
Newly detected diabetics	22	4.8%
IFG individuals	65	14.3%
Non diabetics	293	64.6%
Total	454	100%
IFG-Impaired Fasting Glucose		

Table-1 depicts 21.1% is the prevalence of type 2 diabetes mellitus in the study population

**Table 2: Age of the study population in relation to Diabetes Mellitus**

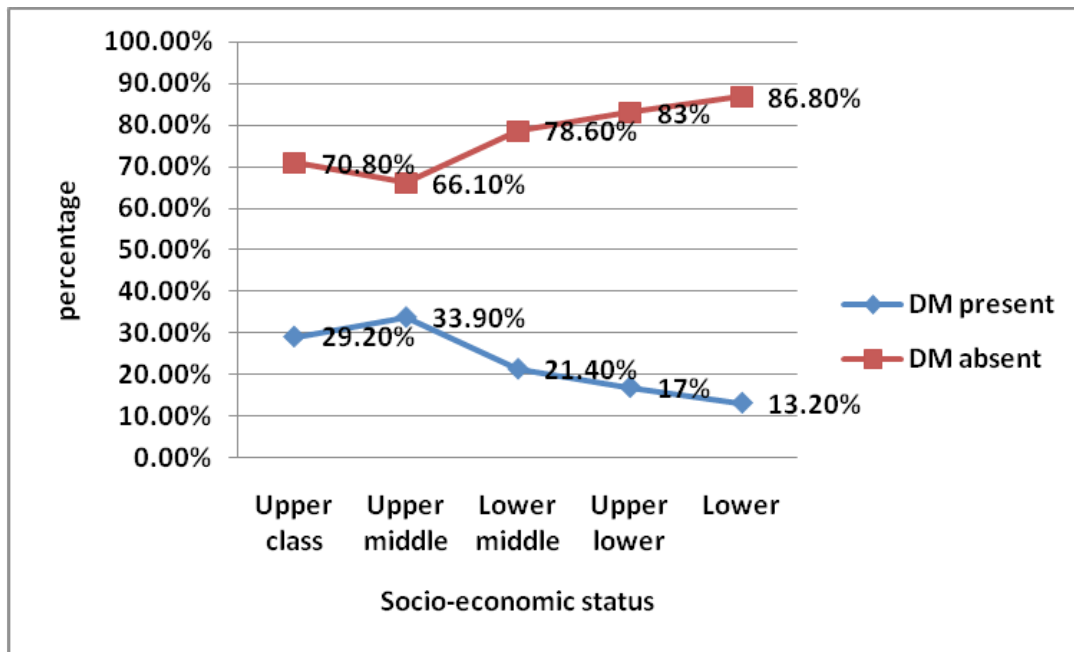
Age (in Years)	DM Present n (%)	DM Absent n (%)	Total N (100%)	p-value
30 to 40	8 (6.1)	123 (93.9)	131	< 0.0001 s
41 to 50	24 (15.7)	128 (84.3)	152	
51 to 60	35 (36.1)	62 (63.9)	97	
> 60	29 (39.1)	45 (60.9)	74	
DM-Diabetes Mellitus, p-probability, n-number, s- significant				

Table 2 shows that Majority of the study subjects belongs to 41 to 50 years age group that is 33.5 percent and there is a high statistically significant association between increasing age of the study population and diabetes mellitus (p<0.0001)

**Table 3: Education level of the study population in relation to Diabetes Mellitus**

Education Level	DM Present n (%)	DM Absent n (%)	Total N (100%)	p-value
Illiterate	23 (22.5)	79 (77.5)	102	0.004 s
Primary school	25 (39.1)	39 (60.9)	64	
Middle school	5 (21.7)	18 (87.3)	23	
High school	12 (13)	80 (87)	92	
Intermediate	11 (18.3)	49 (81.7)	60	
Graduate and above	20 (17.7)	93 (82.3)	113	
DM-Diabetes Mellitus, p-probability, n-number, s- significant				

Table 3 elicits that majority of the study population were of graduation and above and there is an significant association between education level and diabetes mellitus (p<0.05)



**Figure 1: Distribution of study population by Socio-Economic status**

In figure 1, line diagram depicts that prevalence of diabetes mellitus was high among the upper class and upper middle class which were 29.2%, and 33.9% respectively.

**Discussion:**

In the present study 48.9 percent of the study population were males and 51.1 percent were females. Majority that is 33.5 percent of the study subjects belongs to 41 to 50 years age group. The prevalence of the type 2 diabetes mellitus was 21.1 percent in the present study and similar findings were observed in the study done by Menon VU et al<sup>9</sup> who observed the prevalence of 19.5% in urban areas of Ernakulam district in Kerala. A Ramachandran et al<sup>11</sup> (18.6%), Mustafa N, Kushwaha S et al.<sup>12</sup> (18%). Gupta R et al<sup>13</sup> (2007) found the prevalence in their study in Jaipur as 18%. Bai PV et al<sup>14</sup> (17.4%), Kutty VR et al<sup>15</sup> (16.3%). The Eluru survey which was done by Rao PV et al<sup>16</sup> (1989) found the prevalence of diabetes was 1.5%. Prevalence was increased 14 times in the same area in this study after 25 years that is 21.1%. The differences of prevalence observed in the above studies were conducted in different parts of world and considerable variations may be due to socio cultural, ethnic, genetic, life style and environmental changes.

Impaired fasting glucose in the present study was

found to be 14.3% and 4.8% were newly detected diabetic individuals, this was in concordance with the study done by Ramachandran A, Snehalatha C et al<sup>8</sup> (2001) which found the prevalence of IGT as 14%. Similarly Bai PV et al<sup>14</sup> (23.4%). Menon VU et al.<sup>9</sup> (2006) has revealed a prevalence of known and undiagnosed diabetes were 9.0 and 10.5 per cent respectively. The ADEPS done in Kerala showed that 11.2 per cent of the subjects had either IFG or IGT. In the present study prevalence of diabetes mellitus is found to be high was in the age group more than 60 years that is 39.1% and is least in the age group 30 to 40 years that is 6.1%. It is observed that the prevalence of diabetes mellitus increases as the age advances. Similar results were observed in a study done by Vijaykumar G et al<sup>17</sup> (2009) and Rao PV et al.<sup>16</sup> Ramachandran A, Snehalatha C et al<sup>18</sup> (1994) in a study of the elderly population, age > 60 years, highlighted the high prevalence of diabetes and IGT, with increasing age. Prevalence of diabetes in the urban and rural elderly population were 24% and 9.9% respectively.

The prevalence of type 2 diabetes mellitus in this study was higher among females that is 21.5% and in males was 20.8%. However, this difference was not statistically significant (P > 0.05). Ramachandran A, Snehalatha C et al<sup>8</sup> (2001) concluded that prevalence of diabetes mellitus does not have any gender difference. National Urban Diabetes Survey (NUDS)<sup>8</sup> and

Prevalence Of Diabetes in India Study (PODIS) <sup>19</sup> studies reported similar prevalence of diabetes in males and females. The present study showed significant association between the educational status and diabetes mellitus ( $p < 0.0001$ ). Similar results were seen in the study done by Ma S, Cutter J et al.<sup>20</sup> In the present study prevalence of diabetes mellitus was high among the upper class and upper middle class which were 29.2%, and 33.9% respectively. Statistical significant association ( $p < 0.05$ ) was found between different socio economic class of people and Diabetes mellitus. Ramachandran A, Snehalatha C et al <sup>21</sup> (2002) stated that diabetes mellitus is increased among high socio economic group. Mohan V et al.<sup>22</sup> also found a lower prevalence of diabetes in the lower income group compared with middle income group in southern India.

### Conclusion:

In the present study which involved 454 urban population of Eluru who have been studied for one year period showed the prevalence of diabetes as 21.1%, 14.3% were found to be impaired fasting glucose one and 64.6% people were having normal glycaemic status. Based on the study results, prevalence of type 2 diabetes mellitus in the urban population was showing increasing trend and also alarming situation in urban areas. Simple life style modifications like increase in physical activity, decreased fat intake and avoidance of junk foods will reduce or delay the onset of type 2 diabetes mellitus.

Diabetics and high-risk groups should be included in the health education, IEC activities and counseling programmes. This would help in the care of the patient and would also act as primordial prevention for other family members. Large scale implementation of National Diabetes control programme and periodical diabetic screening programme to be implemented to detect the disease at early stage and prevent complications in the adults especially among the individuals of 40 to 60 years and positive family history.

**Ethical Clearance:** taken from Institutional ethical Committee.

**Source of Funding:** None

**Conflicts of Interest:** None

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# A Comparative Study to Assess the Academic Performance and Factors Affecting it among Higher Secondary School Students in Both Rural and Urban Areas of Vadodara

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## Abstract

**Background of the Study:** The student's academic performance is plays a important role in producing the good quantity alumnae who will become manpower and leader of a particular country, and it is consequently responsible for country's economic and social development. Economical, personal, psychological, and environmental factors affect the Student's performance.

**Aims and Objectives:** The aim of the study was to compare the academic performance and factors affecting it among higher secondary school students in both rural and urban areas of Vadodara.

**Material and Method:** Comparative research design, and a non-probability convenience sampling technique was adopted to achieve the goal of the study. The tool consists of two parts. First part consists demographic data of the sample and second part consists of self-modified academic appraisal scale. The sample was 200 students those were taken from selected higher secondary schools of urban and rural areas of Vadodara.

**Results:** The collected data was tabulated and analyzed using comparative and inferential statistics. In urban higher secondary school student's mean percentage was 73.78 and urban student's mean percentage was 66.47, and difference between it was 7.38%.

**Conclusion:** According to the calculation of mean score of academic performance indicates that there was higher academic performance among higher secondary school students of urban area compare with rural area.

**Keywords:** Comparison, Academic performance, Rural and Urban areas, higher secondary school.

## Introduction

Performance or Academic achievement is the degree to which a teacher, student or institution has attained their long or short-term educational goals.<sup>1</sup>

In the current century of globalization, students are the vital element of any nation. The students' performance plays a very important role in the development of quality of Students. This improves the financial growth of a country. Academic achievement is bear in mind as a first step for hiring novel graduates. Therefore, it is connected with students to raise their output and quality of life.<sup>2</sup>

Amounting of academic performance of students is confronting since student performance is result of, psychological, socio-economic and environmental factors. There are two groups of students as generally observed i.e. those who improve and those who don't improve. Education is growing as a gainful industry with prime objective of enlarging profit by delivering high quality education that produces skilled, well-educated, mannered students according to requirements and needs of the lively growing market. So that it is said that possibility of research is always there to find out what are the factors that affect the performance of the students.<sup>3</sup>

## Review of Literature:

**Section A:** Review of literature regarding assessment of academic performance

**Section B:** Review of literature regarding factors affecting academic performance

**Section A:** Review of literature regarding assessment of academic performance

**O. Samdal (2010)** conducted an interventional research study to assess relationship between Student's Perceptions of School Environment, their Satisfaction with School and perceived academic the researcher used 11, 13, and 15 year old students from Finland, Latvia, Norway and Slovakia as a sample. It is based on self-reported data from the "Health Behavior in School-aged Children Survey". The result of the research study suggest that the most valuable psychosocial school setting predictors of students' insight of their academic achievement are that they feel satisfied with school, that they feel the teachers do not expect too much of them, and that they have a good relationship with their fellow students & also entail that interventions which improve the students' satisfaction with school are likely to improve their achievement as well.<sup>4</sup>

**John T. E. Richardson (2008)** carried out a research study to assess the intellectual ability and academic performance of mature students, the research literature based on the academic performance of mature students includes no good evidence that mature students perform any less well than younger students on duration of study in higher education. The result of the study suggest that oldest mature students can obtain good results when assessed by means of both coursework and examinations, normal ageing alters the capacity for learning in higher education is most questionable.<sup>5</sup>

Albert Bandura, et. al (1992) conducted a research study on student's role of self-efficacy beliefs and academic goals in self-motivated academic achievement were studied using path analysis procedures. 56 students were used as a sample. Students' self-efficacy, Parental goal setting and personal goals at the beginning of the semester served as predictors of students' final course grades in social studies. Moreover, their grades in a prior course in social studies were included in the analyses. Student's prior grades were predictive of their parents' grade goals for them, which in turn were linked to the grade goals students set for themselves the result of

the study suggest that self-regulated learning affected their observed self-efficacy for academic achievement, which in turn influenced the academic goals they set for themselves and their personal goal final academic achievement and self efficiency improve the results of the students.<sup>6</sup>

**Norman G. Lederman (1992)** conducted a quantitative research study to assess teacher's and Student's conceptions of the nature of science. The development of adequate student conceptions of the nature of science has been a perennial objective of science instruction regardless of the currently advocated curricular or pedagogical emphases. Resulted that, it has been an area of productive research characterized by several parallel, but distinct, lines of investigation. Although research related to students' and teachers' conceptions of the kind of science has been conducted for approximately 40 years, a complete review of the real life literature (both quantitative and qualitative) has yet to be presented. The purpose of this review is to help clarify what has been learned and to elucidate the basic assumptions and logic which have guided earlier research efforts. finally, advice related to both methodology and the focus of future research are offered.<sup>7</sup>

**Carruyo-Vizcaíno, et. al (1995)** carried out a correlation research study in Venezuela of nutrient concentration and Hemoglobin in middle-class adolescents. The researcher use 213 adolescents in which 112 male and 101 female belongs to) belonging to a medium income group from private secondary educational institution as a sample. In this study the researcher correlate biochemical data and hematologic with academic performance. The result shows that there is positive correlation between hemoglobin and A.A.I., total iron binding capacity in males. It reveals that due to inadequate dietary intake combined with an increase of nutritional requirements and probably parasitic infestation there is high incidence of folate and iron deficiency in adolescent, especially in the adolescent female group.<sup>8</sup>

**Section B:** Review of literature regarding factors affecting academic performance

**Dr. Ehtesham Anwar, et. al (2005)** conducted a research study to examine the effects of gender and socio-economic status on academic achievement of higher secondary school students of Lucknow city. The researcher used 102 males and 98 females in age range of

15 to 19 from five higher secondary schools of Lucknow city Uttar Pradesh as a sample. The researchers collect the data randomly over a period of time. The result of this study was that the difference between low and high socio-economic status groups and also found that the academic achievement was influenced by the socio-economic status and the students who belonged to high socio-economic status showed better performance.<sup>9</sup>

**Karen Scouler (2001)** conducted a research study on the influence of two assessment method on students learning method. 206 students are used as a sample in research study. Assignment essay and multiple choice questions (MCQ) used as a assessment method. Results suggest that. Poorer performance in the MCQ examination was associated with the employment learning strategies. Students were more likely to employ deep learning approaches when preparing their assignment essays which they gain as assessing higher levels of cognitive processing.<sup>10</sup>

**Dr. Amit Kumar Singh (2017)** carried out A cross sectional study to identify and analyze factors that affect the students' academic performance in Community Medicine. As a sample 182 students were used. The structured questionnaire was used to collect the data. The Results of this study suggest that 1% of the students reported using computer, smart phones and access to the internet and three fourth of the students, reported that consuming meals before the examination. Demographic factors like gender and age were significantly associated with students' overall academic achievement in multiple linear regression analysis ( $p < 0.05$ ).<sup>11</sup>

**Preeti Singh, et. al (2015)** carried out the survey research study to investigate the impact of socioeconomic status on the academic achievement of secondary school students in Delhi. In which they used government as well as private schools located in Delhi and 15 schools were finalized. Normative survey method used upon 450 samples from class XI. A survey research study used to collect the data. The result of this study that the academic achievement was influenced by the socioeconomic status and those who belonged to middle and high socioeconomic status have shown better performance, also found that the difference between low and high socioeconomic status groups and further

reveals that gender influences the academic achievement at secondary school (Standard XI) level.<sup>12</sup>

**Usman Sabahat (2012)** conducted a research study to examine the perception of the teachers' on the factors influencing student's academic performance at higher secondary level in Rawalpindi District. In which they used ninety (90) teachers randomly drawn from seven colleges in Rawalpindi city. The result of the study showed that proper methodology, high socio economical status, good study environment, high motivations,, curricular activities regularity in the class, teachers' good behavior, overcrowded classes, teachers' professional educations, distance from home to school and lack of the school resources and large school size enhance students' achievement, traditional thinking of the parents Lack of communication skills and selective study habits decrease student's performance.<sup>13</sup>

## Materials and Method

**Statement of the Problem:** A comparative study to assess the academic performance and factors affecting it among higher secondary school students in both rural and urban areas of Vadodara.

### Aims & Objectives of the Study:

1. To assess the academic performance of higher secondary school students in both rural and urban areas.
2. To compare academic performance of higher secondary school students among urban and rural areas.
3. To find out the factors affecting academic performance of higher secondary school students in rural and urban area.
4. To find out the association between academic performance of higher secondary school students and selected demographic variables.

### Hyothesis:

$H_1$ : There will be a significant association between the academic performance of higher secondary school students with the selected demographic variables.

Research Approach	Quantitative Approach
Research Design	Non- Experimental research design
Setting	Urban and Rural Higher secondary schools of Vadodara district
Population	Higher secondary students
Sample	100 students from Urban & 100 students from Rural Higher secondary school
Sampling Technique	Purposive Sampling Technique
Tool-Development	Socio Demographic data Self Modified academic appraisal scale
Content Validity	Suggestion from various experts i.e Master in the field of Child Health Nursing the Asst. Prof. -5, Statistician -1, Language: Gujarati & English -2
Reliability	Using the cronbachs alpha and the reliability of tool was 0.8%
Pilot Study	Conducted on 14 higher secondary students, 7 from urban high school and 7 from rural high school
Data Collection Procedure	1 <sup>st</sup> week-Data was collected from urban Higher secondary school students 2 <sup>nd</sup> week- Data was collected from urban Higher secondary school students.
Analysis of Data	Descriptive and Inferential statistics

**Findings:** The findings of the study are presented in detail in reference to the objectives and hypothesis of the study.

- 1. Analysis of socio demographic characteristics of the respondent:** The distribution of higher secondary students according to their gender shows that among 200 participants 88 (44%) belonged to the male group, 112(66%) belonged to the female group. According to their class shows that among 200 participants 104(52%) belongs to 11<sup>th</sup> class students, and 96(49%) belongs to 12<sup>th</sup> class students. According to areas of residence that among 200 participants 100(50%) belongs to urban area, and 100(50%) belongs to rural area. According to religion shows that among 100 participants 162(81%) belongs to Hindu religion, 23(11.5%) belongs to Muslim religion, 15(7.5%) belongs to Christian religion, and none of students belong to other cast. According to their ordinal position in family. Shows that among 200 participants 80(35%) belongs to first ordinal position, 82(16.66%) belongs to second ordinal position, 38(23.34%) belongs to above to second ordinal position. According to their type of school shows that among 200 participants 160(80%) belongs to private school, and 40(20%) belongs to government school.
- 2. Assessment of academic performance of higher secondary school students:** In urban area mean of

academic performance is 442.71(73.78%) of high school students. In rural area mean of academic performance is 398.42(66.40%) of high school students.

The overall assessment shows that there is high academic performance in higher secondary students of urban area than rural high school students.

- 3. Comparison of academic performance of higher secondary school students among urban area and rural area:** In urban area mean of academic performance is 442.71(73.78%) of high school students. In rural area mean of academic performance is 398.42(66.40%) of high school students. There is difference between mean of academic performance of urban and rural area is 44.29 and means percentage difference is 7.38%.

The overall assessment shows that there is mean difference is 44.29 and mean percentage difference is 7.38%, it suggest that there is high score of academic performance of higher secondary school students of urban areas compare with rural area.

- 4. Factors affecting academic performance of higher secondary school students in rural and urban area:** There is major factors like internal and external classroom factors, family stress, distance from school which affect the academic performance of high school students of rural area compare with

urban area, so that there is academic of students than urban areas student's academic performance

- 5. Association between academic performance of higher secondary school students and selected demographic variables:** There is demographic variables such as gender, class, area of residence, ordinal position in family and types of school associate with academic performance of students. But only religion is not associated with academic performance So that  $H_1$ : There will be a significant association between the academic performance of higher secondary school students with the selected demographic variables is rejected.

### Conclusion

The study undertaken to compare the academic performance and factors affecting on it, among higher secondary school students with Purposive sampling technique was used to draw the sample. overall conclusion of the study was that major factors affect the academic performance of the rural high school, so there was low academic performance compare with the urban higher secondary school students

### Conflict of Interest:

- All authors have participated in (a) conception and design, or analysis and interpretation of the data; (b) drafting the article or revising it critically for important intellectual content; and (c) approval of the final version.
- This manuscript has not been submitted to, nor is under review at, another journal or other publishing venue.
- The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript

**Source of Funding:** Self funding

**Ethical Clearance:**

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# Applications of Chitosan in Dentistry

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## Abstract

Chitosan has gained popularity in dentistry, its various applications including endodontic treatment, periodontal therapy, wound healing, implant surface modifiers, etc. Recently it has been used in root canal sealers due to antibacterial properties, chelating effect and enamel and dentin regeneration. Furthermore, chitosan nanoparticles penetrate deeper into dentinal tubules and enhance its actions. When used in combination with traditional dental materials, chitosan improves efficacy of restorative materials, adhesives, root canal sealers, disinfectants, etc. Antimicrobial effect against *E. Faecalis* and *Candida albicans*, its bioactive and biomimetic properties make chitosan an ideal ingredient in root canal medicaments.

**Keywords:** Chitosan, nanoparticles, endodontics, antimicrobial, biomimetic, root canal sealer, intracanal medicament.

## Introduction

Chitosan is biocompatible polysaccharide derived from chitin, the second most abundantly occurring polymerized carbon in nature.<sup>1</sup> It is used in various biomedical areas due to its biocompatibility, biodegradability, antimicrobial, emulsifying and chelating properties.<sup>2</sup>

In the field of medicine and dentistry, chitosan is used as an antioxidant, anti-bacterial, antacid, plaque inhibitor, osteogenesis promoter, haemostatic agent, fat absorbent, healing of ulcers and wounds, etc.<sup>3</sup>

Chitosan nanoparticles have characteristics of chitosan and properties of nanoparticles. One of its most imperative properties is elevated bioactivity, which has led to development of new biomaterials for application in dentistry.

French Professor Henri Braconnot, first isolated Chitin in 1811 while studying mushrooms. In 1859, Prof. CRouget found that boiling chitin with hot potassium hydroxide solution caused deacetylation of chitin, yielding an acid soluble substance, later called as Chitosan by Hoppe Seiler.<sup>4</sup>Hydrolyzing chitosan, the glucosamine component was confirmed by Gilson in 1894.<sup>5</sup>

### Preparation and structure

Chitin naturally occurs as microfibrils in shells of arthropods, cell walls of fungi and yeasts. It is intimately attached to protein onto which calcium carbonate deposits, part of protein being involved in a complex with polysaccharide. Deproteinization and demineralization are necessary, along with removal of pigments and lipids.<sup>6</sup>

Thermal maneuvering of chitin under strong aqueous alkali gives partially deacetylated chitin reckoned as chitosan. Heterogenous deacetylation is preferred method for obtaining chitosan by treating chitin with hot solution of NaOH and selective reaction in amorphous regions of polymer occurs, leaving the obstinate crystalline intrinsic regions unaltered.<sup>7</sup>

Whereas, in homogenous deacetylation, lower concentration (13%w/v) alkali acts on pre-swollen chitin

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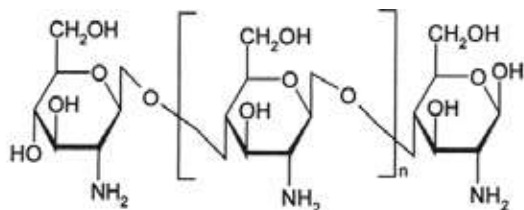
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to develop interactivity with the alkali and left at 25-40°C for 12-24 hours, followed by dissolution in crushed ice.<sup>8</sup>

Chitosan is composed of copolymers of  $\beta$ -(1,4)-linked glucosamine units (2-amino-2-deoxy- $\beta$ -D-glucopyranose) and N-acetyl glucosamine units (2-acetamino-2-deoxy- $\beta$ -D-glucopyranose) with two free hydroxyl groups and one primary amino group for each C6 structure unit. These free amino groups offer chitosan a positive charge which allows its interaction with negatively charged surfaces<sup>9</sup>



When in contact with anions, chitosan forms beads of 1-2mm diameter, large enough to limit drug delivery.<sup>10</sup> Hence, in 1994, Ohya and co-workers developed chitosan nanoparticles by emulsifying and crosslinking, for intravenous delivery of 5-fluorouracil, an anticancer drug<sup>11</sup> Chitosan nanoparticles are synthesized most commonly by ionotropic gelation and polyelectrolyte complex or by microemulsion, emulsification solvent diffusion, and reverse micellar method<sup>12</sup>

#### **Chemical and physical properties of Chitosan:**

2-acetamide-2-dexosi-D-glucopyranose and 2-amino-2-deoxy-D-glucopyranose units determine the average degree of acetylation of chitosan or degree of deacetylation of chitin, and concentration of amino groups. Solubility of chitosan along with physical, chemical and biological properties is directly influenced by the relative percentage of these units.<sup>5</sup>

Solubility relies on degree of deacetylation, molar weight, concentration of acid and biopolymer and ionic strength.<sup>13</sup> Though insoluble alkali and organic solvents, it is soluble in solutions of organic acids with  $\text{pH} < 6$ . Chitosan with 50% deacetylation from homogeneous processing is water soluble<sup>14</sup>.

Along with flexible polymer chain, chitosan is composed of reactive functional groups: amino ( $-\text{NH}_2$ ) groups at C-2 position, primary and secondary hydroxyl groups at the C-3 and C-6 positions, respectively, which are hydrophilic and make chitosan bioadhesive that promptly attaches with negatively charged surfaces (mucosal membranes)<sup>15</sup>

Chitosan is good coagulating agent and flocculant due to high density of amino groups. The adsorption ability depends on free amino group content, degree of crystallization, deacetylation and affinity for water ions.<sup>14</sup>

**Biomedical applications of chitosan:** Chitosan is hemostatic, but sulfated chitosan acts as anticoagulant. Chitosan bandages and sponges were prepared for surgical treatment and wound protection<sup>16</sup>. Tokura et al. immobilized partially sulfated chitosan oligomers on the surface of molded chitosan materials, such as artificial blood vessels and fibers, for producing antithrombogenic medical products.<sup>17</sup> Chitosan is effective against cholesterol and various hypolipemic formulations containing chitosan were prepared for oral administration<sup>18</sup>. Chitosan membranes and gels have potential for use in immobilized cell culture systems<sup>3</sup>. Sirca and Woodman showed that chitosan selectively aggregates leukemia tumor cells in vitro, forming a dense aggregate and inhibiting cell growth<sup>19</sup>. Hadwiger et al. confirmed its interaction with DNA and built a model to explain the resistance response of host cells to the pathogen.<sup>20</sup> Chitosan is used for delivering lower concentrations of drugs and reducing side effects by controlled release.

#### **Applications of chitosan in dentistry:**

**Antimicrobial Activity:**  $\text{NH}_3^+$  groups of glucosamine interact with negatively charged surface components of bacteria, resulting in extensive cell surface attraction, leakage of intracellular substances, and causing damage to vital bacterial activities<sup>21</sup>. Antimicrobial action is influenced by Microbial factors (species, age of cell); Intrinsic factors of chitosan (deacetylation, crystallinity, positive charge density, molecular weight, hydrophobic and hydrophilic characteristics, chelation capacity); Physical factors (solubility, state of matter) and Environmental factors (pH, ionic forces, temperature, time).

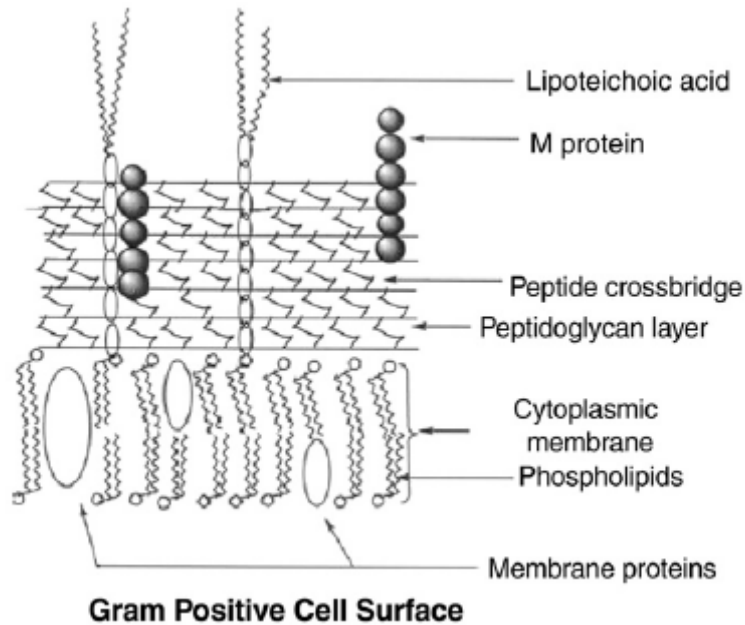
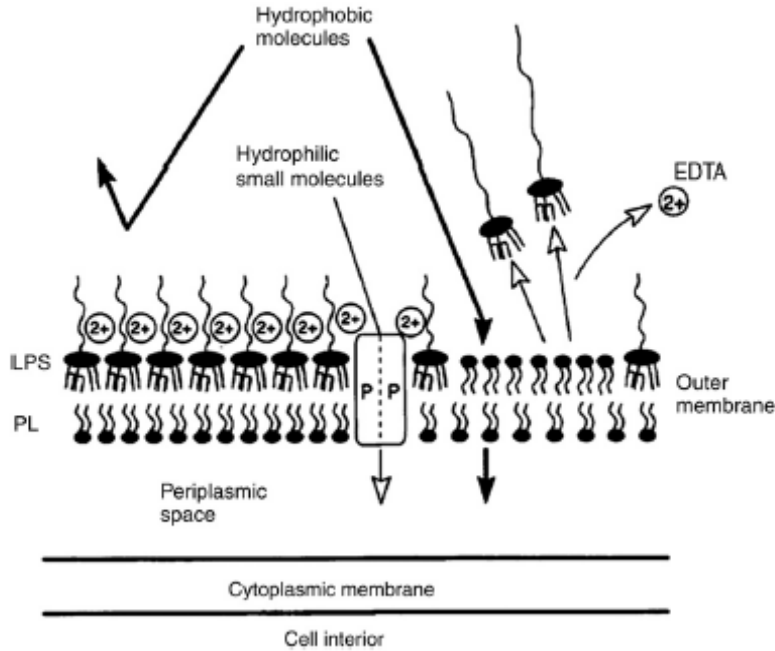
Allan et al. demonstrated bacteriostatic action of chitosan against organisms derived from common skin bacterium. *S. epidermis* was completely inhibited by 0.1% solution of chitosan, whereas *S. aureus* and *P. aeruginosa* required 1% concentration.<sup>22</sup> Kong et al. reported stronger inhibitory effect at low pH and antibacterial activity reduced with increase in the pH<sup>23</sup>.

Higher molecular mass increases bactericidal power of chitosan, whereas Lower molar weight chitosan can

easily penetrate cell wall of fungi, which affects faster the vital components of cells and physiological activities<sup>24</sup>

bacterial cell wall, chitosan presents better bactericidal and bacteriostatic action for Gram-negative bacteria than Gram-positive bacteria.<sup>25</sup>

Due to phospholipids and carboxylic acids in



**Gram Positive Cell Surface**

**Reduction in plaque formation and caries development:** Chitosan toothpastes (Chitodent®), Mouthwash solutions and chewing gums have shown antibacterial activity against Streptococci and are effective in reducing bacterial plaque formation and

stimulating salivation. Studies on association of chitosan with dental materials, such as tetrafluorileno and hydroxyapatite suggest that chitosan enhances biocompatibility of materials, favors cell migration and hinders absorption of oral bacteria (*S. sanguis*, *S.*



mutans, *S. mitis*, *S. salivarius*) to the tooth.<sup>26</sup> Chitosan functions as preventive and therapeutic agent for dental caries<sup>27</sup> Thiolated chitosan based formulations are used in mucoadhesive patches to prevent dental caries.<sup>28</sup>

**Smear Layer Removal:** Chelating property of chitosan removes inorganic portion of smear layer by forming complexes with metal ions due to adsorption, ionic exchange, and chelation and eliminates dentin calcium ions.<sup>29</sup> Chitosan has less chemical and physical changes in radicular dentine and less invasive alternative to 17% EDTA.<sup>30</sup>

**Enamel Regeneration:** Organic amelogenin delivery at site of enamel defects with chitosan-restorative formulations resulted in human enamel regeneration. Ruan et al. aimed to rejuvenate the aligned crystal structure using chitosan based hydrogel as a carrier for amelogenin<sup>31</sup>

**Dentin Remineralization:** In biomineralization of dentine, non-collagen proteins with high affinity for calcium ions and collagen fibrils are responsible for regulating nucleation and growth of minerals, such as dentine matrix protein (DMP1) and dentine phosphophoryn (DPP, DMP2) with highly phosphorylated serine and threonine residues.<sup>32</sup> Phosphorylated chitosan functions as template-analogues and induces homogenous nucleation. Zhen Chen et al, reported that stable nanocomplexes of carboxymethyl chitosan/amorphous calcium phosphate (CMC/ACP) infiltrated into collagen fibrils due to chelation of calcium ions, causing intrafibrillar mineralization of collagen, thus facilitating remineralization of dentine.<sup>33</sup>

### **Modification of Dental Materials:**

**Restorative Materials:** Chitosan was added to conventional glass ionomer cements (GIC) to evaluate its effect on protein and growth factor release vital pulp therapy. Petri et al. reported improved flexural strength and increased rate of fluoride release in GIC incorporated with chitosan. Chitosan-modified GICs could be used for bioactive dental restorations and regenerative endodontics.<sup>34</sup>

Composites containing chitosan powder showed antibacterial characteristics with low OD<sub>660</sub>, smaller Colony Forming Units without altering flexural modulus and Vickers hardness<sup>35</sup>

**Intracanal medication and sealers:** Antimicrobial efficacy of chlorhexidine increases when combined with chitosan. Ballalet al., reported that combination of 2% chlorhexidine (CHX) gel and chitosan showed highest antimicrobial effect against *C. albicans* and *E. faecalis* when compared with CHX gel or 2% chitosan alone<sup>36</sup>. Whereas, Jaiswal N stated that combination of 1% Chitosan+1% Chlorhexidine shows better antimicrobial efficacy.<sup>37</sup>

Chitosan nanoparticles incorporated into zinc-oxide eugenol (ZOE) sealer enhanced antibacterial effects in membrane-restricted assays<sup>38</sup>, suggesting that Chitosan nanoparticles disperse from sealer, piercing into dentinal tubules and anatomical complexities.

Upon contact with saliva, phosphorylated chitosan (PHCS) at dentin interface facilitates biomineralization of collagen matrices<sup>39</sup>, which forms a protective blockade against bacterial recolonization that can hamper bacterial adherence to tooth surfaces<sup>40</sup>.

Shaymaa et al. observed that Ca (OH)<sub>2</sub> combined with chitosan solutions were more efficacious in inhibiting the growth of *E. faecalis* compared with Ca (OH)<sub>2</sub> mixed with saline<sup>41</sup>

Shrestha A, et al. reported lessening of biofilm bacteria and disrupting *E. Faecalis* biofilm structure.<sup>42</sup> Nair N reported that amalgamation of chitosan nanoparticles into calcium hydroxide based sealers considerably improves antibiofilm efficiency against *E. faecalis* strain ATCC-29212<sup>43</sup>

2% chitosan gel containing 0.1% chlorhexidine shows antifungal action against *Candida albicans*.<sup>44</sup> Shaik J, et al. demonstrated antimicrobial effect of combination of chitosan with Triple Antibiotic Paste and calcium hydroxide against *C. albicans* and *E. faecalis*<sup>45</sup>

Chitosan and rose bengal-conjugated nanoparticles (CSRBnps) have shown to exhibit significant antibiofilm effectiveness, stabilize dentin collagen after photo-cross-linking, and hinder collagenolytic activity.<sup>46</sup>

**Chitosan based adhesives:** Bioadhesive polymers and chitosan-based dentine replacement materials have been developed. Antioxidant chitosan hydrogels with propolis, β carotene and nystatin demonstrated dynamic dentine bonding systems with increased shear bond strength values of up to 38MPa after 24h and >20MPa

after 6 months, significantly higher than conventional dentine bonding systems irrespective of phosphoric acid etching.<sup>47</sup>

**Periodontal Therapy:** Chitosan is favourable substrate for periodontal tissue regeneration due to its bioactive, biointegrative, conducive, chemical, physical properties and optimal particle size that elicit favourable host tissue response.

**Wound Healing:** Chevrier and co-workers, reported that chitosan increases vascularization of blood vessels and stimulates budding tissue. Chitosan is used as a substitute for bone graft. Park, Klokkevold and Lee and co-workers reported that spongy chitosan stimulates osteoblasts and enhances osteogenesis.<sup>48-50</sup>

**Chemotherapy:** Folic acid conjugated carboxymethyl chitosan coordinated to manganese-doped zinc sulfide (ZnS: Mn) quantum dot (FACMCS-ZnS: Mn) nanoparticles were used in targeting, sustained drug release and imaging of cancer cells.<sup>51</sup>

### Conclusion

Advantageous characteristics of chitosan such as antimicrobial properties, coagulation with red cells, and complex with DNA have made chitosan not just a waste by-product from seafood processing industry, but a bioactive material with innumerable applications in medicine and dentistry. Chitosan and its nanoparticles are now used as sealer in root canal therapy with sustained antimicrobial activity and due to its ability to cause remineralization of dentine collagen matrix.

**Conflicts of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Not required

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# Health, Sanitation and Hygienic Problems among Women Travellers in Nepal

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## Abstract

The travels made by women are distinctive as it possesses the beauty of journey and the threat of poor sanitation facilities provided by many South Asian Countries. As the increase in travel sparked an unparalleled interest in travel writing all over the world, there must be an initiation to create awareness among public on the need to facilitate better hygienic conditions to tourists, especially women, to make their travel less troublesome and more safe. Health, Hygiene and Sanitation are essential considerations not only for the traveller but also for the host country. People who travelled between different countries have an impact on economic, technological and cultural factors. But their influence of the epidemiology of disease, particularly infections should also be taken into account. The present study focuses on the hazards faced by women travellers in Nepal, where development is still in slow wain. The present study also looks at the ways and tactics adopted by the female travellers in a foreign country.

**Keywords:** Travel, Women travellers, Hygiene, Health, Sanitation.

## Introduction

Mobility is one of the greatest social phenomena of recent history. Travel begins with forced massive human migration in response to economic hardship, war, famine and social injustice. But human international wanderings are not limited to hardship or economic necessity. As Robert Louis Stevenson wrote in *Travels witha Donkey* (1878), 'For my part, I travel not to go anywhere, but to go. I travel for travel's sake. The great affair to move'. This is in part where tourism exists.

The systematic effort to promote sanitation in Nepal dates back to 1980s when UN declared International Decade of Drinking Water Supply and Sanitation. But travels to Nepal by women travellers started in early 1960s after the unification of Nepal in the year 1951. The first travel narrative on Nepal *The Waiting Land: A Spell in Nepal* by Dervla Murphy appeared in the year 1967 describing the experiences of an Irish women traveller in bicycle. The British traveller Barbara J Scott showed anxiety in the future of Nepal in her work *The Violet Shyness of their Eyes: Notes from Nepal* published in the year 1993. This is said to be the first work from a feminist

point of view with the author's note on social issues and the position of woman in Nepal. The Caribbean writer Jamaica Kincaid tried out a new treatment in her writing as a traveller in her narrative. Written as part memoir and part travel journal, Jamaica in her work *Among Flowers: A Walk in the Himalayas* takes a walk in search of the flora and fauna of Nepal. Analysing this narrative is an effort to bring in the experience of a black woman and her quest for identity in Nepal. The concept of empowered woman is introduced to the Western readers by the American traveller in the year 2014 in her work *The Living Goddess*. Elizabeth Enslin's *While the Gods Were Sleeping: A Journey through Love and Rebellion in Nepal* (2014), yet another American travel narrative, is set in rural Nepal which provides an insight into the life of marginalised, native woman of Nepal. More than being an American, Enslin's encounter with Nepali life helps to accommodate herself in second home. Thus the writing as a travel narrative is her quest to find the 'self'.

## Methodology

Patricia Lorcin in her work *Women's Travel Writings* studies travel writing as a rich source of history. She

marked the presence of women's narratives from 15th century and studied the 'other' and 'gaze' in women's travel narratives. The 'other' is the antithesis of the self and therefore serves an accentual purpose in the conceptualization the self. The 'gaze', on the other hand, is the way a particular group, conditioned by its gender, national allegiance, social standing or professional class, views the world. One can therefore talk of the female gaze, the colonial gaze, the Western gaze, etc.

Inderpal Grewal, in her seminal work *Home and Harem: Nation, Gender, Empire and Cultures of Travel*, reworks the colonial discourse and studies both sides of the colonial divide that discusses Indian women travelling West and English Women in travelling the East. The work is a transnational cultural study of the interaction of ideas between two cultures.

Mary Louise Pratt in her pioneering book *Imperial Eyes: Travel Writing and Transculturation* (1992) formulates the concept of 'contact zones'. Contact zones, according to her, are "social spaces where disparate cultures meet, clash and grapple with each other, often in highly asymmetrical relations of domination and subordination..."<sup>(p 16)</sup> She also analyses the significance of travel writing as one of the ideological apparatuses of the empire through which hegemonies of power could be effectively disseminated.

A more intensive work on women's travel narratives by Babitha Justin *Making of an Anecdotal India: A Study in the Writings of British Women Travellers in Independent India* throws light on the functioning of traveller's identity in the works of select women's travel narratives. For the study, she viewed the perspective of British women travellers of 20th century who had come to India as a part of the colonial legacy during the colonial as well as postcolonial period. The work retraces the history of travel made by women in India. She examined how the alien "Other" is comprehended through one's understanding of spaces, time, and relationships with the members of that community. By experiencing the 'other' spaces, time and personal relationships, the women travellers systematically try to

internalize and understand the phenomenon of a cultural strangeness they encounter. In their writings on travel, they try to imagine and conjure up an image of the 'alien' space they have travelled through these first-hand experiences. In fact, the India that the women travel, experience and write about, more or less, mirrors their understanding from their own subject positions and their psychic conditions.

## Results and Discussions

Dervla Murphy quotes the experience of a traveller who made his travel in the year 1877 as follows:

"From a sanitary point of view Kathmandu may be said to be built on a dunghill in the middle of latrines"<sup>(26, The Waiting Land)</sup>.

The situation was nothing different than what she has quoted when she made her travel in 1967. Murphy writes:

"In some quarters reeking water lies stagnant in square stone public baths, and I doubted the evidence of my eyes when I first saw people drinking this brew. After the scum has been pushed aside and the liquid-one can hardly describe it as water- has been collected in earthenware or brass pitchers it looks like strong tea"<sup>(28)</sup>

Among the five women travellers, Dervla Murphy is the only one traveller who has travelled to Nepal before the initiation of Government policies. The Government of Nepal developed plans to eradicate the problem son water supply and to ensure public hygiene and the target was expected to be accomplished in the year 2017.

The problems faced during the exploration of Nepal has been note down by most of the women travellers. While taking into account the experiences of five women travellers from different countries, the issues they have come across stood as a real barrier to achieve the needs of making a journey. Based on their personal accounts written as travel narratives in different time periods, the issues can be listed out as follows:

**Table 1. Common issues faced by the women travellers**

ISSUES FACED BY THE TRAVELLER	DERVLA MURPHY	BARBARA J SCOTT	JAMAICA KINCAID	ISABELLA TREE	ELIZABETH ENSLIN
DRINKING WATER	YES	NO	YES	NO	NO
PUBLIC HYGIENE	YES	YES	YES	YES	YES
SHELTER	NO	YES	YES	NO	NO

**Socio Cultural Contexts:** The socio cultural context of Nepal and the typical geography of Nepal holds back the country to attain sustainable development in many sectors including public health and hygiene. The census made in the year 2001 has come up with varied findings on the social conditions of Nepal.

**Low land holding:** The census survey also shows that about 29% of the total population are landless. These landless people do not have any physical space to build toilets. They are mostly living as squatters in public places and slums where construction of toilets is not legally recognized.

**Settlement pattern:** The settlement pattern too poses a problem for building toilets in some parts of the hills and ethnic Madhesi settlements in the Terai. The settlements are tightly clustered and there is lack of space for building toilets. The only possible solution is public and community toilets in such areas but these seem difficult in terms of the operation and management perspective.

**Poverty:** A recent UNDP survey reveals that the number of people under the poverty level is 65% of the total population (rural and urban). The National Planning Commission, however, claims it is only 25.4%. Besides, there is a big gap of sanitation coverage between poor

(12%) and rich (80%) . Hence poverty remains a major factor in the promotion of toilets in the country. Given the widespread poverty in the country, their affordability would pose a special problem for the community-wide promotion of toilets.

**Lack of awareness:** The illiteracy rate is 37% of the total population above six years old. Due to widespread illiteracy and lack of education, there is inadequate awareness of the connection between unsanitary conditions and practices and vulnerability to disease and ill-health, particularly the fact that human excreta is the main source of transmission and spread of a wide range of communicable diseases.

**Rampant open defecation:** Open defecation continues to be rampant in the country, more so in the Terai. Due to the high ground water table, construction of a toilet is a costly option and open defecation is a most common practice in the Terai.

**Socio-cultural taboos:** In some ethnic culture, traditional beliefs such as a father-in-law and daughter-in-law cannot use the same toilet, has also compelled many people to go for open defecation. In other culture specially in the mid and far western region, menstruating women cannot use the toilet with a belief that they are untouchable during those menstruating days.

### Measures Taken by the Travellers:

**Table 2. Safety Measures taken by the travellers**

MEASURES	DERVLA MURPHY	BARBARA J SCOTT	JAMAICA KINCAID	ISABELLA TREE	ELIZABETH ENSLIN
USING PUBLIC TOILETS	NO	NO	NO	YES	YES
CARRYING FIRST AID	YES	YES	YES	YES	YES
DEPENDS ON NATURAL RESOURCES	YES	YES	YES	NO	NO

## Conclusion

With all the geographical, economic and financial barrier Nepal faces all these years, Nepal rises gradually in overcoming the barriers on health issues. The Master Plan implemented by the Government of Nepal helps the nation to build around a safe and friendly atmosphere for the tourists to visit the country.

Through all South Asian Conferences on Sanitation, Nepal has made firm commitments to develop the Sanitation and Hygiene Master Plan. This commitment was also reinforced through the Nepal Country Plan for the International Year of Sanitation-2008. Considering the existing challenges and barriers to overcome and the commitment needed to meet National and MDG targets, having the Master Plan in place is essential to mainstream the efforts of concerned stakeholders at various levels. Hence, the Steering Committee for National Sanitation Action has formulated this Master Plan to expedite the pace of sanitation promotion and demonstrate Nepal's commitment in its sanitation endeavours.

**Conflict of Interest Statement:** The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

This statement is signed by all the authors to indicate agreement that the above information is true and correct.

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# A Study to Assess the Level of Knowledge on Home Management of Diarrhea among Mothers

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## Abstract

Diarrhea is one of the most common manifestations of illness in infants and children. Diarrhea is a symptom of variety of conditions, and it constitutes one of the main causes of morbidity and mortality among infants and throughout the world<sup>1</sup>. The present study was **to assess the level of knowledge on home management of diarrhea among the mothers** and the objectives were to assess the existing level of knowledge on home management of diarrhea among mothers and to associate the level of knowledge on home management of diarrhea with their selected demographic variables. Non experimental –descriptive research study was conducted. The study sample consisted of total 100 mothers of under five children. The study finding shows that majority of the mothers were having inadequate knowledge and most of the mothers were having moderate knowledge and no mother were having adequate knowledge. The mean value of knowledge score was 9 and the standard deviation was 3. The study findings also shows that there is no significant association between the demographic variables such as (age, education, income, type of family, residence, source of information) and the level of knowledge of mothers regarding home management of diarrhea at  $p < 0.05$  level.

**Keywords:** *Level of knowledge, home management of diarrhoea, mothers.*

## Introduction

Diarrheal disease is a common cause of childhood death in developing countries. World health organization [WHO] estimated that diarrhea kills 2,195 children every day more than AIDS, malaria and measles combine diarrheal disease account for in a child death worldwide<sup>4</sup>. Diarrhea is the second leading cause of death among children under the age five years. About 88% of diarrhea associated deaths are attributed by unsafe water, inadequate sanitation and insufficient hygiene.

India has highest incidence of diarrheal death among children below the age of five year about one third of total hospitalized children are the diarrheal disease. Health of the children has been considered as the vital important to all societies because the children are the basic resources for the future of human kind<sup>2</sup>. Child health depends up on prevention and the majority of child health problems are preventable. Modern approach of child health care emphasis on “preventive care rather than curative care most of the childhood diseases are prevented by mother’s role<sup>3</sup>.”

**Statement of the Problem:** A study to assess the level of knowledge on home management of diarrhea among the mothers at pediatric department, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram district, Tamil Nadu, India.

## Objectives of Study:

1. To assess the existing level of knowledge on home management of diarrhea among mothers.

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2. To find out the association between the level of knowledge on home management of diarrhea and the selected demographic characteristics of mothers.

**Hypothesis:**

**H1-** There is a significant association between the level of knowledge on home management of diarrhoea among mothers with their selected demographic variables.

**Operational Definition:**

**Assess:** It refers to the level of knowledge on home management of diarrhea among the mothers that will be evaluated through the structured interview schedule in selected aspects of diarrhea.

**Knowledge:** Knowledge refers to the level of understanding will be measured by the correct responses from the mothers to the tool regarding the home management of diarrhoea.

**Diarrhoea:** Diarrhea is defined as the passage of three or more loose or liquid stools per day (or) more frequent passage than is normal for the individual.

**Home Management:** A specific measures practiced at home to reduce the occurrence and frequency of diarrhoea.

**Mothers:** The mother who are having children in the age of 0-5 years who are obtaining care in pediatric department, Selected Tertiary Care Hospital, Kanchipuram DT, Tamil Nadu during the period of data collection.

**Materials and Method**

**Research Approach:** Quantitative–evaluative research approach was used

**Research Design:** Non experimental, descriptive research design was used.

**Research Setting:** The study was conducted at pediatric department, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram District, Tamil nadu, India.

**Sample:** Mothers who were having children either male or female between the age of 0-5 years available at pediatric department, Chettinad Hospital and Research

Institute, Kelambakkam, Kanchipuram District, Tamil nadu, India.

**Sampling Technique and sample size:** Non probability – Purposive sampling technique was used to select the mothers of children and the sample size was 100 based on population proportion and the open-epi sample size determination.

**Sampling Criteria:**

**Inclusion Criteria:**

**The study includes the mothers who were:**

- having children 0-5 years of age.
- able to understand Tamil or English.
- available at the time of data collection.
- willing to participate in the study.

**Exclusion Criteria:**

The study excludes the mothers who were

- having critically ill children.

**Data Collection Procedure:** Structured interview schedule was used to assess the data of demographic variables and the level of knowledge on home management of diarrhea. Data was collected over a period of one week. Prior permission and consent were obtained from the mothers before conducting the study.

**Tool Description:** It consist of two parts like part-I and part-II

**Part-I:** Selected demographic variables of mothers such as age, religion, educational status, occupational status, family income, type of family and previous knowledge on home management of diarrhea.

**Part-II:** The level of knowledge was evaluated by the structured interview schedule consists of 20 questions regarding home management of diarrhea. Each questions consists of four options out of which one was the correct option, the mother instructed to select the correct option and to mark in box given for each questions.

**Scoring Interpretation:**

Score	Percentage (%)	Inference
0-9	<50%	Inadequate knowledge
10-15	50-75%	Moderately adequate Knowledge
16-20	76-100%	Adequate knowledge

**Analysis And Interpretation:****Table 1: Frequency and percentage distribution of level of knowledge of mothers on home management of diarrhea. N=100**

S.No.	Level of Knowledge	No of Mothers	Percentage
1.	Adequate	0	0%
2.	Moderate	47	47
3.	Inadequate	53	53

**Table 2 mean and standard deviation of level of knowledge of a mothers regarding home management of diarrhea. N=100**

S.No.	Level of knowledge	Total mothers	Score range	Mean value	Standard deviation
1.	Inadequate knowledge	100	53	9	3
2.	Moderate Knowledge		47		
3.	Adequate knowledge		0		

**Association between selected demographic variables of mothers and their level of knowledge:** It shows that there is no significant association between the selected demographic variables such as age, education, occupation, income, type of family, residence, sources of information and their level of knowledge of mothers regarding home management of diarrhea at  $p < 0.05$  level. Hence the research hypothesis H1 is strongly rejected.

**Discussion**

Demographic data of mothers showed that majority of the mothers (67%) were in the age group of 20-31 years, which showed that the women were married at an appropriate age. The findings were consistent with the study on children with young age mother conducted by V.Suganyabibitha baby (2017) in that study the age group of mother was 20-30 years. Majority of the mothers belong to Hindu religion, the fact that Tamil Nadu being a Hindu predominant state would have been the reason for majority of the participants to be Hindus. Most of the mothers were educated up to primary education school level. The fact might be their low socio economic status and few families were not showing interest in female literacy.

Majority of the mothers (87%) were housewives, with the family income of Rs.5000/- per month which showed that most of the participants were doing Cooley work due to their educational level, familial practice and the economics status.

While assessing the existing level of knowledge it was

noted that 53% of mothers had inadequate knowledge, 47% of mothers had moderately adequate knowledge and no one had adequate knowledge on home management of diarrhea. A study was conducted by Parker in 2018 on knowledge on management of infectious diarrhea among mothers showed that in the pretest the majority of mothers had inadequate knowledge. In posttest the majority of mothers had adequate knowledge it stated that structured teaching method was very effective among the mothers for incorporating new knowledge.

The mean value was 9 and the standard deviation was 3. The reason for the low level of mean value might be due to the poor educational status and most of the mothers were primi mothers so they were not oriented to home management of diarrhea among young children.

The study results shows that there is no significant association between the selected demographic variables such as age, education, occupation, income, type of family, residence, sources of information and their level of knowledge of mothers regarding home management of diarrhea at  $p < 0.05$  level.

**Recommendations:**

- The same study can be replicated on a larger sample and also at different settings.
- A study on mother's attitude and practice aspects of home management of diarrhea for under five children need to be conducted.
- A structured teaching programme can be prepared

and given to village health nurses and balwadi workers so that they can generate knowledge to all mothers regarding home management of diarrhea and their practice.

- A qualitative observational study of the housing conditions to clarify specific dangers in view of home management of diarrhea need to be conducted.

### **Conclusion**

The study results showed that most of the mothers were not having adequate knowledge on home management of diarrhoea. The knowledge should be strengthened by the health care workers and the mass media and even the school educational syllabus should focus on diarrhoea to reduce the burden of diarrhoea related morbidity and the mortality.

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# Autonomic Function Tests in Chronic Obstructive Pulmonary Disease (COPD) and their Correlation with Disease Severity

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## Abstract

**Background:** Chronic hypoxemia in COPD patients, predispose them to cardiovascular autonomic neuropathy and cause sudden cardiorespiratory arrest. COPD patients without hypoxemia can also develop cardiovascular autonomic neuropathy. Similarly, cardiovascular autonomic neuropathy, though observed more often in patients with moderate and severe COPD, can also occur in patients with mild COPD. There is paucity of literature, revealing the relationship of autonomic function tests with disease severity in COPD patients.

**Objective:** In our study we intended to assess, autonomic function tests among different stages of COPD and also to identify the association of these autonomic function tests with disease severity.

**Method:** It is a Cross-sectional study done on (n=130) male COPD patients (who could maintain oxygen saturation above 88%). Anthropometric parameters, autonomic function tests and Pulmonary function test were assessed. Later, based on the GOLD stage criteria they were divided into 4 sub-groups. Data were analysed by SPSS 19.0 version software. One-way ANOVA was used to find Statistical difference between the groups. Correlations between the variables were done using Pearson correlation test.

**Results:** 30/15 ratio and E/I ratio levels were significantly decreased in very severe, severe and moderate COPD patients when compared to mild COPD patients. The  $\Delta\text{DBP}_{\text{IHG}}$  levels were significantly increased during isometric handgrip in very severe, severe and moderate COPD patients when compared to mild COPD patients. E/I ratio ( $r=-0.463$ ), 30/15 ratio ( $r=-0.496$ ) negatively correlated with disease severity and  $\Delta\text{DBP}_{\text{IHG}}$  levels ( $r=0.687$ ) positively correlated with disease severity

**Conclusion:** In our study group of COPD patients, we found increase in the sympathetic vascular BP response which gets increased as the disease severity is increased. 30/15 ratio and E/I ratio levels negatively correlated with disease severity and  $\Delta\text{DBP}_{\text{IHG}}$  levels positively correlated with disease severity.

**Keywords:** Autonomic function tests, COPD, Cardiovascular risk, FEV1, GOLD criteria.

## Introduction

Chronic obstructive pulmonary disease (COPD) is a lung disease characterised by chronic obstruction of lung airways which is irreversible.<sup>1</sup> COPD was predicted to be the third most common cause of death by 2020.<sup>2</sup> In India, burden of COPD -14.84 million.<sup>3</sup> COPD causes deaths in 90% of patients in low-and-middle-income countries.<sup>2, 5</sup> In India, the mortality rate of COPD is

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64.7% which is highest in the world.<sup>6</sup> COPD is now recognised as the systemic inflammatory disease, known to cause cardiovascular diseases (CVD)<sup>7</sup> which accounts for 50% of COPD deaths.<sup>2, 8,9</sup> Lung Health Study showed that higher diastolic blood pressure and reduced pulmonary function were the most potent cardiovascular risk factors in COPD.<sup>10</sup>

Studies have showed that COPD is an independent risk factor for development of cardiovascular disease.<sup>11-13</sup> Lower the FEV1, the higher the risk of CVD in COPD patients<sup>14</sup>. This is because the levels of FEV1 were known to be reduced in low grade systemic inflammatory conditions such as in COPD.<sup>15</sup> Since low-grade systemic inflammation is associated with atherosclerosis, reduced FEV1 might be a significant risk factor for cardiovascular morbidity and mortality, independent of cigarette smoking, hypertension and serum cholesterol.<sup>16,17</sup>

Chronic hypoxaemia causes autonomic neuropathy in COPD patients and COPD patients without hypoxemia can also develop cardiovascular autonomic neuropathy<sup>18,19</sup>. COPD also known to increase sympathetic drive and causes autonomic dysfunction.<sup>20,21</sup> This is again a possible risk factor for CVD in COPD.<sup>22</sup> Conventional autonomic function tests (CAFT) are noninvasive and useful tool to assess cardiac autonomic activity and sympathovagal balance.<sup>23,24</sup> Pulmonary function tests are reliable tool to assess the disease severity in COPD<sup>25</sup>. In the present study, cardiac autonomic functions and pulmonary function tests will be assessed, and the association of cardiac autonomic function with disease severity will be studied.

## Materials & Method

**Study Design:** This was a cross sectional study conducted in 130 male COPD patients. Sample size was estimated conveniently based on logistics, time and budget. It was designed to assess the pulmonary function tests, Cardiovascular autonomic function tests [CAFTs] in male COPD patients and also to correlate CAFTs with disease severity. Before the start of the study, approval from JIPMER scientific advisory committee and Institute ethics committee for human studies were obtained.

**Selection of Subjects:** Male COPD patients (GOLD – Stage I-IV) aged between 35-60 years attending JIPMER pulmonology OPD were included in the study. COPD patients who cannot maintain oxygen saturation above 88%, COPD patients with systemic complications like coronary heart disease, arrhythmia, Stroke and

Alcoholics, Diabetic, hypertensive patients, Tobacco chewers were excluded from the study.

**Experimental Design:** The study was carried out in pulmonary function testing laboratory, and autonomic function testing laboratory in Department of Physiology, JIPMER between 9 am to 1 pm. The subjects were explained clearly about study protocol in their native language and written informed consent was obtained from them. The participants were asked to have light Breakfast around 7 am and come for tests around 9 am as the subjects will have difficulty in performing PFT and CAFTs with the full stomach.

The PFT parameters were measured from a spirometer called SpirolabIII hardware manufactured from Medical international research (MIR), Italy and Winspiro PRO software which assess the total lung function. Pulmonary function parameters studied were, forced vital capacity (FVC) in litres, forced expiratory volume in the first second (FEV1) in litres, the ratio between FEV1 and FVC (FEV1/FVC) in percentage.

Autonomic reactivity tests (CAFT) studied were HR response to standing (30:15 ratio which depicts parasympathetic activity) HR response to deep breathing (E: I ratio which depicts parasympathetic activity) and BP response to sustained isometric handgrip ( $\Delta$ DBP<sub>IHG</sub> which depicts sympathetic activity)

**Statistical analysis of data:** SPSS version 19 was used for statistical analysis. The continuous data such as age, duration of illness, anthropometric parameters (Ht, Wt, BMI, WHR), heart rate and blood pressure were expressed as mean with standard deviation and the intergroup differences in mean were compared using Oneway ANOVA test. CAFTs such as heart rate response to standing (30:15 ratio), heart rate response to deep breathing (E:I ratio), blood pressure response to isometric handgrip ( $\Delta$ DBP) was expressed in mean with standard deviation and the intergroup differences in mean were compared using Oneway ANOVA test. The correlation between CAFTs and FEV1 was done using Pearson correlation test. The difference was considered statistically significant if probability of chance was less than 0.05.

## Results

All the anthropometric, PFT & CAFTs parameters were assessed in 130 COPD patients after obtaining informed consent from them and the data were analysed.

**Comparison of parameters among different stages of COPD:**

**Demographic Characteristics:** The mean age, duration of illness, anthropometric indices of the study group were given in Table 1.

**Heart rate and Blood pressure parameters:** The mean Heart rate, SBP, DBP, PP, MAP of the study group were given in Table 2.

No significant difference was noted among the four subgroups of COPD.

**Conventional autonomic function tests (CAFT) parameters:** Comparison of CAFT parameters among patients in different COPD severity groups was done using One-way ANOVA and the Tukey post-hoc test was performed to find the significant difference among the groups

Among the CAFT parameters, 30/15 ratio and E/I ratio levels were significantly decreased (Table 3) in

very severe, severe and moderate COPD patients when compared to mild COPD patients. The  $\Delta\text{DBP}_{\text{IHG}}$  levels were significantly increased during isometric handgrip in very severe, severe and moderate COPD patients when compared to mild COPD patients. (Table 3). 30/15 ratio and E/I ratio levels negatively correlated with disease severity and  $\Delta\text{DBP}_{\text{IHG}}$  levels positively correlated with disease severity (Table-4)

**Table: 1 Demographic characteristics of study participants (n=130)**

Variables	Mean± SD
Age (Years)	53.37±5.65
Duration (Years)	6.92± 2.57
Height (cm)	161.33 ±7.72
Weight (Kg)	55.06± 9.60
BMI (Kg/m <sup>2</sup> )	21.15±3.47
Waist Hip Ratio	0.82± 0.09

The values are expressed in mean with SD

**Table: 2 Comparison of Basal heart rate and blood pressure among COPD patients**

Cardiovascular Parameters	Total (n=130)	Mild COPD (n=18)	Moderate COPD (n= 41)	Severe COPD (n= 44)	Very severe COPD (n= 27)	P value*
HR	76.7±9.7	67.41± 3.43	74.72± 3.09	78.50±4.77	85.93± 4.30	0.012
SBP	120± 13.8	106.25± 4.24	116.53± 4.85	120.97± 5.23	130.58± 6.05	0.011
DBP	75.9± 13.4	66.76± 3.68	71.25± 5.44	79.05± 6.43	86.08± 4.90	0.014
PP	43.34± 9.58	39.49± 4.45	45.28± 6.85	41.92± 8.93	44.49± 9.21	0.016
MAP	90.9± 10.58	79.92± 3.26	86.35± 4.15	93.03± 4.36	100.90± 3.06	0.010

Values are expressed as mean (SD); Comparison of variables between groups done using ANOVA

\*p<0.05 is statistically significant among the four groups of COPD

HR: heart rate (bpm); SBP: Systolic blood pressure (mmHg); DBP: Diastolic blood pressure (mmHg); PP: pulse pressure (mmHg); MAP: mean arterial pressure (mmHg)

**Table: 3 Comparison of AFT (autonomic reactivity) parameters among COPD patients**

AFT Parameters	Total (n=130)	Mild COPD (n=18)	Moderate COPD (n= 41)	Severe COPD (n= 44)	Very severe COPD (n= 27)	P value*
30:15 ratio	1.12± 0.15	1.31± 0.34	1.17± 0.06	1.12 ± 0.04	1.04 ± 0.06	0.001
E:I ratio	1.11± 0.14	1.23± 0.24	1.15± 0.09	1.12 ± 0.05	1.03 ± 0.05	0.004
$\Delta\text{DBP}_{\text{IHG}}$	17.5± 5	14.00 ±2	16.00 ± 5	18.00± 3	21.00± 4	0.002

Values are expressed as mean (SD); Comparison of variables between groups done using ANOVA

\*p<0.05 is statistically significant among the four groups of COPD

30:15 ratio: ratio of RR interval at 30<sup>th</sup> and 15<sup>th</sup> beat after standing; E:I ratio: ratio of RR interval during expiration and inspiration;  $\Delta\text{DBP}_{\text{IHG}}$ : difference in diastolic blood pressure with isometric hand grip (mmHg)

**Table: 4 Correlation of FEV1 with CAFTin COPD patients (n=130)**

Parameters	Disease Severity	
	r Value	P value
<b>AFT Parameters</b>		
30/15 ratio	-0.496*	0.002
E/I ratio	-0.463*	0.004
$\Delta$ DBP <sub>IHG</sub>	0.687*	0.005

Correlation between variables is done using Pearson’s correlation test. \*p<0.05 is statistically significant 30:15 ratio- ratio of RR interval at 30<sup>th</sup> and 15<sup>th</sup> beat after standing; E:I ratio- ratio of RR interval during expiration and inspiration;  $\Delta$ DBP<sub>IHG</sub> - difference in diastolic blood pressure with isometric hand grip (mmHg)

### Discussion

In our study population of 130 male COPD patients, anthropometric parameters such as height, weight, BMI and waist-hip ratio were assessed. Later the mean height, weight, BMI (20.1, 20.8, 21 and 22) and waist-hip ratio (0.81, 0.82, 0.83, and 0.85) were compared among the four subgroups of COPD patients. We found that none of the anthropometric parameters showed statistical significance among the four subgroups of COPD patients.

In our study, we assessed the autonomic reactivity tests such as E/I ratio, 30/15 ratio and DBP response to isometric handgrip in COPD patients. The E/I ratio and the 30/15 ratio are mainly assessing the parasympathetic reactivity. The mean E/I ratio (1.11) and 30/15 ratio (1.13) were within the normal range for the age group.<sup>26</sup> These findings suggested that the parasympathetic reactivity is unaltered in all four groups of COPD patients included in the study. We found an increased DBP in response to isometric handgrip ( $\Delta$ DBP<sub>IHG</sub>) in COPD patients indicating enhanced sympathetic reactivity. Conversely, study done by S.K. Chhabra et al., showed that 30/15 ratio, E/I ratio levels were decreased in COPD patients and reflected decreased parasympathetic reactivity in COPD patients.<sup>18</sup> In this study, exclusion criteria was not mentioned clearly, as patients included in the study might have had associated systemic comorbid condition which might alter these autonomic function tests.

Though 30/15 ratio and E/I ratio were in normal limits we found significant difference (p<0.05) in the levels of E/I ratio, 30/15 ratio and  $\Delta$ DBP<sub>IHG</sub> in very severe, severe and moderate COPD patients when compared to mild COPD patients. The levels of 30/15 ratio and E/I ratio decreased, and  $\Delta$ DBP<sub>IHG</sub> levels increased from mild to

very severe group of COPD patients.

Our study also assessed the correlation of these autonomic reactivity tests with disease severity and showed that E/I ratio (r=-0.463), 30/15 ratio (r=-0.496) negatively associated with the disease severity.  $\Delta$ DBP<sub>IHG</sub> (r=0.687) was positively associated with the disease severity in COPD patients. Our study is in accordance with the study done by S.K. Chhabra et al.,<sup>18</sup> Conversely in the study done by Doha Rasheedy et al., showed that 30/15 ratio, E/I ratio levels had no significant difference among mild, moderate and severe COPD patients and also showed these autonomic reactivity tests were not correlated with disease severity.<sup>19</sup> However, in this study COPD patients with chronic comorbid condition were recruited which may alter these autonomic function tests. In the study done by Sherman MF et al., showed that blood pressure change to isometric handgrip had no significant difference in mild, moderate and severe COPD patients and there was no correlation between blood pressure change in isometric handgrip and disease severity.<sup>27</sup> The sample size of the study was only 11 COPD patients which might not be enough to get statistical difference between the COPD groups and to correlate with the disease severity. So in our study group of COPD patients, we found increase in the sympathetic vascular BP response which gets increased as the disease severity is increased.

### Conclusion

From the present study, we conclude that, in COPD patients, as the disease severity increases the levels of diastolic BP difference during isometric handgrip were increased. Increased levels of diastolic difference during isometric handgrip suggested cardiac autonomic dysfunction in the form of increased sympathetic



activity. Cardiac autonomic dysfunction increases the cardiovascular risk in COPD patients and the risk increases with increase in disease severity. CAFTs such as 30/15 ratio and E/I ratio levels negatively correlated with disease severity and  $\Delta\text{DBP}_{\text{IHG}}$  levels positively correlated with disease severity.

**Conflicts of Interest:** Nil

**Source of Funding:** Jipmer intramural grant

**Ethical Clearance:** Study was conducted after getting approval from Jipmer ethical committee.

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# A Cross Sectional Study on Smartphone Addiction among Students in Ayapakkam, Thiruvallur District, Tamil Nadu, 2018

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## Abstract

**Background:** India stands second for Smartphone usage in the world according to “global market” report. Smartphone addiction affects the younger generations to a greater extent. The objectives of the study was to estimate the proportion of students of age 18–24 years who were addictive to their Smartphone, to estimate the average time spent by them, to find the main reasons for usage and also to find the association between Smartphone usages and sleep quality of the students.

**Method:** A cross sectional community based study was done in Ayapakkam, Thiruvallur district, Tamil Nadu. Two stage cluster sampling methodology was employed for selecting a random sample of 139 students. In the first stage 4 clusters were selected based on the more populous clusters and in the second stage a minimum of 35 students were interviewed from each of the selected cluster. Smartphone Addiction Scale (SAS) and Pittsburgh Sleep Quality Index(PSQI) were the tools used for assessing the association of Smartphone addiction and sleep quality of the students. Data was collected using tablet and Epicollect 5 web application.

Descriptive statistics, Chi-Square for association and t-test to determine whether there exists significant difference between the means of two groups was assessed.

**Results:** The proportion of students who were addict to their Smartphone was 52.7% and among them it was more in males (66.2%). On an average 6.42 hours/day was spent on their Smartphone. The major reason behind using their Smartphone was for communication (5.03 hours/day). The association between SAS and PSQI were found to be highly significant ( $\chi^2 = 11.035$ , p-value < 0.01).

**Conclusions:** It is an alarming sign that students are prone to addiction to Smartphone. The younger generation must be brought awareness about their Smartphone addiction and health impact they are prone in due course of time.

**Keywords:** Smartphone addiction, Sleep quality, Students.

## Introduction

Addiction to electronic devices has turned out to be an emerging behavioral addiction among youth<sup>(1)</sup>. According to the global market it was reported that India stood second for Smartphone usage in the world and it has brought about psychological dependency towards Smartphone leading to addiction in them<sup>(2)</sup>. Smartphone

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addiction is considered to be a disorder involving compulsive overuse of the mobile devices usually quantified as the number of times users access their devices and/or the total amount of time they are online over a specified period. A previous study says that one of the fastest growing regional electronics is located in India. The increased usage of Smartphones has changed the modern world irreversibly. Smartphone contribute to 24/7 aspect of life whereby one can purchase, bank, chat, study and play games online at different time zones<sup>(3)</sup>. It has been expected that the number of Smartphone users to grow from 2.1 billion in 2016 to around 2.5 billion in 2019 worldwide<sup>(3)</sup>. A study conducted in the Middle Eastern population age 18 plus years, showed that 17% were addicts and 64% were somewhat addicts<sup>(4)</sup>. The main objective of the study was to estimate the proportion of students (18-24 years) who were addictive to their Smartphone and also to estimate the average time spent on their Smartphone and to find the main reasons behind the use of their Smartphone and to find the association between Smartphone usages and sleep pattern.

## Method

**Study population and study design:** A cross sectional community based study was conducted among the students of Ayapakkam, Thiruvallur District, Tamil Nadu, which is the field unit of the institute.

**Inclusion/exclusion criteria:** He/she should be a full time student.

He/she should be within the age 18 to 24.

He/she should be a resident of Ayapakkam, Thiruvallur District, Tamil Nadu.

He/she should own a personal Smartphone.

**Sample size:** Ayapakkam consisted of 13,000 households as per door to door survey in 2014-2015 and, there were 2235 students in the age group 18-24. The required sample size for the present study was 139 students with 95% of confidence level, 10% relative precision, assuming  $p=80%$ , design effect=1.5 and 10% allowance for non response.

**Sampling Procedure:** The entire line listing of students in the Ayapakkam Cohort was readily available and the students were selected using the two stage cluster sampling. The study area consisted of 7 clusters and among them 4 clusters which were higher populated was selected. A minimum of thirty five students were

interviewed from each of the clusters to satisfy the required sample size of 139.

**Data collection procedure:** Data was collected by one-to-one interview method using Epicollect5<sup>(5)</sup>. The interviews were conducted in the local language (Tamil) as well as in English by the post graduate students at the institute. For each cluster, one random start was generated and the required numbers of students were interviewed. In case of two or more students age 18-24 in a household, the available/willing respondent was interviewed. The study was proposed to the Institutional Ethics Committee, ICMR-National Institute of Epidemiology and was approved by the committee and also written informed consent was obtained from all the study participants.

**Training and pilot testing:** The students were trained by the Institute's experienced field and technical staffs on the usage of Epicollect 5, design the form/questionnaire, data collection and data entry. A pilot study was done to validate the questionnaire and to check the respondent's understanding of the *questions* and question flow.

There were three major divisions in the questionnaire. They were a structured questionnaire for socio demographic characteristics and questions on time spent by the students on their Smartphone on daily basis. The second one was about Smartphone addiction scale (SAS-SV)<sup>(6)</sup> in which the questionnaire included 10 questions describing daily life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse and tolerance. For each item, participants expressed their opinion on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). The SAS score ranged from 6 to 60. Male were considered addicted to their Smartphone, if their scores was greater than or equal to 31, and for females it was greater or equal to 33. Higher scores has been indicated as more addiction.

The third division was the Pittsburgh sleeping quality index questionnaire (PSQI)<sup>(7)</sup>. The PSQI questionnaire included 9 questions with 7 components. The sum of component scores ranged from 0 to 21. Subjects who got PSQI global score of 5 or less were classified as 'good sleepers', and those who got more than 5 as 'poor sleepers'. Higher scores has been indicated less sleep quality.

**Data Analysis:** The cluster weights were assigned and data analysis was done. Descriptive statistics and

Chi-Square test for the association between Smartphone addiction and sleep quality and also between different characteristics like gender, age, education, branch of study and Sleep quality. The students' t-test was done for comparison of means between addicted and not-addicted groups, good sleep quality and poor sleep quality. SPSS 25 was used for all the data analysis.

## Results

Among the 147 students surveyed 54% were females and 67% of the students were below 21 yrs of age. The average age of the students was  $19.78 \pm 0.13$ SD and 86.5% of the students were undergraduates and 31.3% were currently pursuing their degree in Engineering. Overall 11.5% students were also earning through part time jobs in IT Company, teaching etc. and also 66.7% of the students bought Smartphone based on their own choice. Smartphone addicts and poor sleeper's median months of owning the Smartphone was 36 months. The Pearson's Chi-Square of association indicated the proportions of addicts among males were significantly higher than among females (Chi-Square=8.65, P-Value<0.01). Also the proportion of students who bought Smartphone of their own choice were significantly more addicted than students who bought without their own choice (Chi-Square=11.09, P-Value<0.01).

**Smartphone addiction:** The overall average SAS-SV score was found to be  $32.80 \pm 9.28$ SD, Whereas the average score of female and male were  $31.45 \pm 10.07$ SD and  $33.98 \pm 8.35$ SD respectively and the mean score was not significant between male and female ( $t=1.645$ ,  $p\text{-value}=0.102$ ). In the study 52.4% of the students participated were addicted to their Smartphone, among which 58.4% were males and 41.6% were females. It was also found that among addicted 79.5% were students who bought Smartphone based on their own choice.

**Time spent on their Smartphone and main usage of Smartphone:** The average hours of time spent on their Smartphone by the students was found  $6.42 \text{hrs} \pm 3.7$  SD per day. The average time spent by students during day were more than the night time and also it was little higher during weekends (table 1). Major time spent on Smartphone (43.7%) was for communication (which includes all modes of online and offline communication) followed by entertainment and education with 31.5% and 21% respectively (table 2).

It was also found (table 3) that students who were addicted to Smartphone (SAS score) spent on an

average 7.7 hours/day whereas it was 5hrs/day by non addicts. According to PQSI the average time spent on Smartphone by the poor sleepers was 7.35hrs/day whereas it was 5.51 hrs/day for good sleepers. Both of the factors were statistically highly significant.

**Smartphone usage among addicts and non addicts:** Smartphone usage for communication purposes ( $t=3.9$ ,  $p\text{-value}<0.01$ ), for entertainments ( $t=3.7$ ,  $p\text{-value}<0.01$ ), for other purposes like navigation, flash lights, news etc. ( $t=2.02$ ,  $p\text{-value}<0.05$ ) were significantly different between addicts and non-addicts.

The mean time spent on their Smartphone for studies ( $t=1.01$ ,  $p\text{-value}=0.31$ ) does not differ significantly among addicts and non-addicts whereas the mean time spent on services such as SMS ( $t=2.12$ ,  $p\text{-value}<0.05$ ), phone calls ( $t=3.19$ ,  $p\text{-value}<0.01$ ), games ( $t=3.23$ ,  $p\text{-value}<0.01$ ), internet Surfing ( $t=2.38$ ,  $p\text{-value}<0.05$ ), WhatsApp ( $t=2.84$ ,  $p\text{-value}<0.01$ ), Facebook ( $t=2.33$ ,  $p\text{-value}<0.05$ ), twitter ( $t=2.26$ ,  $p\text{-value}=0.03$ ), music and videos ( $t=3.08$ ,  $p\text{-value}<0.01$ ), Instagram ( $t=3.22$ ,  $p\text{-value}<0.01$ ), Selfie ( $t\text{-value}=2.15$ ,  $p\text{-value}<0.05$ ) were significantly higher between addicts and non-addicts.

**Smartphone usage among poor sleepers and good sleepers:** Smartphone usage for communication purposes ( $t=2.29$ ,  $p\text{-value}<0.05$ ) were significantly different between poor sleepers and good sleepers.

The mean time spent on their Smartphone for studies ( $t=1.77$ ,  $p\text{-value}=0.08$ ), entertainments ( $t=1.4$ ,  $p\text{-value}=0.17$ ) and for other purposes like navigation, flashlights, news etc. ( $t=0.62$ ,  $p\text{-value}=0.54$ ) does not differ significantly among poor and good sleepers.

The mean time spent on services WhatsApp ( $t=3.13$ ,  $p\text{-value}<0.01$ ), Instagram ( $t=2.5$ ,  $p\text{-value}=0.01$ ), games ( $t=2.05$ ,  $p\text{-value}=0.04$ ) and Selfie ( $t=2.01$ ,  $p\text{-value}=0.05$ ) were found to be significantly higher among poor and good sleepers.

The mean time spent on services music and videos ( $t=1.81$ ,  $p\text{-value}=0.07$ ), SMS ( $t=1.28$ ,  $p\text{-value}=0.2$ ), Phone calls ( $t=1.82$ ,  $p\text{-value}=0.07$ ), Internet Surf ( $t=1.27$ ,  $P\text{-value}=0.21$ ), Facebook ( $t=1.54$ ,  $p\text{-value}=0.13$ ), Twitter ( $t=0.91$ ,  $p\text{-value}=0.37$ ) and other purposes like navigation, flash lights, news etc. ( $1.84$ ,  $p\text{-value}=0.07$ ) does not differ significantly among poor and good sleepers.

The Pearson's Chi-Square for Smartphone addiction

and Sleep quality were highly associated ( $\chi^2=12.662$ , p-value < 0.01). There existed a positive linear relationship between Smartphone addiction and sleep quality and also people who are addicted have higher odds of getting sleep disorders(OR=3.57, CI:1.81, 7.06),

and also exist an higher odd of getting addicted between male and female (OR=2.87, CI: 1.47, 5.64) and also between person who bought Smartphone by their choice and who bought not by their choice (OR=3.6, CI: 1.72, 7.33).

**Table: 1- Average time spent on Smartphone by students (N=147) in Ayapakkam, Tamil Nadu, 2018.**

Smartphone Usage	Day time (6 am to 6pm)		Night time (6pm to 6 am)		Average time spent per day
	Weekdays	Weekends	Weekdays	Weekends	
		4.11 ± 2.44	4.40 ± 2.53	2.08 ± 1.93	2.26 ± 2.02

**Table: 2-Purpose and average time spent by the students using Smartphone Ayapakkam, Tamil Nadu, 2018.**

Purpose	N(%)	Day time (6 am to 6pm)		Night time (6pm to 6 am)		Average time spent per day
		Weekdays	Weekends	Weekdays	Weekends	
Communication	64(43.7)	2.30 ± 2.10	3.54 ± 3.05	1.68 ± 1.83	1.97 ± 2.00	4.75 ± 3.62
Study	46(31.5)	1.58 ± 1.72	1.18 ± 1.44	0.91 ± 1.17	0.88 ± 1.30	2.28 ± 2.14
Entertainment	31(21.0)	0.88 ± 1.30	2.82 ± 2.72	1.44 ± 1.61	1.70 ± 1.92	3.42 ± 2.96
Others*	6(3.8)	0.27 ± 0.86	0.32 ± 0.99	0.12 ± 0.39	0.13± 0.47	0.42 ± 1.19

\*(navigation, flash lights, news, weather, calculator, alarm calls etc.)

**Table 3: Average time spent on Smartphone by students in Ayapakkam, Tamil Nadu, 2018.**

Usage of Smartphone	Addicts	Non addicts	t value	Poor sleepers	Good sleepers	t value
Time spent	7.70±3.89	5.00±2.81	4.88**	7.35±4.1	5.51±2.94	3.12**
Communications	5.78±3.83	3.58±2.99	3.90**	5.42±3.82	4.07±3.29	2.29*
Entertainments	4.23±2.95	2.51±2.70	3.68**	3.79±2.91	3.05±2.97	1.54
Studies	2.45±2.35	2.09±1.87	1.01	2.44±2.53	2.12±1.67	0.89
Others#	0.6±1.39	0.22±0.88	2.02	0.48±1.35	0.36±1.01	0.62
Whats App	5.20±3.95	3.43±3.55	2.84**	5.34±4.4	3.4±2.95	3.13**
Internet Surf	3.55±2.82	2.47±2.66	2.38*	3.33±2.78	2.75±2.78	1.27
Music and Video	2.64±2.60	1.48±1.88	3.08**	2.45±2.65	1.75±1.97	1.81
Instagram	2.31±3.24	0.90±1.96	3.22**	2.22±3.43	1.08±1.83	2.5**
Phone Calls	2.20±2.60	1.13±1.29	3.19**	2.02±2.54	1.37±1.64	1.82
Games	1.74±2.37	0.72±1.38	3.23**	1.6±2.37	0.92±1.56	2.05*
Facebook	1.30±2.59	0.56±0.95	2.33*	1.21±2.45	0.7±1.45	1.54
SMS	0.59±1.31	0.24±0.60	2.12*	0.54±1.2	0.32±0.86	1.28
Selfie	0.43±0.82	0.20±0.39	2.15*	0.43±0.84	0.21±0.4	2.01*
Others#	0.40±1.11	0.17±0.72	1.52*	0.43±1.21	0.15±0.56	1.84
Twitter	0.04±0.15	0.00±0.00	2.26*	0.03±0.15	0.01±0.07	0.91

#(navigation, flash lights, news, weather, calculator,alarm calls etc.), \*Significant at 5% level., \*\* Significant at 1% level.

### Discussion

According to a study conducted in Deakin, 34% tend to lose sleep and 40% felt disoriented without Smartphone. A study conducted in Tamil Nadu among

medical college students showed that 79.2% had poor sleep when they use more than 2 hours/day as compared to 65.7% who had poor sleep when they use 1 to 2 hours/day<sup>(1)</sup>. Another study in Chennai Urban area has shown

that 41.4% among the age group 15-35 were at risk of addiction to Smartphone.

The present study conveys that more than half of the student's community was addicted to their Smartphone and also from the mean SAS-SV score it was also observed that almost all the students were in the verge of Smartphone addiction. Thus the entire surveyed students/younger generation is in jeopardy to be Nomo Phobic which may cause serious imbalance in the physical and mental health of the younger generation.

It was also found that mean SAS-SV score doesn't differ significantly between male and female, Though some studies reported that the mean scores were significantly different between genders and the mean SAS-SV were high in males than that of females<sup>(8)</sup> and also in some studies the mean SAS-SV score in females were more than that of males<sup>(9,10)</sup>.

There existed a linear relationship between the time spent on Smartphone and Smartphone addiction and also between the Smartphone addition and sleep quality. Thus in due course the increase in usage of Smartphone time might lead to more Smartphone addiction and which in turn may lead to serious health conditions such as poor sleep quality.

It was also observed that students who bought Smartphone based on their choice were more addicted than that of students who didn't buy Smartphone based on their choice. It is an alarming sign among the students who are prone to addiction to Smartphone. The students unknowingly sacrifices their mental and physical health at the cost of health by detaching from family members spending more time over phone, sacrificing their sleep which may lead to serious health issues. The young generation must be brought awareness about their Smartphone addiction and health impact which they are prone in due course of time.

**Limitation:** The exact usage timings by the students for each category may be little biased for the following reasons. Students who stay at home during vacation may tend to use their Smartphone more, rather than while in classrooms. Also the Smartphone usage timings cannot be exactly attributed to any specific reason because few students simultaneously used for multipurpose like downloading/tracking and phone calls/chatting etc..

Since it's a community level student's based study, the non-availability rate and non-response rate was little

high (10%). Though the line listing of the entire study area was available due to more non availability (engaged in coaching classes, travelling a long distance, involved in part time jobs) and non response by the selected students, the simple random sampling methodology could not be adopted.

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**Conflicts of Interest:** None

**Ethical Clearance:** Taken from Institutes Ethics committee.

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# A Study to Assess the Effectiveness of Health Teaching Programme on Knowledge Regarding Stem Cell Collection, Preservation & its Benefits among Student Nurses of Selected Nursing Colleges of Vadodara

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## Abstract

**Background of the Study:** Stem cell transplantation is a life saving procedure for a number of malignant and non- malignant life threatening diseases. They are characterized by the ability to renew themselves through mitotic cell division and differentiate into a diverse range of specialized cell types. It is beneficial for later stage in life. In this study an evaluative research approach with pre-experimental research design was used, data was collected from 100 student nurses belongs to selected colleges of Vadodara city.

**Objectives of the Study:** 1. Assess the existing knowledge regarding stem cell collection, preservation & its benefits among student. 2. Determine effectiveness of health teaching on stem collection, preservation & its benefits. 3. Find out the association between pre-test knowledge scores and selected demographic variables.

**Material and Method:** In this research study an evaluative research approach with pre-experimental one group pre-test-post-test design is used. The sampling techniques was non probability convenience sampling is used to collect the 100 samples of student nurses and data collection done by administering the structured questionnaire. Data was analyzed by using descriptive and inferential statistics.

**Result:** With regards to the pre test assessment, the score of (41%) student nurses having moderate level of knowledge and (59%) student nurses having inadequate knowledge while in post test (18%) of student nurses having moderate level of knowledge and (82%) having adequate level of knowledge nobody was found at the inadequate level. The obtained “t” test value 43.10 is greater than table value, at the DF=99 which is significant at 0.05 level. It indicates that there is increased in the level of knowledge regarding stem cell collection, preservation & its benefits after providing HTP. Hence, Hypothesis H<sub>1</sub> accepted. The association of pretest knowledge score was only associate with the age, education level, gender and source of information others are not associate. Hence, H<sub>2</sub> is rejected and conclude that the pretest knowledge score is not associated with the demographic variable of the samples in this study.

**Discussion and Conclusion:** The findings of the study concluded that majority of student nurses were having inadequate level of knowledge & the health teaching programme was effective among student nurses regarding stem cell collection, preservation & its benefits.

**Keywords:** Effectiveness, Health Teaching Programme, Knowledge, student nurses, stem cell collection, preservation & its benefits.

## Introduction

*The only gift is a portion of self.” “Be a blood and organ donor. All it costs is a little love,”* –Emerson

*“Donate Cord Blood – You Can Save a Life”*

Health is the important aspects of life which needs to be maintained at any time in person’s life at any cost. Stem cells are young, primitive and undifferentiated

cells with remarkable potential to renew differentiate and develop in the body. Stem cells have ability to regenerate & stored in the different tissues. Umbilical cord is direct connection between mother & fetus, which is always show that emotional bonding between mother & fetus.<sup>1</sup>

Mother gives birth to the baby that times the blood store in the umbilical cord it is called as cord blood. This blood contains more number of haemopoetic stem cells & these cells have ability to self degenerate.<sup>1</sup> there are mainly two types of stem cells: Embryonic stem cells originate from the inner cell mass of the blastocyte & adult cells originate from adult tissue.<sup>1</sup>

Cord blood contains blood producing hematopoietic stem cells as well as mesenchymal cells. Hematopoietic stem cells are ability to develop brain cells, cardiac muscles, and liver cells. The mesenchymal cells have an ability to develop cartilage, bone, joints, ligament, and fat. Cord blood cells may be useful for the siblings, parents, cousins if there is an adequate Human leukocyte Antigen (HLA).<sup>2</sup> same as a cord blood connective tissue from an umbilical cord also can be preserved for the future medical need & further research. More than cord blood, whartshon jelly, connective tissue is specific source of stem cells & it is called as mesenchymal cells.<sup>2</sup>

Constantly growing attempts are being made to spread awareness of the phenomenon of umbilical cord blood banking that has created a sensation in the scientific community. Research on stem cell therapy has shown that advanced stem cell therapy could be used to treat more than 75 life threatening diseases. Currently research in the use of stem cells to treat more than 85 diseases such as diabetes, heart attack, stroke, spinal cord injuries etc, is being undertaken. There has been a completely new wave of research trials involving umbilical stem research that has swept through the nation.<sup>3</sup>

Although a relatively new concept, cord blood storage is fast gaining momentum as a less traumatic alternative to waiting lists, as a way to treat neurological illness, and as an insurance for the family against a host diseases. So, it increases the need of the participation of health care providers in cord blood storage and the first step in this process is awareness about the cord blood banking. Hence educational programme are in great demand especially for health care providers who in turn aware the public about cord blood storage.<sup>3</sup> The Nurses

most important role in the cord blood transfusion is that preparation, labeling & packaging.<sup>4</sup>

**Need for the Study:** Different research studies have shown that cord blood has various benefits over bone marrow transplantation, mostly in children, and can be life-saving in rare cases where a same bone marrow donor cannot be found. Approximately 50% of patients requiring a bone marrow transplant will not find a suitable donor within a critical period. In certain cases, there may be some medical issues around using one's own cord blood cells as well as availability of cells which will requires treatments done using cells from another donor, with the vast majority being unrelated donors. However, studies have proved that cord blood cells can also be used for siblings and other members of your family who have a matching tissue type. Siblings have up to a 75% chance of match and the cord blood may even be a match for parents & grandparents.<sup>5</sup>

According to WHO more than 70 malignant & nonmalignant disease are cured with stem cell transplantation, so this intervention have more useful for other disease specially in leukemia & lymphoma patients. At present there are at least 3 public and 7 private cord blood banks in India.<sup>6</sup> The Hindu (September, 2010) Newspaper reported that 1500 stem cells are received every month in India.

**Statement of Problem:** "A study to assess the effectiveness of health teaching programme on knowledge regarding stem cell collection, preservation & its benefits among student nurses of Selected Nursing colleges of Vadodara."

#### Objectives:

- Assess the existing knowledge regarding stem cell collection, preservation & its benefits among student.
- Determine effectiveness of health teaching on stem collection, preservation & its benefits.
- Find out the association between pre-test knowledge scores and selected demographic variables.

#### Hypothesis:

H<sub>1</sub>: There will be significant difference between pre-test & post test knowledge score regarding stem cell collection, preservation & its benefits

H<sub>2</sub>: There will be significance association between

knowledge of student nurses regarding stem cell collection, preservation & its benefits and selected demographic variable.

## Methodology

**Research Design:** The research design used for the study was Pre-experimental research design

**Setting:** The main research project was conducted at selected nursing colleges of vadodara city.

**Sample:** The 100 participants included in this study. The sample for the study was selected by non-probability sampling technique according inclusion criteria as availability of sample. Inclusion criteria:

- Students who are able to speak & write in Gujarati & English.
- Students who are willing to participate in the study.
- Students Nurses from G.N.M,B.Sc. or PB B.Sc

### Exclusion criteria for sampling:

- A.N.M students are excluded

### Tool for data collection

#### This consists of two parts:

Section 1: Demographic variables such as age, educational status, gender, previous exposure regarding stem cell collection, preservation & its benefits.

Section 2: Structured knowledge questionnaire will be used to assess knowledge Regarding stem cell collection, preservation & its benefits.

### Scoring interpretation of knowledge:

- Adequate knowledge - >67%
- Moderately adequate knowledge - 34-66%
- Inadequate knowledge - < 33%

**Data Collection Procedure:** The formal permission was obtained for the approval of the study from different colleges of Vadoara city. The data collection done within a given period of 1 week. The investigator selected the subject and established the rapport by explaining purpose of the study, the co-operation required and the anonymity assured before obtaining verbal consent. Initially the demographic tool, self structured questionnaire, administered to the sample to know existing level of knowledge regarding stem

cell collection, preservation, its benefits then the health teaching plan was given to the samples of the study. After 7 days post test was administered to assess the effectiveness of the health teaching programme among student nurses.

**Ethical Clearance:** The ethical approval was taken from ethical committee of university of Sumandeepvidhyapeeth. Ethical clearance was obtained from the SVIEC.

**Statistical Design:** Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (chi square and paired t test) was applied to test the study hypothesis

### Analysis:

**Section:** A description of the samples according their

#### Demographic Characteristics:

**Section 1:** Frequency and percentages distribution of samples, according to their demographic characteristic

Majority of student nurses (71%) from 21-23 age group & minimum student nurses (29%) were in the group of 18-20 year.

Majority of student nurses (94%) were Female and (6%) were male.

The highest percentage (50%) of student nurses (50%) was from B.sc nursing, (32%) from G.N.M & only (18%) from P.P.B.Sc.

Majority of student (92%) were not having previous exposure regarding stem cell collection procedure & only (8%) students having exposure to stem cell collection procedure.

Majority of student nurses (57%) were used news paper for source of information, (21%) were used internet, (14%) were used television and only 5% were having previous clinical exposure regarding stem cell collection..

Section 2: Analysis of pre-test & post test knowledgescore of student nurses regarding stem cell collection, preservation & its benefits.

**Table 1: Distributions of pre test knowledge score of student nurses regarding Stem cell collection, preservation & its benefits. N=100**

Sr. No.	Knowledge Level	Frequency	Percentage
1	Inadequate	59	59%
2	Moderate	41	41%
3	Adequate	00	00
	Total	100	100%

**Table 2: Distributions of post test knowledge score of student nurses regarding Stem cell collection, preservation & its benefits. N=100**

Sr. No	Knowledge Level	Frequency	Percentage
1	Inadequate	00	0%
2	Moderate	18	18%
3	Adequate	82	82%
	Total	100	100

Section 3: Effectiveness of health teaching programme

**Table 3: Comparison of pre test and post test knowledge score of student nurses N=100**

Variable		Mean	Mean Difference	Std. Deviation	t- Value
Knowledge regarding stem cell collection,preservation & its benefits	Pre-test	9.98	15.15	6.88	43.10
	Post-Test	25.13		5.22	

\*Significant at 0.05 level \*t (0.05, 99df) =2

**Section D: Association between pre test knowledge score with socio-demographic variables.**

Association between pre test knowledge score and socio-demographic variables

This section shows the association between knowledge of student nurses and demographic variable. Significant demographic variable are age of student nurses with  $\chi^2$  value 8.94 (1df=3.94), gender of student nurses with  $\chi^2$  value 4.43 (1df=3.84) and educational status  $\chi^2$  value 6.76 (2df=5.99), for source of information of student nurses  $\chi^2$  value 9.46 (3df=7.82) so, for this variable hypothesis is accepted. The non significant demographic variable is previously any exposure regarding programme. Hence, research hypothesis  $H_2$  is failed to accept.

**Discussion**

Stem cells have tremendous promise to help us understand and treat a range of diseases, injuries and other health-related conditions. Their potential is evident in the use of blood stem cells to treat diseases of the blood, a therapy that has saved the lives of thousands of children with leukaemia and can be seen in the use of stem cells for tissue grafts to treat diseases or injury to the bone, skin and surface of the eye. When exploring the knowledge of the nurses about the stem

cells, an important element highlighted in this study is the lack nurse’s knowledge in basic clinical information regarding stem cells.

The purpose of the study is to evaluate the effectiveness of the health teaching programme among 100 students nurses. The findings of the study concluded that majority of student were having inadequate level of knowledge. The health teaching programme was effective among student nurses in improving knowledge (t (99) =43.10) significant at 0.05 level regarding cell collection, preservation & its benefits. Finding reveals the health teaching programme is effective to increase the knowledge of respondent and another finding reveals there is association between pre test knowledge score with demographic variable of age, education, gender & source of information.

Different research studies have shown that cord blood has various benefits over bone marrow transplantation, mostly in children, and can be life-saving in rare cases where a same bone marrow donor cannot be found. Approximately 50% of patients requiring a bone marrow transplant will not find a suitable donor within a critical period. In certain cases, there may be some medical issues around using one’s own cord blood cells as well as availability of cells which will requires treatments done using cells from another donor, with the

vast majority being unrelated donors. However, studies have proved that cord blood cells can also be used for siblings and other members of your family who have a matching tissue type. Siblings have up to a 75% chance of match and the cord blood may even be a match for parents & grandparents.

Although a relatively new concept, cord blood storage is fast gaining momentum as a less traumatic alternative to waiting lists, as a way to treat neurological illness, and as an insurance for the family against a host diseases. So, it increases the need of the participation of health care providers in cord blood storage and the first step in this process is awareness about the cord blood banking. Hence educational programme are in great demand especially for health care providers who in turn aware the public about cord blood storage. The Nurses most important role in the cord blood transfusion is that preparation, labeling & packaging.

### Conclusion

In the light of the study findings, it can be concluded that there was a statistically significant improvement in nurses' knowledge mean scores after intervention. The implementation of an educational intervention was effective and significantly improved nurses' knowledge cord blood collection procedure. Furthermore, the above mentioned findings proved and supported the research hypothesis. The purpose of the study is to evaluate the effectiveness of the health teaching programme among 100 students nurses. The findings of the study concluded that majority of student were having inadequate level of knowledge. The health teaching programme was effective among student nurses in improving knowledge ( $t(99) = 43.10$ ) significant at 0.05 level regarding cell collection, preservation & its benefits. Finding reveals the health teaching programme is effective to increase the knowledge of respondent and another finding reveals there is association between pre test knowledge score with demographic variable of age, education, gender & source of information.

### Recommendations:

Based on the findings of the present study recommendation offered for the future study:

- The similar study can be conducted in different settings.

- The similar study can be conducted on staff nurses.
- The similar study can be conducted on mothers to assess the knowledge & attitude regarding cord blood banking.
- The similar study can be conducted in large sample.
- The similar study can be conducted in different cord blood bank.

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**Ethical Clearance:** The ethical approval was taken from ethical committee of university of sumandeepvidhyapeeth. Ethical clearance was obtained from the SVIEC.

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# A Study to Assess the Level of Nomophobia among Students at Sumandeep Nursing College, Vadodara with a View to Develop an Information Booklet

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## Abstract

**Background:** This study was designed to assess the level of nomophobia among students studying in Sumandeep Nursing College, Vadodara. Emphasis was put on trying to establish the relation between age, gender, course of study, family income, occupation of parents, and duration of mobile usage. The research instruments were established and data was collected from 100 nursing students from Sumandeep Nursing College. To analyze the data descriptive and inferential statistics was used with the aim of finding association between the levels of nomophobia with selected demographic variable.

**Aims and Objectives:** The aim of this study is to find out the level of nomophobia among students at Sumandeep Nursing College, Vadodara and develop the awareness of nomophobia through an information booklet in nursing students. **Material and Method:** In this research study a quantitative survey approach with descriptive research design is used. The sampling technique was non probability convenient sampling used to collect the 100 samples of student. Data collection was done by administering the NMP-Q. Data was analyzed by using descriptive and inferential statistics such as chi-square test. **Results:** In this study, 18% were having mild nomophobia, 68% were having moderate nomophobia, and 14% were having severe nomophobia. Also the findings show that there is an association between the levels of nomophobia with certain demographic variables.

**Conclusion:** This study has dealt with the analysis and interpretation of the data collected from 100 nursing students. Both descriptive and inferential statistics were used to analyze the data. The analysis has been recognized and presented under various sections like description of demographic variable, association between the nomophobia levels with selected demographic variables. It was found that students have 18% mild nomophobia, 68% moderate nomophobia and 14% severe nomophobia. After that we gave awareness to the students through an information booklet.

**Keywords:** *Assess, level of nomophobia, students, information booklet, develop.*

## Introduction

*“Technology is a useful servant but a dangerous master”<sup>1</sup>*

**-Christian Louis Lange**

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Nomophobia is the irrational fear of being without your mobile phone or being unable to use your phone some reason, such as the absence of a signal or running out of minutes or battery power. Nomophobia is the irrational fear of being without your mobile phone or being unable to use your phone some reason, such as the absence of a signal or running out of minutes or battery power. The term “no-mobile-phone phobia”, was coined in 2008 study by the UK Post Office who commissioned YouGov evaluating anxieties suffered by mobile phone users. The study found that nearly 53% of mobile phone users in Britain tend to be anxious when they “lose their

mobile phone, run out of battery or credit, or have no network coverage". The study, sampled 2,163 people, found that about 58% of men and 47% of women suffer from the phobia, and an additional 9% feel stressed when their mobile phones are off. 55% of those surveyed cited keeping in touch with friends or family as the main reason that they get anxious when they could not use their mobile phones. The study compared stress levels induced by the average case of nomophobia to be on-par with those of "wedding day jitters" and trips to the dentist. More than one in two nomophobes never switch off their mobile phones. The study and subsequent coverage of the phobia resulted in two editorial columns authored by individuals who minimized their mobile phone use or chose not to own one at all these authors appeared to treat the condition with light undertones of mockery, or outright disbelief and amusement.<sup>2</sup>

**Need for the Study:** Since the first mobile phone was introduced to the consumer market in 1983, these devices have become significantly main stream in the majority of societies. Mobile phone is playing an important role in this modern world. It is very hard to see a person without a mobile phone. Kids are also spending lot of time on cell phone while playing a game is a very much interest in them. Due to excessive use of cell phone nowadays people have no real friends. And their stress level is very high and they always feel anxiety while they have no cell phone in their hands. Students are so addicted nowadays to their phones. They feel that their phones are their lifeline and a moment without means literal death. They use their phone so extensively, that they click photos of their exams time tables and record the slides of PowerPoint presentation on them. They also recorded entire lectures on them. A recent study by the Hankamer School Business at Baylor University found that college students spend an average of 9 hours a day using their cell phone. While female college students spend 10 hours using the device, male college students use their cell phone for almost 8 hours a day.<sup>3</sup>

**Literature Review: Farooqui IA et.al (2017)** conducted a study Nomophobia: an emerging issue in medical institutions. Assess the prevalence of Nomophobia in the students in 1st year MBBS. Study area: A medical college in Pune city. December 2015 to February 2016. A cross-sectional study was carried out on all the students of 1st year MBBS. A predesigned and pretested questionnaire was used to collect data. Data were analyzed statistically by simple proportions using SPSS v20. A total of 145 students were monitored

according to inclusion and exclusion criteria. Amongst all the participants, 45.5% were males (66/145) and 54.5% were females (79/145). Mild Nomophobia was found in 17.9% students whereas 60% had moderate and 22.1% had severe Nomophobia. Amongst the males, 56.06% and 24.24% had moderate and severe Nomophobia, respectively while in females, moderate and severe Nomophobia was found to be 63.25% and 20.25%, respectively. Nomophobia is found to be prevalent in students of 1st year MBBS.<sup>4</sup>

**Prasad M, et.al (2017)** Nomophobia: A Cross-sectional Study to Assess Mobile Phone Usage among Dental Students. To assess the pattern of usage of mobile phones and its effects on the academic performance of students. A descriptive cross-sectional study was conducted amongst 554 students of D. J. College of Dental Sciences and Research through a self-administered questionnaire to collect the data regarding the usage and associated anxiety with mobile phone. About 39.5% students agreed that they score low marks in professional exams if they spend more time on phone. The number of students who frequently checked their cell phone during their classes or while doing clinical work were 24.7%. A total of 24.12% of the students were found to be nomophobic and at risk of being nomophobes were 40.97%. A statistically significant difference was found among preclinical, clinical, interns and postgraduates regarding the usage and effect of mobile phone on them. The pattern of usage of mobile phone among dental students showed alarming indication that students have been addicted to mobile phone which in turn affect their academic performance in a negative way. It would be useful to advise the students about the controlled as well as proper usage of mobile phone.<sup>5</sup>

## Materials and Method

**Research Design:** The research design used in this study is Non- Experimental descriptive survey design.

**Research Setting:** The study will be conducted in Sumandeep Nursing College, Piparia, Vadodara

**Samples:** 100 Students

**Criteria for Selection of Sample:**

**Inclusion Criteria:**

- Students who are studying in Sumandeep nursing college.
- Students who are willing to participate in the study.

- Students available during data collection.
- Students who are using smartphone

**Exclusion Criteria:**

- Students who are absent at the time of data collection.

**Description of Tools:**

This consists of two parts

**Section 1:** Consists of demographic variables such as Age, Gender, Year of study, Family Income, Occupation of parents, Duration of mobile usage

**Section 2:** NMP-Q consist of 20 statements.

Score	Nomophobia Level
NMP-Q Score = 20	Absent
21 ≤ NMP-Q Score ≤ 60	Mild
60 ≤ NMP-Q Score ≤ 100	Moderate
100 ≤ NMP-Q Score ≤ 140	Severe

**Data Collection Procedur:** Prior permission will be obtained from principal of sumandeeep nursing college and concerned will was taken from each respondent who will participate in this study. On the day one, the purpose of study was explained to the sample and informed consent was taken before starting the study. A test was conducted by administering standard NMP-Q to selected 100 nursing students.

**Analysis and Interpretation:** The process of organizing and synthesizing data to answer research questions and test hypothesis is known as analysis.

Data collected will be analysed by using descriptive and inferential statistics.

**Descriptive Statistics:** Frequency and percentage distribution is used to describe the demographic variables.

**Inferential Statistics:** Chi – square test will be used to associate the level of nomophobia with selected demographic variables.

**Findings:**

Section-1: Frequency and percentage distribution of socio demographic variables.

- According to age 6% nursing students were between 17-18 years, 26% nursing students were between 18-19 years, 37% nursing students were between 19-20

years and 31% nursing students were >20 years.

- According to gender 71% among them were female, and 29% were male
- According to course of study 50% had under graduate education, and 50% had diploma education
- According to family income 11% were having below 10,000Rs monthly income, 25%were having between 10,000-20,000 Rs, 32% were having between 20,000-30,000 and 32% were having >30,000 Rs.
- According to occupation of parents 33% had government job, 37% had private job, 23% had self employment and 7% had unemployed.
- According to how long they using smartphone 33% were using smartphone < 1 year, 14%were using smartphone 1 year or < 2 year, 15% were using smartphone 2 year or <3 year, 15% were using smartphone 3 year or < 4 year, 13% were using smartphone 4 year or < 5 year, and 10% were using smartphone 5 year or more.
- According to mobile data plan in their mobile phone 87% were having internet in their smartphone.
- According to 33% students were spend their time on smartphone per day for 1-2 hours, 24% students were spend their time on smartphone per day for 2-3 hours, 30% students were spend their time on smartphone per day for 3-4 hours, and 13% students were spend their time on smartphone per day for> 4 hours.
- According to 19% were check their smartphone every 5 minutes, 20% were check their smartphone every10 minutes, 20% were check their smartphone every 20 minutes, 10% were check their smartphone every 30 minutes, 17% were check their smartphone every hour, 8% were check their smartphone every 2 hours and 6% were check their smartphone every 3 hourly

Section 2: Association of nomophobia level with selected demographic variables

**Hypothesis:**

H<sub>1</sub>: There will be significant association between the levels of nomophobia with their selected demographic variables.

Data presented in research reveal that the calculated



the statistical findings shown to be statistically significant  $X^2_5$  value for occupation of parents is 15.207 at  $p < 0.05$  level and  $X^2_9$  value for how often do you think you usually check your smartphone is 33.794 at  $p < 0.05$  level. These findings show that there is significant association between the mean pre test NMP-Q score and its demographic variables.

The statistical findings shown to be stastically not significant  $X^2_1$  value for age is 9.075;  $X^2_2$  value for gender is 0.520;  $X^2_3$  value for course of study is 9.523;  $X^2_4$  value for family income is 9.636;  $X^2_6$  value for how long have you been using your smartphone is 13.245;  $X^2_7$  value for Do you have a mobile data plan allows you to access the internet through your Smartphone is 3.282;  $X^2_8$  value for Approximately how much time per day do you think you spend using smartphone is 6.014; at  $p < 0.05$  level. These findings show that there is no significant association between the mean pre test NMP-Q score and its demographic variables.

### Conclusion

The present study “Assessed the level of nomophobia among students at Sumandeep Nursing College, Vadodara with a view to develop an information booklet.” And found that the majority of students have moderate nomophobia.

According to level of nomophobia assessment 14% students suffers with severe nomophobia, 68% students suffers with moderate nomophobia, and only 18% students have mild nomophobia level.

### Recommendations:

- Similar study can be repeated on a large sample to generalize the findings.

- Comparative study can be done on students studying in school.

**Conflict of Interest:** There is no conflict of interest

**Sources of Funding:** Researchers used their own fund for their research

**Ethical Clearance:** Ethical clearance for this UG research project was obtained from the ethical commiittee SVIEC of Sumandeep Vidyapeeth deemed to be University.

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# A Study on Drug Utilization in Hypertension in Medical Care Hospital

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## Abstract

Blood Pressure is the product of the cardiac output (CO) and Total Peripheral Resistance (TPR). Hypertension means elevation of arterial blood pressure. Anti-Hypertensive drugs are the agents which either decreases or normalize the elevated blood pressure.

**Objective:** To study the prescription pattern of anti- hypertensive agents in the General Medicine department of Private Medical Hospital, Ahmedabad, Gujarat.

**Methodology:** A cross sectional observational study was carried for one month duration.

**Results:** During study, 100 hypertensive cases were collected. Among which 55% were males and 45% were females who were prescribed with anti-hypertensive agents. From various anti- hypertensive drugs, six major classes were commonly prescribed to the patients. It includes Diuretics (Ds), Calcium Channel Blockers (CCBs), Angiotensin Receptor Blockers (ARBs), Beta Adrenergic Blockers (BABs), Alpha Adrenergic Blockers (AABs) and Angiotensin Converting Enzyme Inhibitors (ACEIs). ARBs were prescribed in 31 prescriptions whereas; AABs were given in 4 patients only.

**Conclusion:** Among beta blockers, Metoprolol was the most frequently utilized anti-hypertensive drug (31.48%) and Ramipril was the least utilized drug (1.36%). The telmisartan+amlodipine FDC was the common prescribed in patients with indication of CVS complications.

**Keywords:** Hypertension, anti- hypertensive drugs, Angiotensin Receptor Blockers, Telmisartan.

## Introduction

Hypertension represents the elevation of arterial blood pressure for longer duration of time. The World Health Organization (WHO) has projected that 1.5 billion people globally are likely to suffer from hypertension by 2025.<sup>1</sup> The overall prevalence of hypertension in India is estimated at 29%.<sup>2</sup> Cardiovascular diseases are responsible for 1.5 million mortality in India. Hypertension is linked to 57% of all stroke deaths and 24% of all coronary event deaths.<sup>3</sup> Hypertension is the single most important risk factor for cardiovascular, cerebrovascular, and renal disease that can be modified by timely detection as well as decisive therapeutic intervention.

Pharmacist with help of physician and other health

care teams take required steps to improve the drug therapy.<sup>4</sup> Due to the growing epidemic of hypertension regular evaluation of the antihypertensive prescribing patterns is required. Increase in number of new antihypertensive drugs and the increase in number of drug combinations that are introduced into the market with alteration in guidelines make the study of pattern of anti-hypertension prescription more important.<sup>5</sup> The standard treatment guidelines are updated from time to time, based on evidence deriving from basic and clinical research, and guide physicians to select the most appropriate antihypertensive agent in a patient.

Pharmacoepidemiological studies like drug utilization and prescription pattern studies are an important research tool by which the impacts of

guidelines have on the selection of therapeutic agents can be assessed and analyzed. It has been observed that evidence-based clinical research is not adequately incorporated into clinical practice,<sup>6</sup> which can in turn result in suboptimal patient health-care practices. The objective of this study is to observe the pattern of utilization of antihypertensive in a tertiary care teaching hospital.

### Method and Data Collection Procedure

This cross-sectional observational study was conducted in the Private Medical Hospital, Ahmedabad, Gujarat. Before initiation of the study, the approval of the Institutional Ethics Committee was obtained. A predesigned pretested Case Record Form (CRF) was employed to collect the data. The CRF contained information about basic demographic data, Comorbid conditions, and detail recording of the antihypertensive

drugs prescribed. Patients coming to the medicine outpatient department were screened over a 1-month period. All the prescriptions were screened and that had antihypertensive medications were noted along with the hospital number. Data were represented according to gender, age of the patients, type of anti-hypertensive prescribed.

### Results

A total 100 cases of patients with antihypertensive drugs were recorded and studied. Figure 1 represented demographic characteristics of patients to whom antihypertensive drugs were administered based on age and gender. Maximum number of antihypertensive was administered in the age group of 50-60 and 60-70 years (27% in each) and among 100 cases, males were 55% and females 45%.

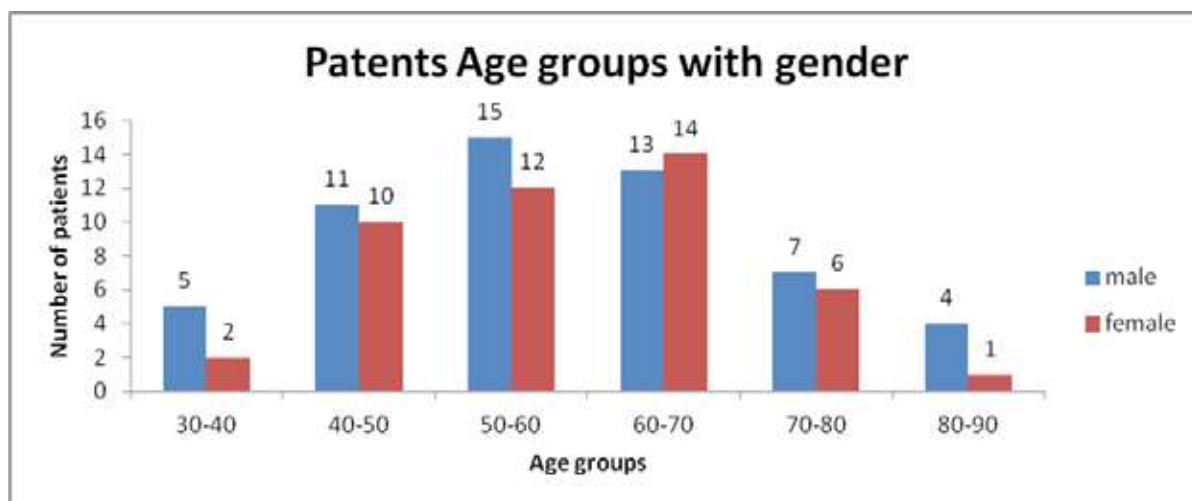
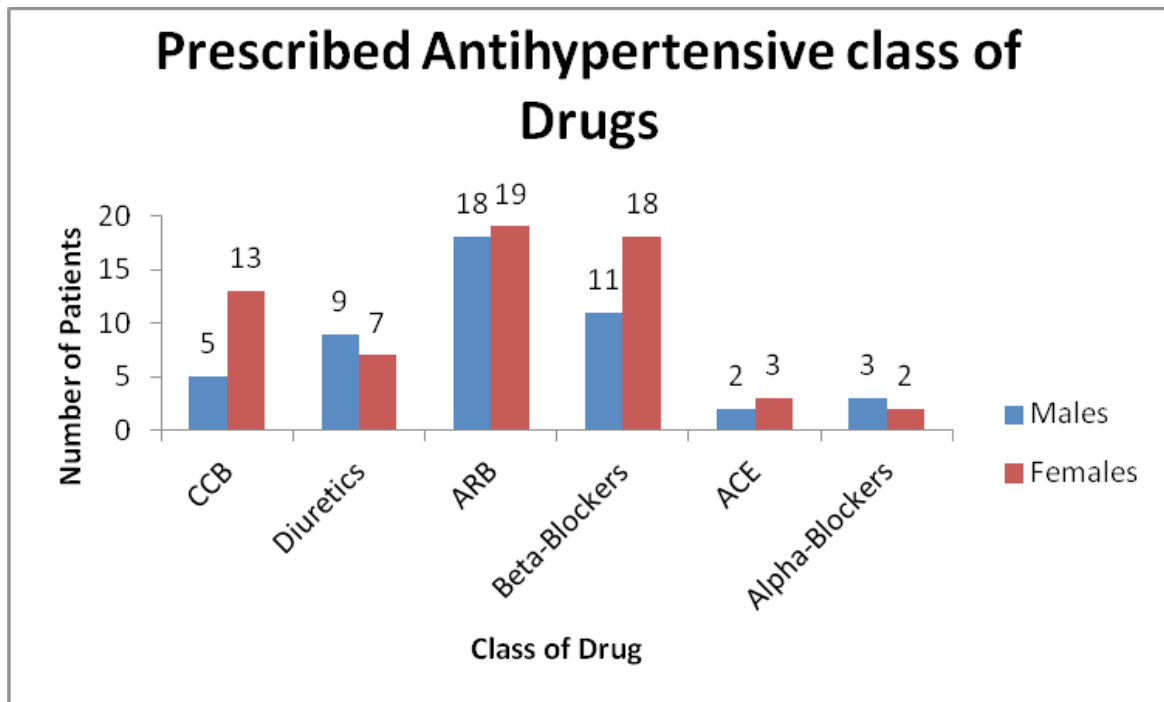


Figure 1: Distribution of Patient's gender according to Age

A classification of prescribed antihypertensive drugs among the gender is depicted in Table 1 Figure 2. Total 37 (68.8%) prescriptions were having Telmisartan as drug of choice and out of them 18 (37.5%) males and 19 (30.64%) females, followed by beta blockers (BBs) in 11 (22.91%) males and 18 (29.03%) females. The least prescribed drug was found to be a alpha blocker (9.47%).

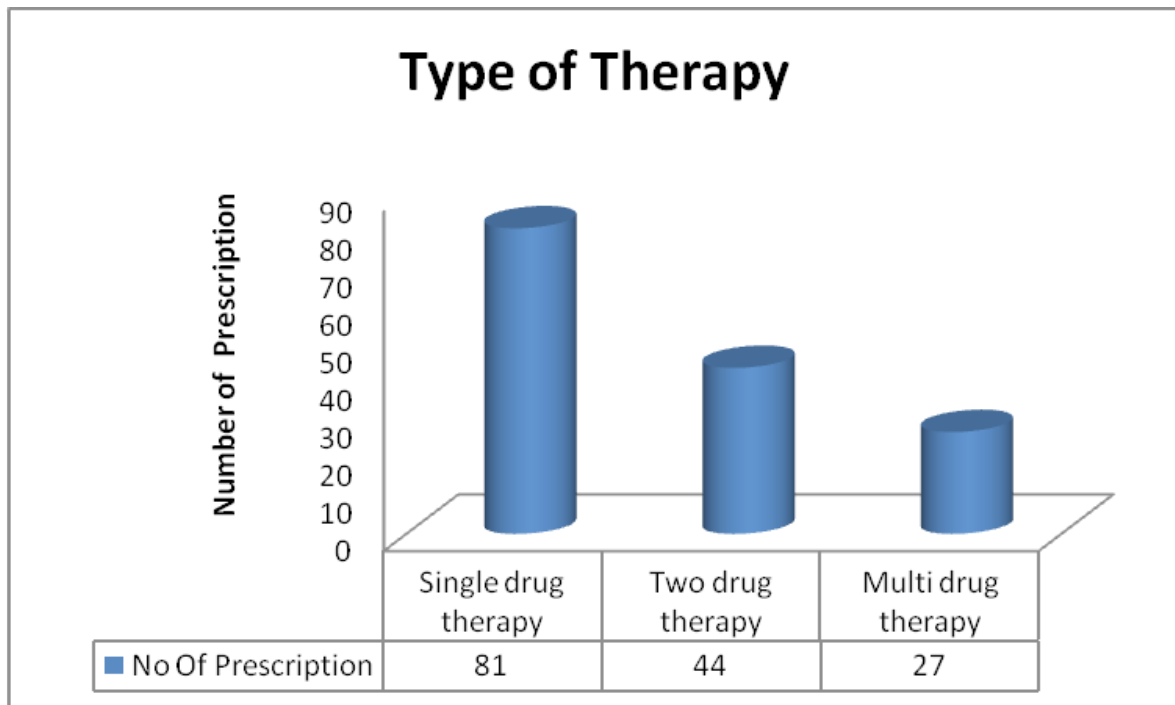
Table 1: Classification of Antihypertensive Drugs Prescribed

Classification	Males	Females	% Males	% Females
CCBs	5	13	10.41	20.96
Diuretics	9	7	18.75	11.29
ARBs	18	19	37.5	30.64
Beta-Blockers (BBs)	11	18	22.91	29.03
ACEs	2	3	4.16	4.83
Alpha-Blockers (ABs)	3	2	6.25	3.22



**Figure. 2: Classification of Antihypertensive Drugs Prescribed**

Figure 3 depicts the pattern of antihypertensive drug use on the basis of type of therapy. Combination therapy (46.7%) and monotherapy (53.28%) of antihypertensive were recorded in different group of patients.



**Figure 3: Type of Therapy**

The most frequently prescribed Fixed Dose Combinations (FDCs) was Telmisartan + Amlodipine (31.81%) followed by Telmisartan +Metoprolol (25%). The table 2 represents the pattern of FDCs antihypertensive therapies received by patients.

**Table 2: Pattern of Fixed Dose Combination among Hypertensive Patients**

Fixed Dose Combination drug	No. of Prescription	% Prescription
Two drug combination	44	
ARB+CCB	14	31.81
ARB+D	2	4.54
CCB+D	3	6.81
ACEI+CCB	3	6.81
ACE+BB	2	4.54
ARB+BB	11	25
ACEI+D	2	4.54
CCB+BB	7	15.91

The frequency of antihypertensive drug used in the medical care hospital is shown in Table 3 The most common prescribed antihypertensive drug was metoprolol and Telmesartan and the least prescribed was atenolol.

**Table 3: Frequency of Anti-hypertensive drugs prescribed**

Antihypertensive Drug	Male	Female	% Male	% Female
Furosemide	3	3	5.35	5.55
Amlodipine	9	10	16.07	18.52
Telmisartan	20	16	35.71	29.63
Metoprolol	20	17	35.71	31.48
Prazosin	1	4	1.78	7.41
Atenolol	0	1	0	1.85
Losartan	1	1	1.78	1.85
Ramipril	2	2	3.57	3.70

## Discussion

Drug utilization studies are an important Pharmacoepidemiological tools and which help in providing an in-depth insight into the disease profile of patients and prescribing behavior of clinicians. In this study, the frequency of hypertension was more in males (63.6%) than in females (36.3%). A relative male preponderance was also observed in other studies.<sup>7,8</sup> However, some studies have reported a relatively higher incidence of hypertension in females than in males.<sup>9,10</sup> The mean age of hypertensive patients was  $60 \pm 15.8$  years. A study done in Bengaluru,<sup>9</sup> in contrast to the findings of this study, observed that the mean age of the male patients was slightly less than that of female patients. In age analysis, the highest percentage of hypertensive patients was found between the age group of 50-70 years (54%). The least percentage of the patient was found between the age group of 30-40 (7%).

Monotherapy and combination therapies were prescribed to the patients as per their clinical need in

present study. ARBs have been found as most frequently prescribed class of antihypertensive as monotherapy and combination as well. The second highest prescribed antihypertensive drug group was BBs, which was a choice of drug in monotherapy and combination too. Recent research clearly demonstrated that treatment with ARBs is protective, reduces cardiovascular risk, and provides cerebral and renal protection beyond that achieved by blood pressure-lowering alone. Beta-blockers are very effective for the symptomatic treatment of patients with effort angina or arrhythmias.<sup>11</sup> Most evidence for the reduction of cardiovascular events by beta-blockers concerns acute coronary syndrome patients; especially in the presence of LV dysfunction.<sup>12</sup> The utilization of diuretics particularly that of the thiazides, was low (11.29%) as compared to all the other antihypertensive drug groups. Such underutilization of thiazides has been observed across many studies<sup>9,10</sup> despite being recommended as the first choice antihypertensive consequent to their ability to prevent major cardiovascular events<sup>13,14</sup> and low cost. The

relatively less frequent use of thiazides could be a result of concerns regarding adverse effects and poor market availability.<sup>15</sup>

Monotherapy was given in large number of patients (53.28%) as compared to combination therapies (46.28%). The least use of combination therapy could be due small patient populations observed during study. Moreover, Patients were diagnosed in early stage of Hypertension and without associated co-morbidities. Additionally, The study findings are not consistent with the JNC7 Report which states that most hypertensive patients with diabetes or renal disease will require two or more antihypertensive drugs to achieve the target blood pressure<sup>16,17</sup> of <130/85 mm Hg. In contrast to it, higher use of combination antihypertensive drug therapy in relation to monotherapy study done in Chandigarh<sup>10</sup> where approximately 46% patients received monotherapy and 54% patients received combination therapy. The findings are similar in studies done in India<sup>9,18</sup> and Ethiopia<sup>19</sup> where the use of monotherapy exceeded that of combination therapy. Variation in the frequency of patients having co morbidities observed in some of the other studies could be a reason for the predominant use of a single antihypertensive agent.

The average number of antihypertensive medicines prescribed is 1.9. the finding are similar with one study reported earlier.<sup>20</sup> The most frequently prescribed Fixed Dose Combinations (FDCs) was Telmisartan + Amlodipine (31.81%) followed by Telmisartan +Metoprolol (25%). Whereas, Metoprolol and Telmisartan were the most common prescribed antihypertensive drugs and the least prescribed was atenolol. This study represented high use of Angiotensin-II receptor blocking agents with few added benefits like better efficacy and blood pressure control in the patients. In addition, when FDCs were selected patient compliance will be enhanced and showed better blood pressure control. The British Hypertension Society Guidelines<sup>21</sup> recommends the use of ACE-I/ARBs or beta blockers in younger hypertensive (higher rennin levels) and CCBs or diuretics for elderly (lower renin levels). The findings are consistent with present study.

### Conclusion:

As it is a primitive study, although the use of antihypertensive in this hospital is relatively aligned with the recommended treatment guidelines. ARBs were the most common class of drugs recommended now a day

in clinical setting. ARBs are best in controlling blood pressure in compelling indications.

**Ethical Clearance:** Taken from Institutional Ethics committee for Human Research (IEC-HR) RPCP

**Source of Funding:** Nil

**Conflicts of Interest:** There are no any conflicts of interest.

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# A Retrospective Study to Compute the Prevalence of Pneumonia and its Associated Risk Factors among Children in Selected Tertiary Care Hospital, Kelambakkam, Kancheepuram, Tamilnadu, India

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## Abstract

A Retrospective study to compute the prevalence and associated risk factors of pneumonia among children at selected tertiary care hospital, Kelambakkam, Kanchipuram district, Tamil Nadu. The objectives are to determine the prevalence of pneumonia among children, to find out the association between selected risk factors and the occurrence of pneumonia among children. The convenience sampling was used. Data collected from the medical records from January 2017 to December 2018. Totally 312 pediatric cases were admitted for respiratory infection among which 49 cases diagnosed with pneumonia. The data was collected by using structured selected risk factors tool. The study results shows that the prevalence of pneumonia was high in the age group of 7 – 12 years and it was highly noted among females. The occurrence of pneumonia was high in rural area. The study results revealed that the prevalence of pneumonia is high mainly in monsoon season and also shows that the prevalence is more among children not vaccinated with flu and PCV vaccine. The study also revealed that the prevalence of pneumonia among children (0 – 18 years) from January 2017 to December 2018 at selected tertiary care hospital, Kelambakkam, Kanchipuram, Tamilnadu, India was 16% and it also shows that there was a significant association between the selected risk factors such as age, gender, area of residence, season, immunization status and the occurrence of pneumonia at  $P < 0.05$  level.

**Keywords:** *Pneumonia, respiratory infection, prevalence, retrospective study, risk factors.*

## Introduction

Pneumonia is an infection that inflames the air sacs in one or each lungs. The air sacs may fill with fluid or pus (purulent material) inflicting cough with phlegm or pus, fever, chills, and issues respiration. A variety of organisms, together with bacterium, viruses and fungi, can cause pneumonia<sup>1</sup>.

Pneumonia will place seriousness from gentle to life threatening. It is most serious for infants and young children, people older than age, and people with health problems or weakened the immune systems.<sup>5</sup>

Pneumonia is associate in nursing inflammation or infection of the lungs. Some have considered any lower (sublaryngeal) respiratory tract infection to be pneumonia, including viral croup, bronchitis, and

bronchiolitis of viral etiology. This review, however, focuses on infections of the gas exchange units (terminal and metastasis bronchioles, alveoli, and interstitium) usually seen in medicine apply. Note that croup, bronchitis, and pneumonia can occur simultaneously.<sup>2</sup>

**Statement of the Problem:** “A retrospective study to compute the prevalence and the associated risk factors of pneumonia among children at selected tertiary care hospital, Kelambakkam, Kanchipuram district, Tamilnadu, India.”

## Objectives of the Study:

1. To determine the prevalence of pneumonia among children with respiratory infections.
2. To find out the association between selected risk



factors and the occurrence of pneumonia among children.

### Operational Definitions

**Compute:** To calculate the number of children diagnosed with Pneumonia in the age of 0 to 18 years during the period of January 2017 to December 2018.

**Prevalence:** Prevalence is associate in nursing applied mathematics idea concerning the amount of cases of a unwellness that was gift in an exceedingly specific population at a amount of January 2017 to December 2018.<sup>4</sup>

**Pneumonia:** Pneumonia is a form of acute respiratory infection that affects the lungs and it is the single largest infectious cause of death in children worldwide.<sup>3</sup>

**Selected Risk Factors:** In this present study the researcher included the selected available related risk factors in the medical records of children diagnosed with pneumonia such as age, gender, area of residence, immunization status, season.

**Children:** In this present study the researcher focused on children in the age of 0-18 years diagnosed with respiratory infection during the period of January 2017 to December 2018.

### Material and Method

**Research Approach:** Quantitative evaluatory approach was adopted in this study.

**Research Design:** Quantitative non-interventional descriptive retrospective design was used to conduct the study

**Research Setting:** Present study was conducted at Medical Record Department, in Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram district, Tamilnadu, India. Permission to pursue the Medical Record Department document for specified data was obtained from the Dean, CHRI.

**Sample and sample size:** Data on pneumonia and associated risk factors among children was collected for the period of 2 years (January 2017 to December 2018).

### Sampling Criteria:

**Inclusion Criteria:** The study includes data on pneumonia

1. From January 2017 to December 2018
2. Among children in the age group of 0-18 years

**Exclusion Criteria:** The study excludes data other than the children with respiratory tract infections.

**Data Collection Procedure:** Data collection is the gathering of information needed to address or face a research problem. The data collection was done for a period of 1week from 01.04.2019 to 07.04.2019 at 8.30 am to 4.00 pm in Medical Record Department. In Medical Record Department they provide all the case files which was diagnosis as Pneumonia from the month of January 2017 to December 2018 for all age group. And we have separate the case files from the age of 0-18 years which is needed for our study. The needed data was collected on all the days. Data confidentiality was maintained.

**Research Tool:** Part 1: Structured tool on selected risk factors of pneumonia.

**Analysis and Interpretation:** The study results shows that the prevalence of pneumonia was high in the age group of 7 – 12 years and it was highly noted among females. The occurrence of pneumonia was high in rural area. The study results revealed that the prevalence of pneumonia is high mainly in monsoon season and also shows that the prevalence is more among children not vaccinated with flu and PCV vaccine. The study also revealed that the prevalence of pneumonia among children (0 – 18 years) from January 2017 to December 2018 at selected tertiary care hospital, Kelambakkam, Kanchipuram, Tamilnadu, India was 16% and it also shows that there was a significant association between the selected risk factors such as age, gender, area of residence, season, immunization status and the occurrence of pneumonia at  $P < 0.05$  level.

### Conclusion

**Frequency and percentage Distribution of selected risk factors among children with respiratory infection:** The Study findings revealed that the frequency and percentage distribution of selected risk factors among children with respiratory infection that most of the children in the age groups of 0 – 6 years and majority of them were males. Majority of the children belongs to urban area and most of the children hospitalized in the month of winter season. Most of the children hospitalized were not vaccinated with flu and PCV vaccines.

**Frequency and percentage distribution of selected risk factors among children with Pneumonia:** The study findings shows that the prevalence of pneumonia was high among the children belongs to rural areas and not vaccinated with flu and PCV vaccine. The percentage of pneumonia was high in the age groups of 7 – 12 years among children. The percentage of pneumonia was high among female gender and the prevalence of pneumonia was high in the monsoon season.

**Estimation of prevalence of pneumonia among children with respiratory infections:** The study results shows that the total number of admitted pediatrics with respiratory infection from January 2017 to December 2018 were 312 and 49 cases were diagnosed with pneumonia. The prevalence of pneumonia in our study was 16%.

**Association between selected risk factors and the occurrence of pneumonia among children:** The study results revealed that there was significant association between the selected risk factors such as age groups, gender, area of residence, season and immunization status and the occurrence of pneumonia at  $P < 0.05$  level.

**Conflicts of Interest:** Nil

**Source of Funding:** Self funding and no external funding.

**Ethical Clearance:** Obtained clearance from institutional human ethical committee on 04.02.2019.

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# A Comparative Study to Evaluate Early Postoperative Complications and Short-Term Quality of Life Assessment Between Stripping and Endovenous Laser Therapy in the Treatment of Chronic Venous Insufficiency Patients: A Study From North India

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## Abstract

**Introduction:** Most common cause of chronic venous insufficiency (CVI) is Great saphenous vein (GSV) followed by short saphenous vein (SSV) insufficiency. Various modalities for the treatment of CVI are Endovenous thermal (by laser or radiofrequency) ablation, Foam sclerotherapy and Ligation and stripping of GSV.

Endovenous thermal therapy is costly for the patients residing in the developing country. Herewith we have compared quality of life and early complications between ligation and stripping (L & S) of GSV and Endovenous laser therapy (EVLT).

**Method:** Patients of CVI were diagnosed clinically and radiologically by duplex doppler USG. Fifteen patients in group 1(L & S) and 22 patients in Group 2 (EVLT) were followed at the 6 weeks, 3 months and 6 months.

Early post procedural outcomes were documented at one week. Generic health was assessed by SF 36 tools and Specific health was assessed by Aberdeen varicose vein questionnaires (AVVQ) at baseline (preprocedural), at 6 weeks,3 months and at 6 months.

**Results:** Postoperative pain in group 1 and group 2 patients were in 20.0% and 04.5% patients respectively( $p>0.05$ ). Paresthesia was in 26.7% and 9.1% respectively ( $p >0.05$ ). Skin hyperpigmentation was 00.00% and 4.5% respectively ( $p 0.403$ ). In both groups, infection was found in 20.0% and 04.5% respectively ( $p 0.137$ ). Tract haematoma along GSV was in 13.3% and 0.00% respectively in both groups.

Physical function, role limitation due to physical problems and emotional problems, emotional well-being, social function, pain, general health at end of 6 weeks and at end of 6 months were slightly better in EVLT patients but was insignificant ( $p >0.05$ ). DVT and recurrence were absent in both groups.

**Conclusion:** Regarding treatment of CVI, Early post-operative complications, Short term General and disease specific QoL is slightly better in patients having EVLT than L & S, but is statistically insignificant.

**Keywords:** *Chronic venous insufficiency, ligation and stripping (L & S) of GSV, Endovenous laser therapy (EVLT), Quality of Life Assessment.*

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### Introduction

Varicose vein refers to dilated, elongated and tortuous superficial vein of leg having reflux. Prevalence

varies from 01% to 73% in females and 2% to 56% in male. Most commonly it is caused by Great saphenous vein (GSV) insufficiency (60- & 70%) followed by short saphenous vein (SSV) insufficiency (10-15%) and it may be due to both (10-15%)<sup>1,2</sup>. Treatment modalities of chronic venous insufficiency (CVI) are Endovenous thermal (laser or radiofrequency) ablation, Foam sclerotherapy, saphenofemoral junction (SFJ) ligation and stripping (L & S) of GSV up to knee joint<sup>3-7</sup>.

Endovenous thermal therapy can be performed by Laser or radiofrequency. Various studies have shown that both are equally effective while few studies show that RFA causes less pain. Stripping of GSV causes slightly more paresthesia, pain, bruising, and tract hematoma. 1470 nm laser fiber is water specific and it shows better results as compared to 810 nm, which is hemoglobin specific<sup>8,9</sup>.

Herewith authors have evaluated early postoperative complications and short-term quality of life (QoL) between Ligation and stripping (L & S) and EVLT of GSV in patients having CVI.

## Material and Method

Patients admitted at King George's Medical University, Lucknow, for the treatment of CVI were enrolled and evaluated by duplex doppler USG in standing position.

This study was open Level, Parallel groups having two arms. Group 1 for L & S and Group 2 for EVLT. Duration of study was from October 2017 to July 2018 and patients were followed for 6 months.

Primary end points were to evaluate early post interventional complications at one week. Secondary end points were to evaluate Generic QoL by SF 36 items and disease specific QoL by Aberdeen varicose vein questionnaires in both groups.

Patients having primary Varicose vein, having age more than 15 years in any grade from C3 to C6 (CEAP classification) were included for this study. Patients having DVT or any other secondary varicose vein (Pregnancy, Pelvic mass) deranged coagulation profile, AV fistula, BMI  $\geq$ 40, or any patients not giving consent for the study were excluded.

If reflux time on duplex doppler in standing position at saphenofemoral junction (SFJ) and saphenopopliteal junction (SPJ) on Valsalva or calf muscle squeeze

was more than 500 msec and in perforating vein more than 350 msec, then these valves were considered incompetent.

Patients having SFJ incompetency were treated by L & S in group 1 and patients in Group 2 were treated by EVLT.

Patients having concurrent SPJ incompetency was treated by SPJ ligation and division of SSV and passing Foam sclerosant in SSV (1.5% Polidocanol). In both groups, varicosities of tributaries were treated by USG guided Foam sclerotherapy (1% polidocanol). Foam prepared by mixing 1% polidocanol with 4 times room air (Tessari technique) in Luer lock syringes, connected to triway stopcock.

Duplex doppler USG were performed in these patients at baseline, 6 weeks, 3 months and at 6 months. Pain, hyperpigmentation, hematoma, DVT, paresthesia and recurrence were documented on one week for primary end points.

Anatomical closure in group 1 was defined as total absence of GSV in the stripped part while in group 2 it was defined as total occlusion of ablated GSV.

Before treatment(baseline)parameters for QoL by SF 36 tool and AVVQ were noted. After treatment, patients were followed up at end of 6 weeks, 3 months and at end of 6 months and these parameters were documented (in the OPD or on the cell phones).

Generic health was assessed by 36 item Short Form Survey (SF 36) scoring instructions version 1.0.<sup>10</sup>. These were scored by RAND 36 Score calculator available online<sup>11</sup>.

Aberdeen varicose Vein questionnaires (AVVQ) contain 13 questions. AVVQ scores range from 0 to 100, with the manikin diagram contributing up to 22 points, depending on the extent of the varicose veins<sup>12,13</sup>. The total score for 13 questions ranges from 0 to 100, patients with 0 points indicates best quality of life<sup>14</sup>.

**Ligation and Stripping (Group 1):** This procedure was performed under spinal anesthesia. Under USG guidance SFJ site was marked and incision planned. All three tributaries along with GSV were ligated and divided at SFJ. Stripper was passed through this cut end of GSV and was taken out at knee level through a small incision. Lower end of stripper at knee was ligated along with GSV and stripper was pulled through groin incision.

GSV was stripped from groin to knee. Immediately elastic crepe bandage was applied.

**Endovenous Laser Therapy (Group 2):** EVLT was performed under spinal anesthesia. This was performed ultrasound guided with a 1470 nm diode laser on pulse mode by Biolitec machine. In brief, USG guided venous access was obtained by puncturing the vein at knee level by a 16 FrSeldinger needle. After entrance to varicose vein, J tip guide wire was passed fascial dilator with introducer sheath was introduced inside the GSV. Laser fiber was passed into GSV through introducer sheath up to 2 cm below to SFJ. Tumescant fluid (normal saline) was infiltrated in perivenous space deep to saphenous fascia (5 ml/cm). energy setting of 8W power and energy 60 j/cm on pulse mode. Fiber was pulled out 1 cm at every 10 seconds interval.

**Statistical Analysis:** Categorical variables were presented in numbers and continuous variables was presented as mean  $\pm$  SD. Quantitative variables was

compared using Unpaired t-test between two groups and paired t test was used to compare pre and post-operative values. Mann Whitney U test was applied to compare preop and post op variables in different time intervals. A p value of  $<0.05$  was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 16.

## Results

Total 44 patients were enrolled in the study and were divided in two groups of 22 each. Out of these, 15 patients in group 1 and 22 patients in group 2 were completely followed up for 6 months.

In the study, we found Anatomical closure rate 100% in group 1(total absence of GSV in treated part) and 90.90% (20 patients) in group 2 at 6 months. No recurrence was found till 6 months in both groups.

**Table 1. Demography of Patients**

Attributes		Group 1(n=15)	Group 2(n=22)
Age (Mean)		37	38.00
Sex CEAP	Male	13(86.7%)	16 (72.7%)
	Female	02 (13.3%)	06 (27.3%)
	C3	04 (26.6%)	06 (27.2%)
	C4	06 (40.0%)	08 (36.3%)
	C5	04 (26.66%)	06 (27.2%)
	C6	00	00

**Table 2. Early post-operative outcomes**

	Attributes	Group 1 (L & S) n=15	Group 2 (EVLT) N=22	p-value
1	Post-operative pain (VAS score)	2.8 $\pm$ 2.24	2.64 $\pm$ 2.25	0.83
2	Paresthesia	4 (26.7%)	2(9.1%)	0.154
3	Hyperpigmentation	0	1(4.5%)	0.403
4	Surgical site infection	3(20.0%)	1 (4.5%)	0.137
5	DVT	0	0	
6	Tract hematoma	2(13.3%)	0(0%)	0.078

**Table 3. SF 36 items**

	Characteristics	Group	Baseline Mean score. (SD)	At 6 weeks Mean score (SD)	3 months Mean score(SD)	6 months Mean Score (SD)
1	Physical function	Group1	75.87(1.77)	80.07(1.67)	83.67(1.23)	87.47(2.07)
		Group2	76.91(1.66) (p 0.076)	81.73(0.88) (p<0.001)	84.32(0.89) (p 0.071)	88.(1.48) (p 0.366)
2	Role limitation due to Physical Problems	Group1	55.83(12.38)	60.0 (13.53)	70 (9.21)	79.17 (13.08)
		Group2	55.68(13.21) (p 0.972)	59.66(14.91) (p0.944)	66.48(8.95) (p 0.253)	71.59(11.03) (p 0.065)
3	Role limitation due to Emotional problem	Group1	71.27(21.37)	82.33(21.28)	89(16.10)	89(16.10)
		Group2	72.86(22.18) (p 0.829)	81.91(22.35) (p 0.954)	89.5(15.73) (p 0.094)	89.5(15.73) (p 0.926)
4	Energy	Group1	63.33(6.73)	66.00(5.73)	68.33(6.17)	69.33(5.63)
		Group2	63.18(6.46) (p0.945)	65(4.88) (p0.572)	67.05(5.04) (p0.491)	70.00(4.63) (p0.696)
5	Emotional wellbeing	Group1	62.4(6.20)	64(5.01)	66.93(5.34)	68.27(6.32)
		Group2	66.36(4.73) (p0.034)	65.64(4.88) (p0.329)	68.91(4.26) (p0.220)	72.91(3.89) (p0.009)
6	Social Function	Group1	64.4(9.25)	71.93(8.71)	73.6(9.25)	75.20(8.19)
		Group2	63.86(9.35) (p0.864)	70.73(8.10) (p0.669)	72.45(9.33) (p0.715)	74.05(7.58) (p0.662)
7	Bodily Pain	Group1	73.6(10.24)	78.4(8.82)	81.93(7.56)	84.4(6.20)
		Group2	74.95(10.84) (p0.705)	80.05(8.23) (p0.566)	82.86(7.20) (p0.708)	82.86(7.20) (p0.505)
8	General health	Group1	65(5.35)	68.33(4.08)	69.33(3.72)	70.33(4.42)
		Group2	65.23(5.23) (p0.898)	69.09(3.98) (p0.577)	70(3.45) (p0.579)	70.91(4.26) (p0.693)

- Physical Function: At 6 weeks it was in favor of EVLT and was statistically significant (p<.001). but at baseline, 3 month and at 6 month were insignificant in both groups.
- Role limitations due to physical problems was statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups.
- Role limitation due to emotional problems was statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups.
- Difference in energy were statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups.
- Emotional well being was significant (p- 0.034). different at base line in both the groups while it was insignificant at 6 weeks, 3 month and at 6 month in both the groups.
- Social function difference was statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups.
- Bodily Pain difference was statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups.
- General Health difference was statistically insignificant at baseline, 6 weeks, 3 month and at 6 month in both the groups

**Table 4. Aberdeen varicose vein questionnaire scores**

Attributes	Group	Mean	Std. deviation	p-value
Baseline	Group1	14.88	10.60	0.342
	Group2	18.65	12.34	
6 Weeks	Group1	08.63	07.94	0.416
	Group2	06.53	07.40	
3 Months	Group1	4.0772	6.00550	0.293
	Group2	2.2479	4.43622	
6 Months	Group1	04.07	06.00	0.293
	Group2	02.24	04.43	

**Aberdeen Varicose vein scoring:** At 6 weeks, 3 months and 6 months Quality of life was better in Group 2 but was statistically insignificant

### Discussion

The wavelengths applied in EVLT treatment ranged from 810 to 1320 nm, and these were associated with recanalization in 5% of the patients in the first year<sup>15,16</sup>.

In a RCT by Dermody M, they found that there was a significantly higher rate of wound infection for L & Svs EVLT. The paresthesia rate was significantly lower with EVLT (3.8%) as compared with L & S (7.4%)<sup>17</sup>. In our study we found SSI in 20% in group 1 and 4.5% in group 2 while paresthesia was 26.7% in group1 and 9.1% in group 2.

In RCT by Jan et al, the difference in treatment failure at 2 years between EVLT (7 of 98) and HL/S (0 of 99) was insignificant<sup>18</sup>. In our study we found Anatomical closure rate 100% in group 1 (total absence of GSV in treated part) and 90.90% (20 patients) in group 2 at 6 months<sup>18</sup>.

In a study by Pan Y, Procedural failures were more common following EVLA than in conventional surgery at one- and two-year follow-up. However, fewer complications were observed in EVLA compared with HLS, including bleeding and hematoma (1.28% versus 4.83%), wound infection (0.33% versus 1.91%) and paresthesia (6.73% versus 11.27%)<sup>19</sup>.

In a meta-analysis, performed at 12 months postintervention, surgical ligation and vein stripping versus the other interventional procedures were equally effective approaches to treat GSV incompetence in terms of quality of life<sup>20</sup>.

Cryostripping is less traumatic, with lower rates of complications and recurrence, than conventional stripping<sup>21,22</sup>. Cryostripping is more cost effective than EVLT<sup>23</sup>. No difference in outcomes and postoperative complications in cryo stripping and EVLT groups<sup>24</sup>.

In a RCT by Rasmussen LH studied laser, radiofrequency, foam and stripping groups. Disease-specific quality-of-life and Short Form 36 (SF-36®) scores was improved in all groups by 1-year follow-up. In the SF-36 domains, bodily pain and physical functioning, the radiofrequency and foam groups were performed better in the short term than the others<sup>25</sup>.

### Conclusion

Early postoperative outcomes is slightly more in ligation and stripping of GSV for the treatment of CVI but is statistically insignificant. Short term generally (by SF 36) is slightly better in Patients of having EVLT but is statistically insignificant. Physical function is better in patients having laser therapy at 6 weeks. Disease specific QoL (by AVVQ) is better for laser therapy but is statistically insignificant. So, we concluded that both therapies are almost equally effective.

**Conflicts of Interest:** None

**Source of Funding:** self

**Ethical Clearance:** yes

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# Risk Assessment of Catheter Associated Urinary Tract Infection among Catheterised Patients at Selected Hospital at Mangaluru

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## Abstract

**Objectives:** The objectives of the study is to assess the relation between the risk scores and the demographic variables and to assess the risk of occurrence of catheter associated urinary tract infection among catheterized patients.

**Method:** A descriptive study was conducted among 100 catheterized patients from selected hospitals at Mangaluru from October 2018 to January 2019. Probably simple random techniques was used in the study to select the sample. A standardized risk assessment tool was used to find out the risk rate of the patient.

**Result:** The result showed that 74%% of the patients is at medium risk for getting CAUTI. The study shows that there is an association between the risk score and demographic variable such as size of the catheter used and there is no significant association between the other demographic variables and the risk scores.

**Conclusion:** There is a medium risk for the catheterized patients for getting catheter associated urinary tract infection.

**Keywords:** *Catheterization, catheter associated urinary.*

## Introduction

Urinary Catheterization, a sterile procedure including the introduction of a tube into the urinary bladder through urethra to drain the bladder<sup>1</sup>. Urinary tract infections are the most common nosocomial infection accounting for up to 40% of infections reported by acute care hospitals<sup>2</sup>. Up to 70%-80% urinary tract infection are associated with the presence of an indwelling catheter. Recent studies shown that a urinary catheter is the most common indwelling device, about 17.5% of patients in 66 European hospitals and 23, 6% in US hospitals<sup>3</sup>. About 5 million urinary catheters are put annually in US. Between 12% to 25% of the patients will receive urinary catheters on their hospital stay, in this half are placed without indication<sup>4</sup>. About 40% of the physicians are unaware that their patients are having urinary catheter<sup>5</sup>. Urinary tract infections account for approximately 40% of all hospital. Acquired infections

annually and also accounting for about 23% of hospital acquired infection among adults ICU patients in US in the general care ward it usually tend to increase ranging from 4.7 infections per 1000 catheter days in adults step downs units to 16.8 infections in rehabilitation units<sup>4</sup>

Urinary tract infections are most common health care associated infections. The main cause is indwelling catheters, catheter care, host susceptibility, drainage system connected are main contributing factors for occurrence of urinary tract infections . This could be a major issue to be taken care by all health care professionals to prevent and control the infections up to the extent while caring the patients with indwelling catheters. If the urinary bladder empties completely while voiding there will be no chance for bacterial growth in the urinary tract<sup>6</sup>. Areas of catheterization also play a major role in contributing to urinary tract infections. This means catheterization done other than operation theatre

shows a high incidence rate of CAUTI. Daily catheter care is an important factor that can minimize the risk of infection in the patient with indwelling catheters. Aseptic technique can follow while caring with patients and after catheterization position of the catheter (thoroughly fixed to patient’s thighs), drainage bag (below the bladder level) is properly monitored. Personal hygiene is very necessary and important, especially regular personal hygiene is mandatory when the patient is on indwelling catheter. Patients should be taught and aware of the importance of personal hygiene<sup>7</sup>.

**Materials and Method**

The study was conducted at a selected hospital of Mangaluru and the hospital were selected based on the feasibility of conducting the study and the availability of the samples. The probability simple random technique was used for selection of the sample. The study samples were consisting of 100 catheterized patients. The a standardized risk assessment tool was used to assess the risk of CAUTI.

**Finding:**

**Section 1:** Assess the risk of occurrence of catheter associated urinary tract infection.

**Table: Frequency and percentage distribution of subject according to risk rate.**

Level of Risk	Frequency	Percentage
High	18	18%
Medium	74	74%
Low	8	8%

Table table 1: shows that maximum(74%) have medium risk, 18% have high risk and 8% have low risk.

**Section 2: association of the risk scores and the selected demographic variables.**

In order to find out association between risk scores and selected demographical variable, the following null hypothesis was stated

**H<sub>1</sub>:** There will be a significant association between risk scores of catheterized patients with their selected demographic variables

**Table 2: Association between risk scores and selected demographic variables. n=100**

Sl. No.	Variables	Rating			df	Chisquare	Inference
		High Risk	Medium Risk	Low Risk			
1.	Age				6	0.90	NS
	30-40	1	15	2			
	41-50	7	29	1			
	51-60	8	25	2			
	61-70	2	5	3			
2.	Gender				2	0.571	NS
	Male	9	47	5			
	Female	9	27	3			
3.	Education				8	0.91	NS
	No formal education	4	5	3			
	Primary	4	28	2			
	Secondary	5	14	3			
	Pre university	2	14	0			
	Graduation and above	3	13	0			
5.	Period ofCathterizatn				6	0.89	NS
	<5	10	33	0			
	6-10	3	7	2			
	11-15	3	20	2			
	>16	2	14	4			

Sl. No.	Variables	Rating			df	Chisquare	Inference
		High Risk	Medium Risk	Low Risk			
6.	History of Surgery				2	0.252	NS
	Yes	9	47	3			
	No	9	27	5			
7.	Other disease				2	0.996	NS
	Yes	11	45	5			
	No	7	29	3			
8.	Catheterization Performed by				2	0.048	NS
	Doctor	15	63	4			
	Staff nurse	3	11	4			
9.	Antibiotic Therapy				2	0.309	NS
	Yes	11	57	5			
	No	7	17	3			
10.	Size of the Catheter				6	0,002	S
	14fr	16	62	3			
	16fr	1	7	1			
	18fr	1	4	2			
	20fr	0	1	2			
11,	Placement of Uro bag				6	0.382	NS
	Above the bed above the level of the bladder	4	10	2			
	Below the bed below the level of the bladder	3	3	1			
	Above the bed above the level of the bladder	7	44	3			
	Below the bed Below the level Of the bladder	4	17	2			

NS = Not significant; S = Significant.

The table ton shows that there is a significant association between the risk score and the demographic variables such as size of the catheter and there is no association between the other demographic variables. For the null hypothesis is rejected and the research hypothesis is accepted.

### Conclusion

The study result shows that there is a medium risk for the catheterized patients to get CAUTI and there is a significant association between the risk score and the demographic variables such as size of the catheter and there is no significant association between risk scores and other demographic variables.

**Ethical Clearance:** Yenepoya ethics committee-1 approved our study protocol number 2018/061 titled

“Risk assessment of catheter associated urinary tract infection among catheterized patients in a selected hospital at Mangaluru ” on 17/09/2018 under the chairmanship of Dr. Uma Kulkarni.

**Source of Funding:** Self

**Conflicts of Interest:** Nil

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# Evaluation of Serum Level of RANTES among Vitiligo Patients before and After Treatment by Fractional Carbon Dioxide Laser

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## Abstract

**Aim:** RANTES (Regulated upon Activation, Normal T cells Expressed and Secreted) is a CC chemokine that plays a critical role in activating and attracting a variety of cells. The present study aimed to evaluate the expression of RANTES among stable non segmental vitiligo patients before and after treatment by fractional CO<sub>2</sub> laser.

**Method:** The present study was a non-randomized, comparative, trial that included 30 adults' patients with stable non-segmental vitiligo and 15 age and gender-matched healthy volunteers as a control group. All eligible participants were exposed to sunlight twice daily for three months. In addition, patients with vitiligo received three sessions of fractional CO<sub>2</sub> (10600nm) laser therapy with one month apart between each session. Assessment of serum RANTES in all subjects was done using enzyme-linked immunosorbent assay (ELISA) technique

**Results:** The mean RANTES significantly decreased to reach  $980.483 \pm 1957.1$  ng/L in vitiligo patients three months after treatment ( $p < 0.001$ ). Similarly, the mean VAS score significantly decreased to reach  $12.7 \pm 8.2$ . There were statistically significant differences between patients group and control group in terms of RANTES ( $p < 0.001$ ); patients had significantly higher RANTES values than the control group before and after treatment.

**Conclusion:** In conclusion, the current study suggests a possible involvement of RANTES in the development of vitiligo lesions and it could be considered as a possible marker for screening of early disease.

**Keywords:** Vitiligo; Chemokines; Inflammatory markers; RANTES.

## Introduction

Vitiligo is a multifactorial, idiopathic, depigmentation disorder of the skin that is characterized by destructive loss of melanocytes. Recent epidemiological studies reported that the prevalence of vitiligo ranged from 0.1%–0.2% of the global population, with higher prevalence in Africa and female predominance<sup>1,2</sup>. The pathophysiology of vitiligo is still largely unknown. However, recent reports demonstrated that autoimmunity

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represents the basic pathophysiological process of vitiligo which develops in response to different environmental and inflammatory triggers in genetically-susceptible individuals<sup>3,4</sup>. Such triggers can induce oxidative stress in melanocytes with subsequent cellular disruptions and upregulation of a number of cytokines and chemokines<sup>5,6</sup>. Consequently, this upregulation attracts inflammatory cells infiltration into the epidermal and follicular tissues which lead to the development of histopathological pattern of vitiligo<sup>7</sup>.

While the role of some cytokines as Interferon- $\gamma$  (IF- $\gamma$ ) in the pathogenesis of vitiligo is well-established<sup>8</sup>, the involvement of some other chemokines is still controversial. RANTES (Regulated upon Activation, Normal T cells Expressed and Secreted) is a CC chemokine that plays a critical role in activating and attracting a variety of cells including T $\square$ helper (Th1) 1 cell and Th2 $\square$ mediated responses<sup>9</sup>. Previous studies have shown a significant upregulation of RANTES in many inflammatory diseases including rheumatoid arthritis, asthma, atopy, and diabetic nephropathy<sup>10,11</sup>. Nevertheless, there is a scarcity in the published literature which assessed the role of RANTES in vitiligo pathogenesis.

Effective treatment is critical in order to optimize the physical and psychological outcomes of vitiligo patients. Narrowband ultraviolet B (NB-UVB) therapy is one of the established treatment of vitiligo which induce immunosuppression and melanocyte proliferation<sup>12</sup>. However, owing to adverse reaction of NB-UVB, sun exposure represents a convenient alternative, especially in sunny countries<sup>13</sup>. In addition, the CO<sub>2</sub> fractional laser has emerged as treatment option in vitiligo with fair re-pigmentation rates and patients' stratification when combined with NB-UVB<sup>14</sup>. It was reported that the CO<sub>2</sub> fractional laser acts in vitiligo by alternating the release of cytokines and inducing growth factors for melanocytes proliferation<sup>15</sup>. Thus, it is postulated that the combination of CO<sub>2</sub> fractional laser and sun exposure can be associated with significant downregulation of vitiligo-related chemokines such as RANTES.

The present study aimed to evaluate the expression of RANTES among stable non segmental vitiligo patients before and after treatment by fractional CO<sub>2</sub> laser in order to detect if it could be a possible indicator for the prognosis of treatment through an easy laboratory test.

## Materials and Method

**Study Design and Sampling:** The present study was a non-randomized, comparative, study that was conducted at dermatology outpatient clinic of National Research Centre and National Institute of Laser Enhanced Science of Cairo University from August 2017 till March 2019. Adults' patients were included if they had stable non-segmental vitiligo. All patients should have stable refractory lesions with no improvement to conventional treatments. We excluded pregnant or breastfeeding women, active infection, or other autoimmune diseases. In addition, age and gender-matched healthy volunteers were included as a control group.

A non-probability, consecutive, sampling technique was utilized to recruit eligible patients. The sample size calculation was done using Stats Direct statistical software version 2.7.2 for MS (Windows, StatsDirect Ltd., Cheshire, UK) and the effect size was obtained from Yang et al<sup>16</sup>. The study included 45 subjects who were divided into two groups: Laser group which included 30 patients with stable non segmental vitiligo and control group which included 15 healthy volunteers.

**Interventions:** Eligible participants were exposed to sunlight daily for three months. In addition, patients with vitiligo received three sessions of fractional CO<sub>2</sub> (10600nm) laser therapy with one month apart between each session. The sun exposure was applied to the affected area at the 5<sup>th</sup> day after each session and the non-affected area was protected by sunscreen.

**Data Collection:** The following data were collected from every participants: demographic characteristics, clinical types and/or patterns of vitiligo, Vitiligo Area Severity Index (VASI)<sup>17</sup>, and serum RANTES level.

**Detection of RANTES:** Before the application of study intervention, venous serum samples 3-5 cc were withdrawn from the anti-cubital fossa of each subject and were left to clot for 30 minutes at room temperature, then the samples were subjected to centrifugation for 10 minutes at 5000 rotation per minute (rpm). The supernatant serum was separated in ependorph tubes and stored at -80 $\square$ c till the time of analysis. Repeated freeze and thaw cycles were avoided. Assessment of serum RANTES in all subjects was done using enzyme-linked immunosorbent assay (ELISA) technique through a kit supplied by Glory Science Co., Ltd, Del Rio, TX 78840, USA. This step was done in the Medical Biochemistry

department in the National Research Center. By the end of third month, the serum RANTES level was measured again.

**Statistical Analysis:** Data analysis was carried out using SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 22 for Microsoft Windows. Quantitative data were described in terms of mean±standard deviation (±SD), while qualitative data were expressed as frequencies (number of cases) and relative frequencies (percentages). Comparison of numerical variables between the study groups was done using Mann Whitney U test for independent samples. Correlation between various variables was done using Spearman rank correlation equation. A probability value (p-value) less than 0.05 was considered statistically significant.

### Results

In the present study, 30 patients with vitiligo and 15 age and sex-matched controls were included. The mean age of the patients was 33.3 ±14.3 years and the majority of patients were females (60%). Almost 33% of the patients had positive family history. There were

no statistically significant differences between patients group and control group in terms of age (p =0.75) and gender (p =0.81). In contrary, there was statistically significant difference between patients group and control group in terms of family history (p <0.001). Patients with vitiligo were more likely to have positive family history. The face was the most common site of initial lesion. At study’s enrollment, the mean VASI score of the patients was 23.03 ±12.7 and the mean RANTES score was 1223.4 ±588.6 ng/L.

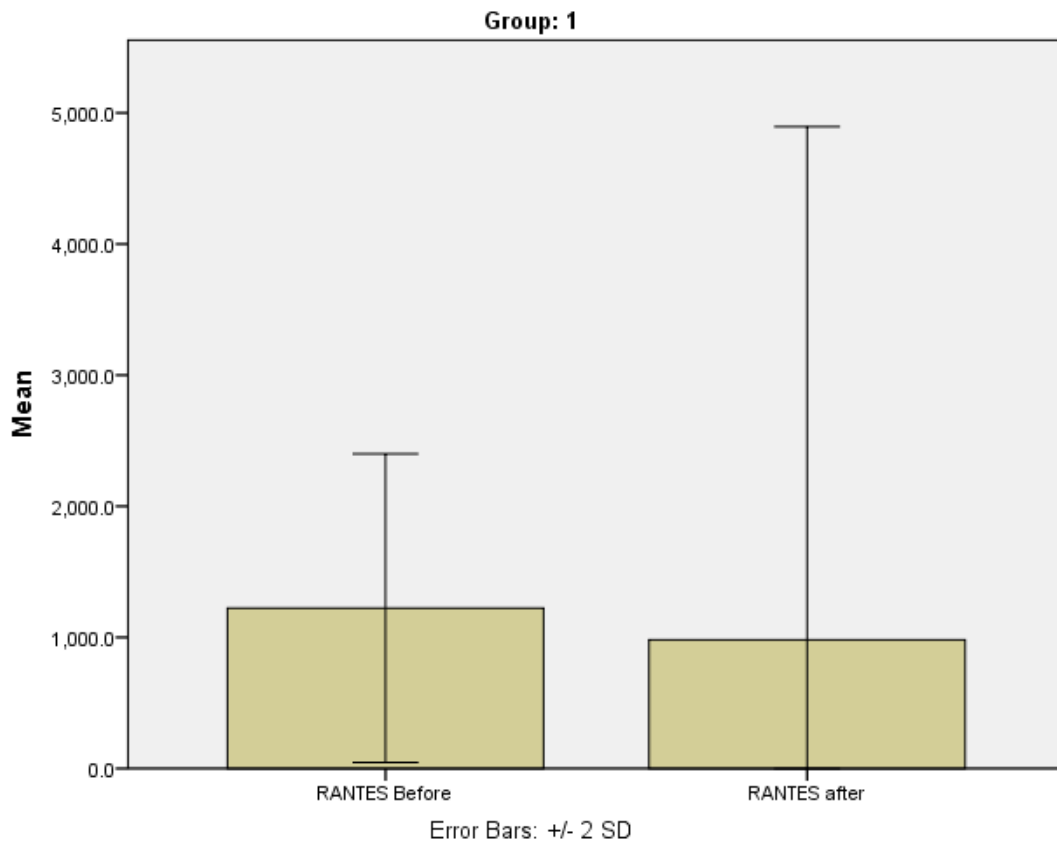
With regard to the change in study’s outcomes after treatment, the mean RANTES significantly decreased to reach 980.483 ± 1957.1 ng/L in vitiligo patients three months after treatment (p <0.001) (**Figure 1**). Similarly, the mean VASI score significantly decreased to reach 12.7 ±8.2 (p <0.001) (**Figure 2**). Notably, there was no significant change in RANTES level in control group after exposure to sunlight. There were statistically significant differences between patients group and control group in terms of RANTES (p <0.001); patients had significantly higher RANTES values than the control group before and after treatment (**Table 1**).

**Table 1: The changes in RANTES values**

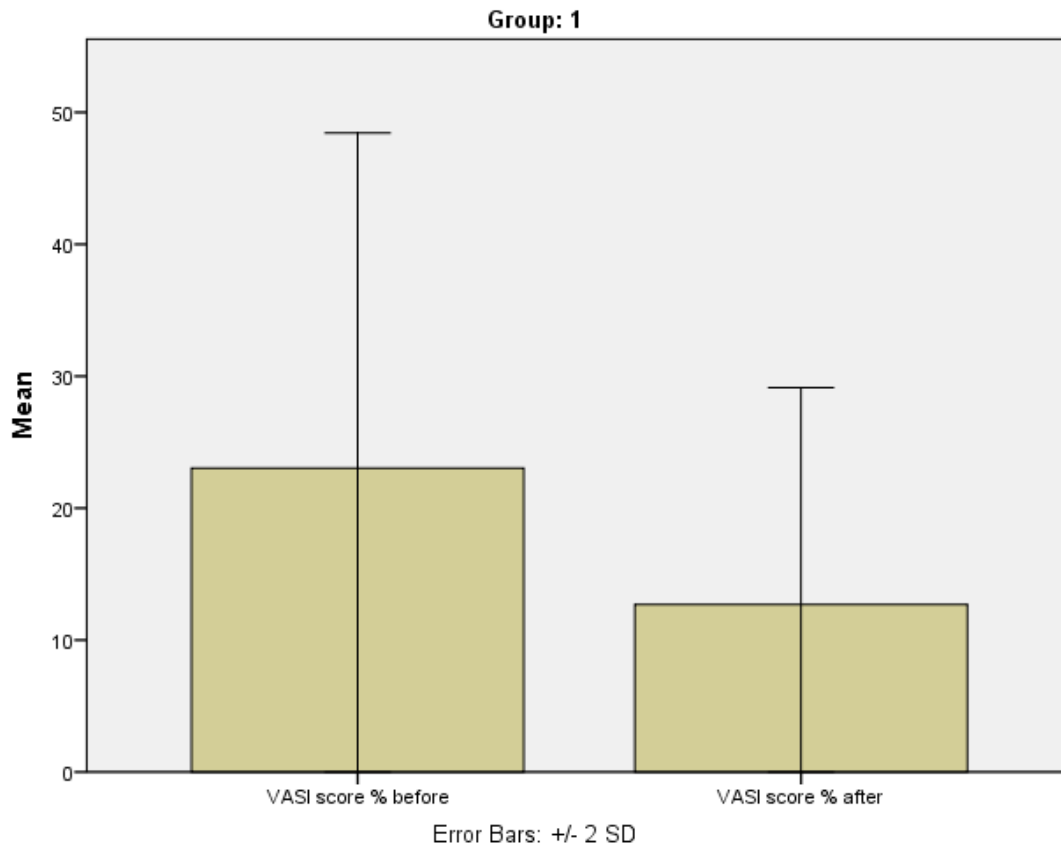
Variables	Patients (N = 30)	Control (N =15)	P-value
<b>RANTES values before in ng/L</b>			
- Mean ±SD	1223.4 ±588.6	197.1 ±111.6	<0.001
- Median (Range)	1224.8 (893–1466.43)	173.8 (80.6 – 214.6)	
<b>RANTES values after in ng/L</b>			
- Mean ±SD	980.483 ±1957.1 585.9 (498.9 – 782.4)	191.6 ±76.8 190.1 (98.1 – 294)	<0.001
- Median (Range)			

\*Data are presented as mean ±SD, median (Range), or number (%).





**Figure 1: The change in RANTES levels after treatment in Vitiligo Patients**



**Figure 2: The change in VASI after treatment in Vitiligo Patients**

## Discussion

The present comparative study demonstrated that patients with non-segmental, stable, vitiligo had statistically significant higher level of serum RANTES than healthy controls. In addition, the fractional CO<sub>2</sub> laser, in combination with sun exposure, was effective in reducing the serum RANTES level 3 months after treatment; while sun exposure alone was not associated with significant reduction in serum RANTES level in control group. On the other hand, there were no significant correlations between serum level of RANTES and age of patients, duration of the disease, gender, family history, or disease severity.

Though the exact pathogenesis of vitiligo is still unclear, the oxidative stress and the infiltration of inflammatory mediators have been well-established as major contributors for the progressive, autoimmune-mediated, destruction of melanocytes seen in vitiligo<sup>18</sup>. Recently, upregulation of RANTES, a potent chemotactic agent of Th1 cell, has been proposed as a significant consequence to the oxidative stress which lead to the characteristic infiltration of inflammatory cells seen in vitiligo. In the present study, the serum level of RANTES was significantly higher in patients with vitiligo compared to normal population. In concordance with our findings, Rezk and colleagues<sup>19</sup> reported significant elevation of RANTES level in cultured vitiligo melanocytes and skin samples of early vitiligo. Another case-control study reported that the serum RANTES level was significantly elevated in active vitiligo patients compared to stable patients and healthy controls<sup>20</sup>. Another interesting report by Rashighi and colleagues<sup>21</sup> reported that both human vitiligo patients and a mouse model of vitiligo expressed high levels of RANTES that were correlated with disease activity. Such findings highlight the important role of chemokines signals in stimulating the migration of melanocyte-specific CD8<sup>+</sup> T cells to the skin, with subsequent infiltration and destruction of melanocytes<sup>22,23</sup>.

In the setting of wound healing, it was found that fractional CO<sub>2</sub> laser enhanced fibroblast functions and suppress pro-inflammatory cytokines such as IL-1<sup>24-26</sup>. In the present study, we found that the fractional CO<sub>2</sub> laser, in combination with sun exposure, was effective in reducing the serum RANTES level 3 months after treatment.

Notably, our results showed that RANTES level was not significantly associated with duration of disease

activity or severity. Similar to our findings, a previous prospective study on 85 patients reported that serum RANTES level did not correlate with the extent of the lesions, though it correlated significantly with disease activity<sup>27</sup>.

## Conclusion

In conclusion, the current study suggests a possible involvement of RANTES in the development of vitiligo lesions and it could be considered as a possible marker for screening of early disease. On the other hand, the fractional CO<sub>2</sub> laser, in combination with sun exposure, is an effective treatment strategy in reducing the inflammatory process in vitiligo, as demonstrated by the significant decrease in the serum RANTES level 3 months after treatment. RANTES is considered as a possible early indicator for assessment of the successfulness of the treatment. Nevertheless, larger studies are still needed to confirm our findings and to investigate the role of RANTES in disease severity.

**Conflict of Interest:** All authors confirm no financial or personal relationship with a third party whose interests could be positively or negatively influenced by the article's content.

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**Ethical Clearance:** The protocol of the present study was registered by the local ethics committee of Cairo University Teaching hospital.

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# Effectiveness of Myotherapy on Stress among Patients Subjected to Major Orthopaedic Surgery at a Tertiary Care Hospital, South India

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## Abstract

**Introduction:** The stress response to surgery, critical illness, trauma, and burns encompasses derangements of metabolic and physiological processes which induce perturbations in the inflammatory, acute phase, hormonal, and genomic responses. The surgery-induced stress response is largely similar to that triggered by traumatic injuries, the duration of the stress response, however, varies according to the severity of injury.

**Objectives:** The objectives of the study were to determine the effectiveness of myotherapy on stress and associate the selected background variables with stress.

**Method:** The research design adopted for the study was randomized controlled trial. The study was conducted among 250 samples, 125 in the study and 125 in control group to evaluate the effectiveness of myotherapy on stress among patients subjected to major orthopedic surgeries. The mean age of the study participants were male and female equally distributed. Data were collected and analyzed using descriptive and inferential statistics.

**Findings:** Independent t 't' test revealed that mean difference score was observed in stress at p=0.001 level. Post stress in the study group was significantly associated within previous history of hospitalization at the level of p<001.

**Conclusion:** The study result reveals that the orthopaedic surgical patients suffering with severe stress, economically burdened and functional disability for long time. Myotherapy is one of the complementary medicine which has a great impact on the human body and this study suggested that the practice of myotherapy can decrease the stress

**Keywords:** Stress, Myotherapy, post operative, surgery.

## Introduction

The incidence of stress among individuals submitted to major surgery is relevant<sup>1</sup>. The surgical patients have

a high probability of presenting one of the four phases of stress. Recognizing the stress phase that affects the patient permits the medical team to act in a more appropriate manner and to propose interventions that will prevent worsening of the disease and an unsuccessful outcome of surgery<sup>13</sup>. The physical and psychic components involved in the stress, evoke physical and psychological responses in humans and make them to restore their homeostasis after a physical or psychical threads. The physiological component involves various symptoms, mouth dryness, arterial hypertension, and cardiovascular and digestive disturbances. In addition to these symptoms, stress involves increased insomnia,

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diarrhea, tachycardia, changes in appetite, muscle tension and tooth grinding, among other manifestations. The psychological component involves emotional states such as anxiety and fear (Straub 2005). And also added states of irritability, impatience, depression, anguish, anger, and apathy<sup>2</sup>. Other authors consider laughing, smoking and expressing oneself in a pessimistic manner as manifestations of behavioural stress<sup>3</sup>. An observational cross sectional study was carried out to identify stress and factors associated with stress during hospitalization by an in depth interview using pretested structured proforma on patients admitted the medicine, OBG, Surgery and Orthopaedic wards and rated on 11 point scale. Total of 700 patients participated, out of which, 510 (72.9%) were under stress due to hospitalization. Females (76.5%) and patients from urban (77.6%) area were in more stress. Fear of losing body part or function, stress of undergoing operation and not knowing the outcome of treatment were found to be major factors for stress<sup>14</sup>. Nurses caring for patients during the post-operative period find it challenging to their stress. Therefore, there is a need for nurses to have scientifically tested, simple and effective interventions to manage stress. A steady, emerging body of evidence suggests that myotherapy is vital to the healing process of patients undergoing general surgery. However, very little is known about their effectiveness in orthopaedic

surgery patients. So, the researcher has chosen the study to propagate this intervention on a wide spread in all health care settings. This intervention is feasible and also can be done easily at any setting. All these above mentioned issues prompted the investigator to undertake The objective of this study was to evaluate the effectiveness of myotherapy on stress among patients subjected to major orthopaedic surgery.

**Materials and Method**

**Ethical Issues:** Ethical clearance was obtained from the Institute Ethics Committee (Human studies). Permission was obtained from the orthopedics department to carry out the study. Written consent was obtained from the patients.

**Study Design and Setting:** The experimental research design adopted was Randomized controlled trial. The 250 samples were selected based on the selection criteria. The investigator used randomization to have a control over the individual and extraneous variables and to secure good comparable groups. Block randomization was adopted using 5 blocks with 50 patients in each block. The patients were randomly assigned to the study and control groups based on the lottery method. The procedure was explained to them and written consent was obtained from them.

**Table 1. Schematic representation of the Research design**

Group	Pretest	Intervention	Post test	
	1 <sup>st</sup> Post- operative day	1 <sup>st</sup> to 5 <sup>th</sup> Post-operative day	12 <sup>th</sup> post- operative day	30 <sup>th</sup> post- operative day
Study	*O <sub>1</sub> ♣	*X @	* ¨	* ♣
Control	*O <sub>1</sub>	*	*	* ♣ ¨

**Key:** R - Block Randomization of patients with major orthopedic surgeries to the study and the control group., O1 - Pretest assessment of back ground variables, \* - Routine care including medications, X - Intervention - A series of steps performed by investigator over the predefined pressure points on the patient’s foot and hands by applying direct pressure using the palm daily for five days. This is to stimulate the spinal points in order to reduce pain, stress and to improve the ADL., @ - Demonstration of myotherapy to the patients caregiver, Δ - Return demonstration by the patients’ caregiver, ¨ - Issuing of myotherapy manual to the study group on 5<sup>th</sup> POD with performance checklist diaries attached at the end of the booklet and control group on 30<sup>th</sup> POD

**Setting:** The study was conducted at orthopedic ward of Sri Ramachandra Hospital ‘G’ Block (SRH). SRH ‘G’ block is a 1175 bedded multispecialty hospital. An average of 100- 150 patients was admitted with various orthopedic problems. on average 5-15 patients were posted every day. The sample consisted of major orthopedic surgical patients who fulfilled the sampling criteria during the study period.

**Sample Size Calculation:** Sample size was calculated based on power analysis and effect size ( $\alpha = 5\%$  and  $1-\beta = 80\%$ ). The sample size estimated was 110 patients for each group with a total of 220, to achieve 80% power at a 5% level of significance. Considering the chance of attrition, an increase of 15% was done and the obtained value was rounded to 250. A total of 125 for the study group and 125 for the control group.

**Sampling Criteria:** Block Randomization technique was adopted using five blocks with 50 samples in each block. Each block had 25 samples in the study group and 25 samples in the control group. The investigator identified the samples from the operation theatre secretary desk of department of orthopedic and assessed the samples for the eligibility criterions. The investigator randomized the samples that 125 samples were allotted to the study group and 125 samples to the control group. The following patients were included in the study Male and female in the age group of 21- 60 years, patients who received either general/spinal/epidural anesthesia, who underwent surgery like open reduction internal fixation (femur, tibia, fibula), total knee replacement and total hip replacement, who completed 24 hours after surgery with irrespective of receiving analgesics and antibiotics during post-operative period and patients' caregivers who is willing to perform myotherapy for patients' and available during data collection period. The Demographic variables of the patients were age, gender, educational status, occupation, monthly income, marital status, type of family and residency, The Clinical variables of the patients were co morbid illnesses, edema, previous history of hospitalization, previous history of surgery and caregivers support and Surgical variables of the patients were type of surgery type of anesthesia. The Perceived Stress Scale (PSS) was used to measure stress. The questions in this scale ask about your feelings and thoughts during the last month. First, reversed the scores for questions 4, 5, 7, & 8. On these 4 questions, changed the scores like this: 0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress. The Scoring and interpretation as follows: 0-13 - low stress, 14-26 - Moderate stress and 27-40 - High stress.

**Intervention and data collection procedure:** Independent variable myotherapy was used as an intervention for the patients in the study group who were subjected to major orthopedic surgeries. Myotherapy is series of steps of procedures performed by the investigator such as head spin, ankle slide, rotation massage, foot

side twist, planter pressure, sole massage, dorsal press, groove press, top of foot crease side and closing over the predefined pressure points on the patient's foot(12 steps) and Finger massage, Finger stretch, Finger squeeze, Wrist massage both side and Wrist shake on hands (5 steps in each hand) by applying direct pressure in the palm during hospital stay, there after by the care giver who observed the demonstration This is to stimulate the spinal points in order to reduce stress. The intervention intended to reduce the stress..

**Findings:** All 250 sample each in intervention and control group were almost equally distributed in age, gender, education, income, type of family, marital status, residency, co morbid condition, edema, type of surgery, type of anesthesia, caregiver's support, previous history of surgery and previous history of hospitalization categories . During pretest 97 (77.6%) in the study group and 100(80.0%) in the control group had high stress and 28 (22.4%) in the study group and 25(20.0%) in the control group had moderate stress. None of them had low stress. It was not statistically significant [table 2]. During post test 99 (79.2%) in the study group and 19 (15.2%) in the control group had low stress, 23 (18.4%) in the study group and 94(75.2%) in the control group had moderate stress and 3(2.4%) in the study group and 12(9.6%) in the control group had high stress. It was statistically significant at  $p < 0.001$  level There was a statistically significant mean difference found between the pretest and posttest in the study group at  $p < .001$  level [table 3]. During pre and posttest the mean score of stress in the study group was 34.82 and 4.08 with SD of 9.68 and 7.29. The MD score was 30.73 .It was significant at  $p < .001$  level [table 4]. The mean difference score of stress was 30.73 in the study group and the mean difference score was 19.01 in the control group. It shows that there was a statistically significant difference at  $p < .001$  level [table 5]. There was an association between age groups, type of surgery and marital status and level of stress among patients with major orthopedic surgery in the study group.

**Table 2: Comparison of level of stress among patients in the study group and the control group during pre test (N=250)**

Level of stress	Study group (n=125)		Control group (n=125)	
	No	%	No	%
Low stress	-	-	-	-
Moderate stress	28	22.4	25	20.0
High stress	97	77.6	100	80.0
X <sup>2</sup> & p value	0.215 & .642			

**Table 3: Comparison of level of stress among patients in the study and control group during post assessment (N=242)**

Level of stress	Study group (123)		Control group (120)	
	No	%	No	%
Low stress	97	78.8	19	15.8
Moderate stress	23	18.6	89	74.1
High stress	3	2.4	12	10
X <sup>2</sup> & p value	96.719 .000***			

\*\*\* p<.001

**Table 4: Comparison of pre and post mean score of stress among patients in the study group (n=125)**

Duration of study	Mean	SD	Mean difference	Paired t Value & p Value
Pretest	34.82	9.68	30.73	28.77
Posttest	4.08	7.29		.000***

\*\*\* p<.001

**Table 5: Comparison of mean difference score of stress among patients between the study group and the control groups (N=242)**

Level of stress	Study group	Control group	Independent 't' value and p value
	MD	MD	
Pre and post test	30.73	19.01	9.20 .000***

\*\*\* p<.001

The mean difference score of stress was 30.73 in the study group and the mean difference score was 19.01 in the control group. It shows that there was a statistically significant difference at p<.001 level.

These study findings were closely consistent with the study conducted by Albert Moraska, Robin A. Pollini, Karen Boulanger, Marissa Z. Brooks, and Lesley Teitlebaum collected a comprehensive review on massage therapy for stress reduction.. On-line databases were searched for articles relevant to both massage therapy and stress. A total of 25 studies met all inclusion criteria. A majority of studies employed a 20–30 min massage administered twice-weekly over 5 weeks with evaluations conducted pre-post an individual session (single treatment) or following a series of sessions (multiple treatments). Single treatment reductions in salivary cortisol and heart rate were consistently noted<sup>11</sup>. The stress is occurs in different stages among surgical patients. In the first, the alarm phase, the central nervous system is stimulated and there is catecholamine release from the hypothalamus, which may cause arterial

hypertension and tachycardia. In the second stage, the body is mobilized to prepare itself for the fight-or-flight response.<sup>4</sup> Coping is the process by which an individual administers the internal and external demands perceived as stressful and the emotions they generate<sup>6</sup>. The greater difficulty is to compare theoretical studies. The articles point out that there are internal and external sources of stress with physical, emotional, behavioral and hormonal components that contribute to the occurrence of stress during the perioperative period<sup>7</sup>.

.Many literature reports regarding psychosomatic medicine, especially studies of psycho neuro immunology indicate that strong fear and stress before an operation are associated with difficulties in recovery. A long period of hospitalization, enhances perioperative complications, high rates of re-hospitalization, and mortality, especially due to infections<sup>5</sup>. There are physical and psychic components of stress which act for the defense of the organism, while at the same time causing a deterioration of its condition<sup>1</sup>. The effectiveness of a relaxation massage therapy programme in reducing stress, anxiety



and aggression on a young adult psychiatric inpatient unit. The result showed that there was a significant reduction in self-reported anxiety ( $p < 0.001$ ), resting heart rate ( $p < 0.05$ ) and cortisol levels ( $p < 0.05$ ) immediately following the initial and final massage therapy sessions. Significant improvements in hostility ( $p = 0.007$ ) and depression scores ( $p < 0.001$ ) on the SCL-90-R were observed in both treatment groups<sup>9</sup>.

### Conclusion

The study result reveals that the orthopedic surgical patients suffering with severe pain, stress, economically burdened and functional disability for long time. Myotherapy is one of the complementary medicine which has a great impact on the human body and this study suggested that the practice of myotherapy can decrease the stress and can improve the quality of life. The myotherapy is to be considered a noninvasive, cost effective intervention, positively influencing therapy and contributing to the reduction of stress and improvement of quality of life in patients following orthopedic surgery.

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**Conflicts of Interest:** There are no conflicts of interest.

**Ethical Clearance:** Ethical clearance got from intuitional ethics committee (No- IEC-N1/13/FEB/32/08).

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# Impact of Cranial Electrical Stimulation on Statistical Indices of Time Domain Parameters of Heart Rate Variability in Hypertensive Individuals

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## Abstract

**Background:** Hypertension is primary care in medical world which is a lifestyle disorder linked with an increased risk of cardio vascular diseases, it is crosslinked to anxiety, depression, state of confusion and stress. They act as cofactor for sympathetic dominance. We conducted a study to analyse Heart rate variability in Hypertensive subjects and assessed impact of Cranial Electrical Stimulation on them. Heart Rate variability (HRV) is a powerful tool which is a clinical biomarker and non -invasive helps to detect the neuro cardiac function.

**Objectives:** To assess the statistical indices of time domain parameters of heart rate variability in hypertensive individuals.

**Design:** Pre-post experimental design.

**Methodology:** Forty subjects of pre hypertension and grade 1 hypertensive subjects with SBP(120-159mm of Hg) and DBP(80-99mm of Hg) with age group of 40-60 years were recruited by convenient sampling, they were randomly allocated in two groups Group A (control) and Group B (Experimental). We used Alpha Stim Aid from EPII (Miner wells, Texas U.S.A), stimulation to the experimental group for 20 minutes for 7 weeks (5 days per week). Heart rate variability of both the groups was measured using sophisticated tool based on MATLAB software (KUBIOS 2.1), pre and post intervention analysis done.

**Results:** Statistically significant differences were found in Group B comparison with Group A, like Mean RR, STD RR, MeanHR, RMSSD, NN50, pNN50, SBP, DBP with p value ( $p < 0.001$ ), ( $p < 0.001$ ), ( $p < 0.001$ ), ( $p < 0.075$ ), ( $p < 0.002$ ), ( $p < 0.0012$ ), ( $p < 0.001$ ), ( $p < 0.001$ ) respectively. Heart Rate variability was significantly higher in Hypertensive subjects of Group B comparison with Group A after receiving Cranial Electrical stimulation.

**Conclusion:** It was concluded from this study that experimental group treated with cranial electrical stimulation had significant increase in their heart rate variability, which defines the dominance of parasympathetic control and sympatho-vagal balance.

**Keyword:** Cranial Electrical Stimulation, Autonomic Nervous system, Heart rate variability, Hypertension.

## Introduction

Cranial electrical stimulation (CES) is the application of low-level, pulsed electrical currents (usually not

exceeding one mill ampere), and applied to the head for medical and/or psychological purposes. It is primarily used to treat state (situational) and trait (chronic) anxiety,

depression, insomnia, stress related and drug addiction disorders. Cranial electrical stimulation is a simple treatment that can easily be administered at any time<sup>(1-3)</sup>. Cranial electrical stimulation is an alternate current stimulation applied through ear clip electrodes creates rhythmic oscillations in cortex of the brain by producing cortical noise in the ongoing brain wave oscillations<sup>(4)</sup>.

In our study purpose is to investigate the cross-sectional association between cranial electrical stimulation, and pre hypertensive and grade-1 hypertension subjects measuring beat to beat variation of heart through heart rate variability. Cranial electrical stimulation (CES) is a non-invasive therapeutic device that applies pulsed, alternating micro current (<1000  $\mu$ A) transcutaneous to the head via electrodes placed on the earlobes, mastoid processes, zygomatic arches, or the maxilla-occipital junction<sup>(1)</sup>. Cranial electrical stimulation helps in enhancing alpha activity (increasing relaxation), and reduction of beta and delta activities (decreasing fatigue and ruminative thoughts) by cortical deactivation of brain which are similar changes those produced by anti-anxiolytics, proved in a study through functional magnetic resonance imaging<sup>(5-6)</sup>. In our study CES has decreased blood pressure in case of pre hypertensive individuals (systolic BP 130-139 and diastolic BP 80-89) and grade 1 hypertensive individuals (Systolic BP 140-159 and Diastolic BP 90-99) according to WHO guidelines. As stress, anxiety, depression, and insomnia are primary co factors for blood pressure. Hypertension is a result of dysregulation in the autonomic nervous system

Traditionally, heart rate (HR) has been considered a product of emotional response or stress, but it is becoming apparent that the interval between beats is a marker of the capacity to regulate internal and external demands. The intervals are not constant, but differ from beat to beat: essentially a higher HRV indicates better general health<sup>(7)</sup>. All the parameters of HRV decrease with the age increases, especially of parasympathetic cardiac activity due to aging<sup>(8)</sup>. Conversely, there is developing confirmation that unfavourable psychosocial factors might also be connected with a fall in HRV and different measures of irregularity in sympatho vagal<sup>(9)</sup>.

There are two approaches to measuring HRV: Time domain and frequency domain measures. In time domain, the standard deviation of NN intervals (SDNN) represents the general measurements of the nervous system<sup>(10)</sup> and the root mean square of successive

differences (RMSSD) reflects the parasympathetic activity of the nervous system. Geometric time-domain method are obtained through the conversion of the NN intervals data into geometric forms like histograms or the HRV triangular index (RRTri) and Triangular interpolation of RR intervals (TINN) that is a valuable estimate of overall HRV<sup>(11-12)</sup>.

## Methodology

**Materials and Method:** Forty subjects were recruited in the study including Males and Females between age group 40 years to 60 years suffering hypertension SBP (120-159mm/Hg) and DBP (80-99mm/Hg) were divided into two groups, Group A (Control N=20) and Group B (Experimental N=20).

Cranial Electrical Stimulation [ALPHA STIM AID from Electro Medical Products 4 international Inc.] was given to Group B for 21 days (5 days per Week) with duration of 20 minutes per day and Heart Rate variability [PHYSIO PACK, KUBIOS, MATLAB SOFTWARE], short term heart rate variability was measured by recording 5 minutes ECG of each subject.

HRV was assessed as per protocol. After HAP screening a set of instruction (i.e. to remain nil orally 2 hours prior to test) was conveyed to the selected subjects. HRV was assessed with certain requisites such as removing any metal objects (including jewelry), being silent and relaxed with close eyes lying Supine with palms facing upwards, without any physical movements.

### HRV examination

#### Overall Process:

- A written consent was taken from all participants in the study.
- All the Parameters of the group were collected between 9:00am to 5:00 pm at room temperature (20-22°C).
- Subjects were told to report 15 minutes before screening.
- They were asked to have light breakfast at least two hour before and allowed to have relaxed for half an hour before the HRV test.
- The study was conducted at Amity University, Noida.
- Subjects were recruited from the faculties and students from the campus

**Inclusion Criteria:** 40-60 years pre hypertensive and grade -1 hypertensive subjects including both male and females were recruited for the study. Subjects having normal BMI and not on anti -hypertensive medications were recruited for the study (18-24kg/m<sup>2</sup>).

**Exclusion Criteria:** Individuals unwilling to participate and presenting any feature of systemic disorder were excluded from the study. Subject on any medication were excluded from the study. Pregnant females were excluded from the study. Subjects with any kind of cardiovascular, respiratory, neurological or musculoskeletal disorder were excluded from the study

**Study Design:** Pre and post experimental study.

**Experimental Design:** Out of 60 screened volunteers, 40 were found free from any systemic and sleep disorders. On the basis of HAP (Health assessment proforma) the subjects with Pre-hypertensive group (SBP- 120-139 mm/Hg) and (DBP- 80-89 mm/Hg) and Grade 1 Hypertensive group (SBP- 140-159 mm/Hg) and (DBP- 90-99 mm/Hg) not taking any anti-hypertensive medication were included and categorised into two groups i.e. Group A (Control group) hypertensive group treated with placebo effect of cranial electrical stimulation, and Group B (Experimental group) Hypertensive group treated with cranial electrical stimulation.

Cranial Electrical stimulation (ALPHA STIM AID) was given to Group B for 21 days (5 days per week) and duration 20 mins per day. Heart rate variability was measured by Physio Pack (Kubios 2.1)

**HRV Procedure:** HRV was assessed as per the HRV protocol. After HAP screening a set of instruction (i.e. to remain nil orally 2 hours prior to test) was conveyed to the selected subjects.

**Analysis of HRV Data:** The first 5 min. resting (supine) phase ECG data was analyzed. The analysis of the data is done by using a sophisticated tool, Kubios HRV software package. The variability of heart beat intervals can be easily measured by using Kubios HRV.

**Statistical Analysis:** Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean  $\pm$  SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used.

**Statistical tests were applied as follows:** Quantitative variables were compared using Independent t test/Mann-Whitney Test (when the data sets were not normally distributed) between the two groups. Paired t test/Wilcoxon signed rank test was used to compare pre and post.

A p value of <0.05 was considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

## Results

A total of 60 individuals were screened, but 40 healthy subjects were screened according to the Health assessment proforma (HAP). Participants were categorized randomly according to their blood pressure (pre hypertension and grade 1 hypertension) into two groups out of which autonomic activity of 40 subjects was assessed with baseline Heart Rate Variability as (pre intervention) and after 7 weeks heart rate variability (Post intervention) was for further analysis.

**Table 1. Comparison of Time Domain Parameters and Blood pressure between Group A [control] and Group B [Experimental] before treatment with Cranial electrical stimulation [Pre intervention comparison]**

Factors	Group A (Control)	Group B (Experimental)	p Value
Mean RR (ms)	769.88 ± 93.58	762.14 ± 78.14	NS
STD RR (ms)	63.05 ± 40.72	63.92 ± 32.25	NS
Mean HR (1/min)	80.29 ± 9.04	79.21 ± 7.53	NS
STDHR (1/min)	5.61 ± 2.96	5.55 ± 2.99	NS
RMSSD (ms)	62.91 ± 58.05	66.01 ± 57.82	NS
NN50	54.58 ± 60.39	59.96 ± 62.11	NS
pNN50 (%)	19.27 ± 18.6	19.39 ± 17.64	NS
SBP (mm/Hg)	146.5 ± 5.03	146.41 ± 4.72	NS
DBP (mm/Hg)	96.32 ± 2.24	93.64 ± 2.53	NS

Values expressed in Mean ± S.D.; NS- Not significant; Mean RR, The mean of the RR intervals; Mean HR, The mean of the heart rate; STDHR, Standard Deviation of Heart Rate; SDNN, The standard deviation of NN intervals; RMSSD, Root mean square

of successive differences; NN50, the number of pairs of successive NN intervals that differ by more than 50 ms; pNN50, the proportion of NN50 divided by total number of NN intervals, SBP Systolic blood pressure, DBP Diastolic blood pressure.

**Table 2. Comparison of Time Domain Parameters and Blood pressure between Group A [control] and Group B [Experimental] after treatment with Cranial electrical stimulation [Post intervention comparison].**

Factors	Group A (Control)	Group B (Experimental)	p Value
Mean RR (ms)	754.77 ± 94.12	889.67 ± 114.62	0.001**
STD RR	50.06 ± 20.64	77.38 ± 38.16	0.001**
Mean HR (1/min)	79.48 ± 9.58	70.56 ± 11.31	0.0001***
STDHR (1/min)	5.73 ± 2.73	6.48 ± 3.26	0.108 <sup>NS</sup>
RMSSD (ms)	63.12 ± 34.41	82.43 ± 43.77	0.075 <sup>BS</sup>
NN50	72.61 ± 84.58	117.82 ± 73.19	0.002**
pNN50 (%)	18.20±14.24	28.94 ± 17.83	0.012*
SBP (mm/Hg)	145.27 ± 7.72	124.64 ± 3.1	0.0001***
DBP (mm/Hg)	96.04 ± 1.85	81.36 ± 2.51	0.0001***

Values expressed in Mean ± S.D.; NS- Not significant; Mean RR, The mean of the RR intervals; Mean HR, The mean of the heart rate; STDHR, Standard Deviation of Heart Rate; SDNN, The standard deviation of NN intervals; RMSSD, Root mean square

of successive differences; NN50, the number of pairs of successive NN intervals that differ by more than 50 ms; pNN50, the proportion of NN50 divided by total number of NN intervals, SBP Systolic blood pressure, DBP Diastolic blood pressure.

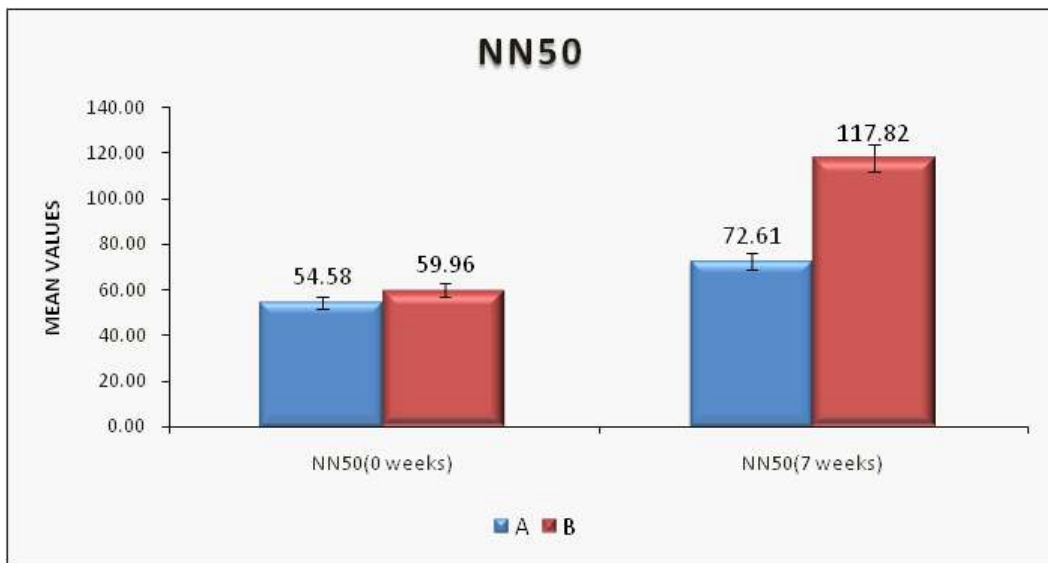


Fig 1: Shows NN50 {Pre and Post differences of Group A (control) and Group B (experimental)}

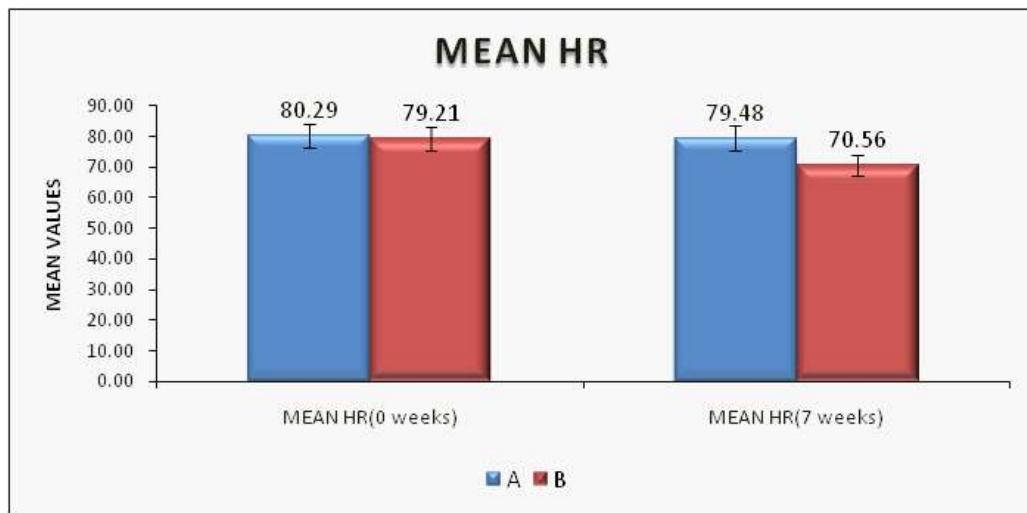


Fig 2: Shows Mean HR {Pre and Post differences of Group A (control) and Group B (experimental)}

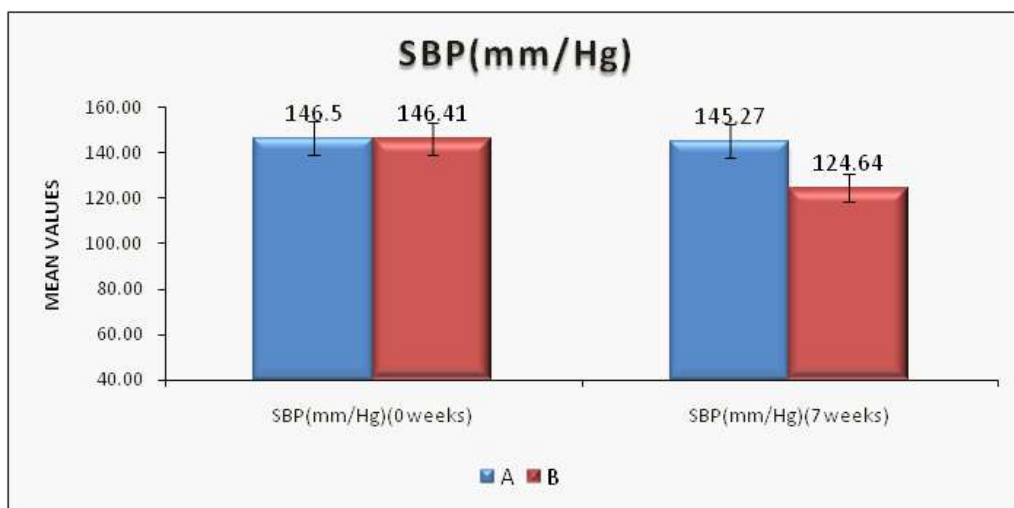
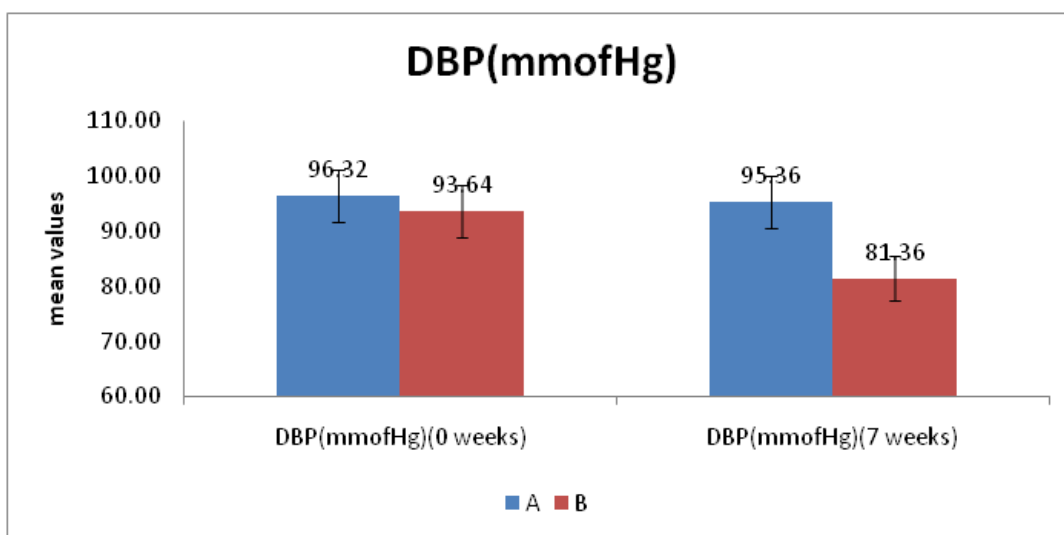


Fig 3: Shows Systolic Blood Pressure {Pre and Post differences of Group A (control) and Group B (experimental)}



**Fig 4: Shows Diastolic Blood Pressure {Pre and Post differences of Group A (control) and Group B (experimental)}**

### Discussion and Conclusion

Dysregulation of the autonomic nervous system has been implicated in the development of hypertension. We found altered Heart rate variability in both groups before intervention. But in experimental group after applying Cranial electrical stimulation for 7 weeks (5 days per week) time domain parameters increased significantly. Cranial electrical stimulation through ear clip method stimulate subcortical areas of brain like reticular activating system, thalamus, and hypothalamus, Medulla, hence it helped in reducing blood pressure in experimental group with a significant difference. Cranial electrical stimulation produces cortical noise in ongoing brain wave oscillations producing rhythmic oscillations in the cortex of the brain as it is alternating current stimulation. Hence it was concluded from this study that experimental group treated with cranial electrical stimulation, the hypertensive individuals had significant effect on heart rate variability. In time domain parameters there were significant increase in which defines the dominance of parasympathetic control with increase of overall HRV, there was improved sympatho vagal balance.

Time domain indices like Mean RR, STDHR, SDNN, RMSSD, pNN50 showed significant increase in experimental group in comparison to control group. In Blood Pressure there were significant reductions of both systolic and diastolic blood pressure of experimental group in comparison to control group. The mean

RR interval is an indicator of the ratio of the cardiac sympathetic to parasympathetic tones (sympatho-vagal balance). The higher mean RR interval denotes a lower overall resting heart rate. This suggests a tilt of the overall cardiac sympatho-vagal balance of the experimental group towards the parasympathetic side as compared to control group<sup>(13)</sup>. The STDHR, an indicator of overall HRV, was significantly increased in the individuals treated with cranial electrical stimulation in experimental group.

Changes in the pNN50 and RMSSD are both reported in the literature to reflect parasympathetic modulation<sup>(14)</sup>. This result suggests that the parasympathetic activity also increased significantly in the experimental group.

**Conflicts of Interest:** Nil.

**Source of Funding:** Self.

**Ethical Clearance:** Taken from IEC of Amity University, Noida.

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# Role of Hip Complex Re-Training Exercises on Patients with Chronic Low Back Pain

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## Abstract

**Background:** Although the strengthening of hip posterolateral complex (HPC) strengthening is largely used in physiotherapy practice for treating patients with hip and knee injuries, there is still a lack of proof regarding patients with chronic low back pain (CLBP). The efficacy of the HPC strengthening as an additional intervention to conventional treatment in a well-designed trial with statistic power needs to be tested.

**Method:** An experimental trial with a sample size of 30 CLBP subjects, divided into two groups, 15 in each group was used. Group A- received HC musculature strengthening along with Conventional Physiotherapy Program and Group-B received Conventional Physiotherapy Program only. All the participants underwent a pre- treatment assessment at the start (0 week) and post-treatment assessment at the end of 2 weeks and 4 weeks using the NPRS and HC muscle strength measurement.

**Results:** The present study showed that both the treatment group attained statistically meaningful improvement in Pain (NPRS), and Strength.

**Conclusion:** HC musculature strengthening exercises can be used as an adjunct in reducing pain, minimizing disability and improving the strength of HPC muscles in subjects with CLBP.

**Keywords:** *Chronic low back pain, conventional back exercises, Hip posterolateral complex musculature strengthening exercises, Oswestry disability index, Hand-held dynamometer.*

## Introduction

Chronic low back is categorized as pain arising from lower margin of the rib cage to the lower glutei fold, with or sans referral into the lower extremity.<sup>1</sup> It may be criterion to a specific etiology where directing the underlying pathology can adequately cope with the pain. Non-specific LBP, where there is no known

dismemberment, is much more common representing as much as 85% of the population of people with low back pain.<sup>3</sup> Most of acute episodes of non-specific low back pain resolve instinctively without any significant intervention.<sup>4</sup> When episodes of non-specific LBP do not resolve they often progress to chronic non-specific low back pain. Very often, the pain is “non specific”, meaning related to a mechanical origin. The main factors inducing the pain to become chronic are individual factors, psychological factors or socio-professional factors.<sup>2</sup> The clinical entity of chronic non-specific low back pain is a tremendous burden, accounting for most of the expenses related to low back pain care. Low back pain is the fifth most common reason to visit a physician and the second most common reason for lost productivity in the workplace.<sup>8</sup> A biomechanical approach that has been described is that a weakness

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of the hip abductors, extensors, and lateral rotators musculature (hip posterolateral complex HPC) would lead to undue contralateral pelvic drop during weight-bearing activities such as walking, running, climbing up or downstairs, generating an overloading the lumbar area. Although the strengthening of the HPC is largely used in physiotherapy practice for treating patients with hip and knee injuries, there is still a lack of proof regarding patients with LBP. Therefore, the question remains to be tested i.e. the efficacy of the HPC strengthening as an additional intervention to conventional treatment in a well-designed trial with adequate statistical power<sup>12</sup>. Most clinical practice guidelines prescribe exercise for the management of CLBP<sup>15</sup>. One of the major challenges for researchers in the field of LBP is to provide proof regarding the treatment, which provides the most benefit for subgroups of patients with low back pain<sup>16</sup>. Biomechanically, the hip extensors and abductors play a major role in all ambulatory activities, stabilizing the trunk and hip and helping to transfer force from the lower extremities to the pelvis<sup>17,18</sup>. The gluteus maximus plays a key role in stabilizing the pelvis during trunk rotation or when the center of gravity is grossly shifted, while the hamstrings play a more significant role during activities such as running or jumping<sup>17,18</sup>. The gluteus medius/minimus are the major stabilizers of the pelvis during single limb stance<sup>19</sup>. Activation of these hip abductors prevents the Trendelenburg sign whereby the pelvis contralateral to the weight-bearing extremity tilts downward during the stance phase of gait. The hip musculature thus plays a major role in transferring forces from the lower extremity up towards the spine during upright activities. Poor endurance and the delayed firing of the gluteus maximus and gluteus medius muscles have earlier been noted in persons with CLBP<sup>20,21,22,23</sup>.

So, this study was designed to determine the efficacy of re-training exercises on hip complex in on reducing pain, improving the strength of HC musculature and reducing disability thus improving functionality in patients with CLBP.

## Materials and Method

### Inclusion Criteria:

1. Both males and females of age group within 30-50 years;
2. Numerical pain rating scores from 3 to 6;
3. Consistent daily LBP for a minimum of 12 weeks
4. Location of pain is below the costal margin and

above the gluteal folds with or without leg pain

### Exclusion Criteria:

1. History of major trauma, persistent night pain, bladder or bowel dysfunction, and/or lower extremity neurological deficit
2. Previous surgery to the lumbar spine, abdomen, pelvis, or hip
3. Use of any radiological interventions or injections in the past 3 months
4. Any contra indication for exercise therapy (e.g. uncontrolled hypertension, previous myocardial infarction, cardiovascular disease, peripheral vascular disease, respiratory disorders)
5. Patients unable to perform isometric contraction and hold it for 30 seconds while testing
6. Any pain originated because of SI pathology
7. Menstruation during testing days and
8. Individuals incapable of understanding and answering the questionnaire

Ethical approval from Central Ethics Committee on Human Research (C.E.C.H.R) C.E.C.H.R/D.M.I.M.S/12/2010 was obtained.

### Procedure:

**Ethical Approval:** Ethical approval for this study, with protocol number Clearance from Central Ethics Committee on Human Research (C.E.C.H.R) C.E.C.H.R/D.M.I.M.S/12/2010 was obtained was obtained from the Health Research and Ethics Committee of University of Iowa Spine Center Physical Therapy Clinic. The nature and purpose of the study was explained to each subjects and informed consent was obtained

Experimental group performed active resistance exercises for the hip joint using elastic bands (Theraband, USA). The band colors were selected based on subjects' ability. For hip joint flexion, extension, abduction, and adduction, the subjects were instructed to fix the band on the ankle in the standing position, the starting position and to perform active exercises throughout the entire range of motion for each task. For internal rotation and external rotation, the subjects were instructed to fix the band on the ankle in an upright sitting position on a fixed chair, the start position, and to perform active exercises throughout the entire range of motion for each task. Verbal encouragement via the physiotherapist saying

the word push repeatedly in a loud voice was provided during the muscle contraction. Patients performed 2 maximal contractions for each tested motion.

The subjects maintained 10 seconds of contraction in of each exercise, before returning to the initial position and resting for three seconds. They repeated each exercise four times per set for four sets, with 30 second rest periods between each set. As subjects' ability to perform the exercises improved, load was increased accordingly. In control group received hot fomentation over glutei region for 15 mins under supervision along with hip extension, static glutei, back extension exercise. All these exercise were administered to the patient with verbal cues. The subjects maintained 10 seconds of contraction in of each exercise, before returning to the initial position and resting for three seconds. They repeated each exercise four times per set for four sets, with 30 second rest periods between each set. As subjects' ability to perform the exercises improved, load was increased accordingly.

**Statistical Analyses:** Initial evaluation was done

and patients was assessed at two weeks, six weeks and twelve weeks by the same investigator. In each visit measurement of pain intensity and disability level was performed by Visual Analogue scale (VAS). Post intervention result was compared with baseline result. Data were processed manually and analyzed with the help of SPSS (Statistical package for social sciences) Version 19.0. Quantitative data were expressed as mean and standard deviation and comparison were done by student "t" test.

## Results

Results In group-A, the maximum patients were in 30-50 years (52.3%) of age group, 35% of the patients of age 41-55 years, 10% of the patients of age 51-62 years, and 6.57% of the patients of 61-70 years were all allocated to group A. On the other hand, in Group-B, the 16 patients were in 30-40 years of age group (46.67%), 08 were of patients of age between 41-50 years, 05 were patients of age between 51-60 years and 3 patients were of age between 61-70 years were allocated to Group-B (Table 1).

**Table 1: Age group distribution of the study group**

Age Group	Group-A n(%)	Group-B n(%)	Total
30-50 yrs	16(53.3)	14(46.67)	30
41-55 yrs	09(30.0)	08(26.67)	17
51-62yrs	03(10.0)	05(16.67)	08
61-70 yrs	02(6.67)	03(10.0)	05
Total	30(100)	30(100)	60

**Table 2: Mean Visual Analogue Scale Score pretreatment and 2 weeks, 6 weeks and 12 weeks follow up**

Visual Analogue Scale	Group A	Group B	P Value
Base line score	8.10(±1.62)	7.30(±1.78)	1.00ns
Score at 2 weeks	6.29(±1.29)	6.58(±1.13)	0.42ns
Score at 6 weeks	3.50(±1.13)	3.00(±1.43)	0.19ns
Score at 12 weeks	0.20(±0.40)	1.10(±0.71)	<0.001 S

Regarding improvement after treatment, it was found that in pre treatment mean Visual Analogue Scale Score was 8.10 (±1.62) were in group A and 7.30 (±1.78) were in group B ( $p > 0.05$ ), after 2 weeks follow up 6.29 (±1.29) were in group A and 6.58 (±1.13) were in group B, ( $P > 0.05$ ) which was not significant and after 6 weeks

follow up 3.50 (±1.13) were in group A and 3.00 (±1.43) were in group B ( $p > 0.05$ ) that was not statistically significant. But after 12 weeks follow up the score was 0.20 (±0.40) in group A and 1.10 (±0.71) was in Group B ( $p < 0.05$ ) that was statistically significant (Table 2)

## Discussion

The improvement in the patients in the present study may be explained by the effect of therapeutic exercise. Exercise is one of the most important rehabilitation modalities<sup>9,10</sup>. In this study, patients who continued with exercises had better improvement in disability and pain scores<sup>9</sup>. Exercise may have a significant role in clinical improvement<sup>9</sup>. McKenzie suggested extension exercises and Hansen et al.<sup>10</sup> applied a method based on principles used in body building which involve intensive dynamic hyper-extension back exercises. These exercises were reported to be beneficial in the treatment of patients with chronic low back pain. The improvement of this study in both groups may also be explained by physical therapy consisting of local superficial heat and thermal ultrasound effects, a proposed mechanism of alleviating pain. But most of the previous studies indicated temporary efficacy of these modalities.<sup>11,12</sup> The mean pain score was not statistically lower at follow-up, while the disability scores reduced, indicating improvement on disability but no statistically Significant improvement seen. In this study, patients reported feeling better as a result of therapeutic exercise, but they still experienced recurrence of pain. The HC musculature strengthening exercise group showed more improvement in HC strength compared to the conventional physiotherapy group. But when considering pain reduction the study results showed that both treatment groups attained a significant reduction in pain not only statistically but also with the clinically significant important difference of NPRS.<sup>13</sup> The hip musculature thus plays a significant role in transferring forces from the lower extremity up towards the spine during upright activities. Poor endurance and delayed the firing of the hip extensor (gluteus maximus) and abductor (gluteus medius) muscles have previously been noted in individuals with CLBP.<sup>13,14</sup> Jeong et al.<sup>14</sup> showed that lumbar segmental stabilization exercise plus exercise to strengthen the muscles of the gluteus lead to a greater reduction in LBP disability index and increase in lumbar muscle strength and increased balance ability.

The present study has few limitations. Such as non-blinded clinicians, lack of long term outcomes data, relatively small sample size and data collection not by an independent observer. A power analysis was calculated based on a pilot data of eight participants. A large sample size with more diverse population would allow greater generalization of results to clinical practice.

**Ethical Clearance:** IT has been obtained by datta meghe ethical committee, dmims, sawangi meghe wardha.

**Conflicts of Interest:** Nil.

**Source of Funding:** Self

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# Assessment of the Prevalence of Febrile Seizure and Associated Factors among Children: A Retrospective Study

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## Abstract

A study to assess the prevalence of febrile seizure and associated factors among children admitted in tertiary care hospital. Seizure is the most common neurological finding in children as 10% of kids experience such clinical condition sometime during their life. Febrile seizure is the most common seizure disorder in children. It occurs in 2-4 percent of children at least once before five years of age. The signs and symptoms dependent on the areas involved and ranging from varying degrees of motor, sensory, and sensorimotor changes and altered consciousness. Prevalence of febrile seizure in children is approximately 3%-4% and usually develops in children of 9 months to 5 years old following an increase in body temperature higher than 39°C without evidence of acute electrolyte imbalances and Central Nervous System infection or history of febrile seizure. The objectives are to assess the prevalence and types of febrile seizure among children, to find out the relationship between febrile seizure and selected associative factors. Data related to febrile seizure and associated factors among children was obtained from the Medical Records at Medical Record Department on Febrile seizure from January 2018 to December 2018. An extensive review of literature and guidance by experts formed the foundation to the development of the study. The data collection tool was validated and reliability was established. The data collection for the study was done. Collected data was tabulated and analyzed. Data on Febrile seizure and associated factors among children was collected for the period of 1 year (January 2018 to December 2018). A sample of 33 febrile seizure who fulfilled the inclusion criteria were selected for the study and age of 0-2 years - 17 (52%), 2-4 years - 07 (21%), 4-6 years- 09 (27%).

**Keywords:** Febrile seizure, Prevalence, Associated factors, Children (0-6 years).

## Introduction

Seizure is the most common neurological finding in children as 10% of kids experience such clinical condition sometime during their life. Febrile seizure is the most common disorder in children. It occurs in 2-4 percent of children at least once before five years

of age<sup>1</sup>. The signs and symptoms dependent on the areas involved and ranging from varying degrees of motor, sensory, and sensorimotor changes and altered consciousness. Prevalence of febrile seizure in children was approximately 3%-4% and usually develops in children of 9 months to 5 years old. . It is characterized by loss of consciousness, involuntary movements of limbs on both sides of the body. In most cases it occurs during the first day of fever. The febrile seizure observed as simple and complex febrile seizure<sup>2</sup>.

Febrile convulsions are the most common seizure disorders in childhood and generally have excellent prognosis. The febrile seizures is defined as a seizure during fever, between 6months to 6 years of age in absence of intracranial infection or previous unprovoked

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seizure<sup>10</sup>. Another definition from the International League Against Epilepsy (ILAE) is a seizure occurring in childhood after one month of age upto 6 years, associated with a febrile illness not caused by an infection of the Central Nervous System(CNS), without previous neonatal seizures or a previous unprovoked seizures, and about 5% have symptomatic seizures<sup>3</sup>. In United States between 2% and 5% of children have febrile seizure by their 5<sup>th</sup> birthday. A similar rate of febrile seizure is found in western Europe<sup>4</sup>. The incidence else where in the world varies between 5% and 10% for India, 8.8% for Japan, 14% for Guam, .35% for Hongkong, and 0.5-1.5% for China. Variation in prevalence relates to differences in case definitions, ascertainment method, geographical variation and cultural factors. Males have a slightly higher incidence of febrile seizures<sup>5</sup>.

According to AAP(American Academy of Pediatrics) the definition of febrile seizure includes a child who has febrile illness or certainly fever, is neurologically healthy between 6 months and 5 years of age; whose seizure is brief (<15 minutes), generalized and occurs only once (Simple febrile seizure) or more times(Complex febrile seizure) within 24 hours during fever<sup>6</sup>.

**Statement of the Problem:** A study to assess the prevalence of febrile seizure and associated factors among children admitted in tertiary care hospital, Kelambakkam, Kancheepuram district, Tamilnadu, India.

### Objectives of the Study:

1. To assess the prevalence and types of febrile seizure among children.
2. To find out the relationship between febrile seizure and selected associative factors.

### Operational Definitions:

**Febrile Seizure:** A febrile seizure also known as a fever fit or febrile convulsion is defined as a convulsion associated with a significant rise in body temperature<sup>7</sup>.

**Children:** Febrile seizures are occurring in children less than 6 years associated with fever without other underlying causes such as Central Nervous System (CNS) infection or electrolyte imbalance<sup>8</sup>.

**Associated Factors:** Associated factors is an expression used for describing a perfect compatibility. Electrolytes and hemoglobin are the associated factors

which are involved in the febrile seizure. Fever can worsen the effects of iron deficiency anemia on the brain and therefore cause convulsion. Acute or severe electrolyte imbalances can manifest with rapidly progressive neurological symptoms of seizure<sup>9</sup>.

## Materials and Method

**Research Approach:** Quantitative evaluatory approach was adopted in this study.

**Research Design:** Quantitative non-interventional descriptive retrospective design was used to conduct the study.

**Research Setting:** Present study was conducted at Medical Record Department, in Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram district, Tamilnadu, India. Permission to pursue the Medical Record Department document for specified data was obtained from the Dean, CHRI.

**Population:** Data related to febrile seizure and associated factors among children was obtained from the Medical Records at Medical Record Department on Febrile seizure from January 2018 to December 2018.

**Sampling Size:** Data on Febrile seizure and associated factors among children was collected for the period of 1 year (January 2018 to December 2018).

**Sampling Technique:** Purposive sampling technique was adopted for this study.

### Sampling Criteria:

#### A. Inclusion Criteria:

The study includes medical records data on

- Febrile seizure and associated factors from January 2018 to December 2018
- Children with 0-6 years
- Both male and female

#### B. Exclusion Criteria:

The study excludes data on other than the

- Non febrile Seizure

Selection and Development of the Study Instrument

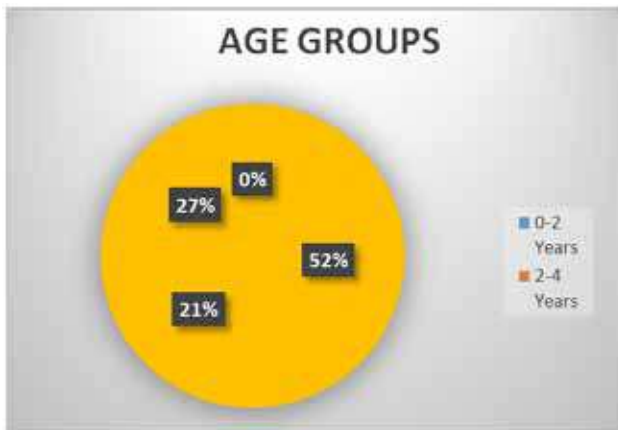
### Tool Description:

**Part 1:** Determine the Age, Gender, Season, Past history of febrile seizure, Area of residence.

**Part 2:** Determine the types of febrile seizure, causes of fever, prevalence and associated factors of electrolytes and hemoglobin in febrile seizure among children.

**Data Collection Procedure:** Data collection is the gathering of information needed to address or face a research problem. The data collection was done for a period of 1week from 01.04.2019 to 07.04.2019 at 8.30 am to 4.00 pm in Medical Record Department. In Medical Record Department they provide all the case files which was diagnosis as febrile seizure from the month of January 2018 to December 2018 for all age group. And we have separate the case files from the age of 0-6 years which is needed for our study. The needed data was collected on all the days. Data confidentiality was maintained.

**Findings:** The demographic variables shows that the febrile seizure is mainly occurring in children with the age group of 0-2 years(52%) in male children (64%) during summer season (36%) with no past history of febrile seizure (73%) and it is mainly occurring in children staying in urban area (88%). In types of seizure and types of febrile seizure the prevalence is more in partial seizure (45%) and simple febrile seizure (94%) among children. This shows that their is association between the febrile seizure and the selected variables were the level of haemoglobin is associated with gender and the past history of febrile seizure and the level of RBC is associated with gender. The percentage of associated factors also shows the same result as demographic variables.



**Figure 1: Frequency distribution of age groups who affected with febrile seizure.**

## Conclusion

We have conducted a research topic on A study to assess the prevalence of febrile seizure and associated factors among children admitted in tertiary care hospital, Kelambakkam, Kancheepuram district, Tamilnadu, India. The quantitative non- interventional descriptive retrospective design was used to conduct the study on data obtained on febrile seizure from January 2018 to December 2018. 33 samples were collected.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Chettinad Academy of Research and Education, Institutional Human Ethics Committee on 04.02.2019.

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# Effectiveness Practice-intervention Based Project on Knowledge, Attitude and Practice Compliance to Infection Control Measures and Factors Predicting Non-compliance among Nurses Working in Tertiary Care Hospital, Mangalore, India

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## Abstract

**Introduction:** Safety practice adherence by the nurses is the important aspect in patient care health facilities. Their knowledge, attitude for and compliance with infection control practice is the primary target in any healthcare system. The present study planned to survey the knowledge, attitude and compliance (KAP) in infection control practice among the nursing staff and to evaluate the effect of practice -intervention based project where besides direct training programme, one to one by infection control trained staff to other nurse could be speculated.

**Method:** This was an experimental study with pre-test post-test design that included 2 groups of nurses (30 – group I(core); 50 –group II(trainee)) working in a tertiary care hospital. Structured knowledge questionnaires were designed to assess various aspects of knowledge; Likert scale to measure attitude and infection control compliance in pre and post training tests. **Results:** Compared to pre-test, there was comparable and sustained significant improvement of knowledge attitude and practice compliance in the subsequent post test results among both groups of nurses. Higher age group (odds ratio (OR) 6.037, 95% CI 0.706-51.621), low knowledge (OR 4.985, 95% CI 1.562-15.910), poor attitude (OR 1.114, 95% CI 0.474-2.622), unavailable infection control measures (OR 1.066, 95% CI 0.369-3.077), less time since training (OR 13.145, 95% CI 1.929-89.564), and working in surgical department (OR 8.043, 95% CI 1.97-32.838) showed higher odds of non-compliance to infection control practices.

**Conclusion:** This study illustrated the need of target based educational training interventions in any form of either direct or trained group training the other nurses, to improve the KAP in infection control practices.

**Keywords:** Practice-intervention based project, Knowledge, Attitude, Compliance, Infection Control Practices, Nurses.

## Introduction

Healthcare/hospital acquired infections (HAIs)

otherwise called nosocomial infection is associated with increased morbidity and mortality and predisposes healthcare workers (HCWs) to an increased risk of infections. HAI has grown into a major problematic area of patient safety, with estimation of more than 1.4 million patients worldwide in developed and developing countries affected at any time.<sup>1</sup> An estimated 10%-25% of hospitalized patients in developed and developing countries develop HAIs, and subsequently results in adverse healthcare outcomes as increased hospital stay,

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economic burden, significant morbidity, and mortality.<sup>2</sup> Challenges of lack of standardized infection prevention program in healthcare settings, deficient infrastructures, limited resources and poor quality of care contribute towards burden of HAIs.<sup>3-5</sup>

HAIs are infections that were not present or incubating at the time of admission but contracted by the patient during the process of care in health care facility like, Hepatitis B, C virus, HIV, mostly can be transmitted by failure to practice infection prevention measures.<sup>6</sup>

Patient safety is the central concern of current healthcare delivery systems,<sup>7</sup> and it is an important indicator of health care quality. Nurses, who are responsible for the constant care of in-patients, can be the most reliable persons to incorporate their knowledge, attitude and practice compliance on several health related aspects, healthy habits and care among the patients.<sup>8</sup> An assessment of the knowledge, attitude and practice (KAP) of standard precautions by healthcare workers is a prerequisite for initiating and implementing a successful infection prevention and control (IPAC) strategy in any health facility. There are numerous evidences,<sup>9, 10</sup> that have shown that HCW display capricious KAP of standard safety measures in keeping with their professional group and duration of professional experience, among other factors. More professional experience, awareness and training in standard precautions, and high risk perception have all been associated with improved compliance with standard precautions among health workers.<sup>11</sup>

Limitation in current knowledge and practice, lack of attitude, type of work shift, professional experience and training can predict noncompliance to infection control. Hence this study was designed to find the factors that can predict the noncompliance and adopt a reliable and sustainable practice based training programme by nurses as trainer themselves to fellow colleagues to improve infection control practice.

## Materials and Method

**Subjects and Study Setting:** This is an experimental study with pre-test post-test design where 2 groups of nurses (30 and 50 in number respectively) working in a tertiary care hospital with 960 beds were included in the study after obtaining institutional ethical clearance and informed consent. The study population consisted of registered nurses with valid state council number. No specific inclusion and exclusion criteria were applied in this study to include the nurses. Seventy other health

professionals included in the first phase only were-physicians, medical interns and post graduates. Only those who were willing were included in the study.

**Research Tools and Data Collection:** Structured knowledge questionnaire, Likert scale to measure attitude and practice compliance were designed by researchers. Questionnaires and scales were validated by subject experts and Cronbach's alpha was used to calculate the consistency of questionnaire, ( $r=0.9$ ). A pre-test survey was done based on these questionnaires. 70 other health professionals including doctors, post graduates and interns were included only during pre-test survey. Practice-intervention based project was implemented to the group 1 nurses (core group) by researchers for 2 hrs/day, for a week. It was imparted by pedagogue, demonstration using multimedia devices and practicing under direct observation. Posters on infection control and hand hygiene were displayed in prominent places. The bundles included; nursing bundles-Blood Streamline Infections (BSI) Form-adapted from CDC center, Surgical Site Infections (SSI) checklist, Urinary Tract Infections (UTI) check list.

Three Post-test surveys were done at interval of one month for 3 months to check the sustainability of training. Similarly these trained nurses of group 1 (core group) trained 3-4 nurses (trainee group) each in their respective units. Infection control pamphlets were also displayed in prominent places of hospitals. The time take for the administration of tools and collection of data lasted for 15-20min for a subject.

Chi square test was used to analyse the difference between two groups of nurses, and differences in pre and post-test performances. Ordinal regression with plum analysis was used to find the factors predicting non-compliance.

**Ethical Considerations:** The study protocol was approved by the Institutional Ethics Committee (IEC/ Rev/22/2015-16). All subjects were informed about the purpose of the study and obtained written informed consent. The questionnaires were anonymous, and the confidentiality of study data was emphasised.

## Results and Discussion

Out of 30, group-1 nurses, 50 group-2 nurses, 27 and 42 belonged to 20-30 years age group respectively. Twenty six group 1, 29 group 2 nurses worked in surgical and the rest in orthopaedics department. Twenty group

1 and 42 group 2 nurses had professional experience between 1-3 years and the rest had < 1 year experience. Twenty group 1 nurses and 44 group 2 nurses had alternate shift work pattern. All had participated in 1

day training programme in infection control prior to the study. Twenty seven group 1 and 44 group 2 nurses had participated in infection control workshop less than 6 months back; the rest more than 6 months back.

**Table No. 1: Pre test vs. Post test of Knowledge, attitude and practice compliance in group 1 nurses.**

Attribute (number of responses each item) Pre Test		Test Status (number of nurses in each group, n-30)				Chi Square	Sig
		Post Test 1	Post Test 2	Post Test 3	X <sup>2</sup>	p	
Knowledge	Correct	40(33.3%)	114(95.0%)	114(95.0%)	112(93.3%)	23.78	0.001***
	Incorrect	707(57.5%)	45(3.7%)	89 (7.2%)	97(7.9%)		
Attitude	Strongly Disagree	72(9.2%)	6(0.8%)	3(0.4%)	2(0.3%)	143.08	<0.001***
	Disagree	95(12.2%)	0	0	0		
	Neutral	144(18.5%)	15(1.9%)	15(1.9%)	11(1.4%)		
	Agree	220(28.2%)	214(27.4%)	214(27.4%)	174(22.3%)		
	Strongly Agree	249(31.9%)	545(69.9%)	548(70.3%)	593(76.0%)		
Compliance	never	69(11.5%)	30(5.0%)	30(5.0%)	30(5.0%)	182.24	<0.001***
	seldom	93(15.5%)	0(0.0%)	0(0.0%)	0(0.0%)		
	sometimes	205(34.2%)	8(1.3%)	8(1.3%)	8(1.3%)		
	usually	117(19.5%)	91(15.2%)	91(15.2%)	91(15.2%)		
	always	116(19.3%)	471(78.5%)	471(78.5%)	471(78.5%)		

**Table No. 2: Pre test vs. Post test of Knowledge, attitude and practice compliance in group 1 nurses.**

Attribute (number of responses each item) Pre Test		Test Status (number of nurses in each group, n-30)				Chi Square	Sig
		Post Test 1	Post Test 2	Post Test 3	X <sup>2</sup>	p	
Knowledge	Incorrect	1373(67.0%)	67(3.3%)	104(5.1%)	102(5.0%)	15.35	0.018*
	Correct	677(33.0%)	1983(96.7%)	1946(94.9%)	1948(95.0%)		
Attitude	Strongly Disagree	158(12.2%)	15(1.2%)	7(0.5%)	3(0.2%)	267.52	<0.001***
	Disagree	47(3.6%)	0(0.0%)	6(0.5%)	0(0.0%)		
	Neutral	329(25.3%)	25(1.9%)	45(3.5%)	10(0.8%)		
	Agree	362(27.8%)	343(26.4%)	305(23.5%)	241(18.5%)		
	Strongly Agree	404(31.1%)	917(70.5%)	937(72.1%)	1046(80.5%)		
Compliance	never	115(11.7%)	50(5.0%)	50(5.0%)	48(4.8%)	197.05	<0.001***
	seldom	121(12.1%)	0(0.0%)	0(0.0%)	2(0.2%)		
	sometimes	252(25.2%)	42(4.2%)	29(2.9%)	29(2.9%)		
	usually	210(21.0%)	149(14.9%)	113(11.3%)	113(11.3%)		
	always	300(30.0%)	759(75.9%)	808(80.8%)	808(80.8%)		

**Table No. 3: Pre-test survey results of knowledge, attitude and practice compliance in nurse and other health professionals**

		Pre Test in Multiple Groups			Total X <sup>2</sup>	Chi Square	Sig
		Group 1 Nurse n-30 (%)	Group 2 Nurse n-50 (%)	Other Health Professionals		P	
K	Incorrect Response	707 (57.5%)	1373(67.0%)	880(34.9%)	2960	2.01	0.73
	Correct Response	523 (42.5%)	677 (33.0%)	1640 (65.1%)	2840		
	Total	1230	2050	2520	5800		
ATT	Strongly Disagree	72 (9.2%)	158 (12.2%)	35 (2.1%)	265	60.99	<0.001***
	Disagree	95 (12.2%)	47 (3.6%)	85 (5.1%)	227		
	Neutral	144 (18.5%)	329 (25.3%)	166 (9.9%)	639		
	Agree	220 (28.2%)	362 (27.8%)	411 (24.5%)	993		
	Strongly Agree	249 (31.9%)	404 (31.1%)	983 (58.5%)	1636		
	Total	780	1300	1680	3760		
C	never	69 (11.5%)	117 (11.7%)	0	186	7.276	0.201
	seldom	93 (15.5%)	121 (12.1%)	0	214		
	sometimes	205 (34.2%)	252 (25.2%)	0	457		
	usually	117 (19.5%)	210 (21.0%)	0	327		
	always	116 (19.3%)	300 (30.0%)	0	416		
	Total	600	1000	0	1600		

Legend to Table.No.3, P<0.05-sig;<0.01-highly significant;<0.001-very highly significant; HH(Hand hygiene) K (Knowledge) C(Compliance) ICM(Infection control measure) ICP(Infection control practice) ATT(Attitude)

**Table No. 4: Factors predicting noncompliance to infection control amongst nurses**

	Non-Compliance	Sig	OR	95% CI		X <sup>2</sup> walds
				UL	LL	
Age in years	41-50	.836	1.291	.116	14.418	.043
	31-40	.101	6.037	.706	51.621	2.696
	20-30		1	-	-	-
Area of work	Medical	NA	-	-	-	-
	Surgical	.004*	8.043	1.970	32.838	8.436
	Ortho					
Experience in years	<1	.046*	3.436	1.022	11.549	3.982
	1-3		1	-	-	-
	3-6	NA	-	-	-	-
	>6	NA	-	-	-	-

	Non-Compliance	Sig	OR	95% CI		X <sup>2</sup> walds
				UL	LL	
Work shift	Alternate	.467	1.843	.355	9.565	.530
	nightshift	.836	.724	.034	15.468	.043
	long day		1	-	-	-
Time since training in months	>12	NA	-	-	-	-
	6-12	.009**	13.145	1.929	89.564	6.923
	<6		1	-	-	-
Knowledge	Incorrect	.007*	4.985	1.562	15.910	7.360
	Correct		1			
Attitude	Not agree	0.804	1.114	.474	2.622	0.061
	agree		1	-	-	-
ICM Available	Not	.907	1.066	.369	3.077	.014
	Some extent	1	-	-	-	

Legend to Table No.4, ICM-Infection control measures, P<0.05-sig;<0.01-highly significant;<0.001-very highly significant;

According to the present study results, nurses' knowledge of infection control was low at the pre-intervention phase of study.<sup>12</sup> The study demonstrated significant improvement in knowledge regarding all the areas of infection control, attitude towards infection control and practice compliance in both group 1 and group 2 nurses after training. A similar improvement in infection control measures of nurses was testified in similar studies.<sup>13,14</sup> This improvement was sustained during the next 3 consecutive post-tests that were conducted at one month intervals (Table No. 1 and 2).

Other health professionals (physicians, interns and postgraduates) had better knowledge and attitude though not significant, when compared with both group of nurses in some areas (Table No. 3).<sup>15</sup> Other health professionals positively associated with a better knowledge & attitude for compliance practices compared to nurses, this could be explained by the heterogeneity of both the subject groups, their higher educational qualification (level) and training programmes they had undergone.<sup>16</sup> This result is in contrast to study done at Amhara region, and this difference might be due to the sampling size, study participants.<sup>17</sup>

Age group higher than 30 years has more odds of being non-compliant when compared younger one. Interesting to notice nurses working in surgical departments had significantly higher odds of being non-compliant when compared with others. Nurses with professional experience of less than 1 year had

significantly higher odds of non-compliance compared with more experienced nurses which is in line with the study in Bahirdar city.<sup>18</sup> Maybe with increasing work experience in clinical setting was their motivation for further self-learning.

Nurses with alternate shifts in working had higher odds of non-compliance, because of the irregular pattern with the disturbed working pattern showed to impact on the patient care and the safety practices due to mental fatigue, which was in hand with similar study assessed impact of working of nurses on patient safety.<sup>19</sup>

Moreover, this study showed that when infection control measures guidelines were not available, nurses had higher odds of non-compliance (Table no. 5) which was in line with the study conducted in Nigeria<sup>20</sup> and Australia.<sup>21</sup> Findings in this study also depicts, nurses with incorrect knowledge and poor attitude had poor compliance suggesting that all these factors are interlinked to some extent and invariably impact the patient safety.

It is interesting to note that young nurses showed a better knowledge, attitude and compliance to practice compared to other elder nurses who are recently trained. This can be addressed by routinely conducting training programmes to these groups of nurses comprising of seminars, Continue Nursing Education sessions. They should be encouraged to interact with other less skilled nurses in the unit thereby exert a positive influence on their knowledge, attitude towards practice compliance.

Conclusion: as the practice based intervention was indeed effective to enhance the knowledge, compliance of nurses' in infection control, identified some predictors for the poor compliance among nurses. This study illustrated the need of educational training interventions to improve the KAP practice compliance among the nurses and one to one training method effectively be implemented.

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# Awareness of Oral Complications of Diabetes Mellitus in Diabetes Patients: A Questionnaire Study

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## Abstract

**Background:** Diabetes mellitus is one of the many metabolic disorders that show a drastic increase in its prevalence with every year. Though there are many literatures available explaining the importance of oral hygiene in preventing complications in diabetes there is a tendency in the patients to ignore their oral hygiene. The role of dentist in resolving or preventing the oral complications is important at the same time, the patient themselves should take an initiative to acquire more knowledge about their condition.

**Method:** A two-page questionnaire was created in accordance with the OHSU guidelines for evaluating the awareness of oral complications in diabetic patients.

**Results:** Majority of the patients, irrespective of being graduates or literate lacked sufficient knowledge on oral complications of Diabetic patients in spite of being aware about the general complications.

**Conclusion:** Awareness is needed for the patients with diabetes in both systemic and dental complications as it can affect their quality of life. Diabetic individuals should be encouraged to get regular dental check-ups done and more frequently than non-diabetic individuals to seek active care for their problems for better prognosis and improved quality of life.

**Keywords:** *Diabetes, Questionnaire, Oral health, Complications of diabetes, OSHU guidelines.*

## Introduction

Diabetes mellitus or diabetes is a group of metabolic disorder which is characterised by high blood glucose levels for a prolonged period of time. Diabetes is an endocrinal disorder of the pancreas where the gland is not able to produce insulin the hormone which regulates blood glucose levels in the body. Even with advance in treatment strategies still the prevalence and incidence of the disease is becoming alarmingly higher every year.

In the year 2016, 422 million people all over the world were estimated to be suffering from diabetes mellitus, which is an average of 8.3% of the total population of the world. WHO has reported an average of 1.5 million deaths due to diabetes every year all over the world and about 2.2 million death due to diabetes associated complications affecting the renal, cardiac system etc.<sup>(1)</sup>

The need for special care to those affected with this disease was established as early as in 1900s with the first recognised step being the St Vincent Declaration in 1989, which aimed in improving the care of those affected with diabetes. Following this several countries have adopted various programs and measures to help these individuals to live a better life and to improve their life expectancy and living standards.<sup>(2)</sup>

Not only is the disease dangerous, but the complications produced by it as a result of it is more

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devastating. The aftermath of the disease affects many other systems in the body, mainly renal system, cardiac system, eyes. But though the knowledge about the behavioural pattern and characteristic of the disease is blooming every day, proper awareness is yet lacking in many. The individuals affected by diabetes lack the basic understanding of the course of the disease in their body and how it will behave, which leads to negligence and delayed diagnosis of many complications of it which if noticed earlier could have been at least controlled. Proper awareness of the disease as well as the complications of the disease should be provided to the patients as well as their family to prevent this. <sup>(3)</sup>

The oral manifestations of diabetes vary in its severity in relation with the blood sugar level it can be as simple as normal gingivitis or xerostomia to as severe devastating opportunistic infections like mucormycosis or candidiasis. Proper awareness of oral complications is also relevant as maintenance of oral health also plays hand in hand with maintenance of blood sugar level. <sup>(4)</sup> If the patient has poor oral hygiene because of the compromised immune status owing to defective neutrophil chemotaxis seen in this condition predisposes the individual to many infections in the oral cavity, like dental caries, gingivitis, periodontitis, candidiasis etc. It is the duty of the dentist to impart to the patient importance of maintaining oral hygiene and the need for frequent dental visits especially in diabetic individuals for assessment of their oral health. Proper brushing techniques should also be demonstrated. The various oral complications that follow this disease should also be informed and ways in preventing as well as managing these complications also should be informed. <sup>(5)</sup>

In this study we have conducted a questionnaire to assess the awareness of complications of diabetes in diabetic patients to evaluate the need for awareness campaign for the same.

**Aim:** To evaluate awareness of complications of diabetes mellitus in diabetic individuals.

**Objectives:**

1. Evaluate awareness of complications of diabetes mellitus in diabetic individuals.
2. Assess the need for awareness campaigns on complications of diabetes mellitus.

## **Materials and Method**

The study was approved by the Institutional Review Board of SRM dental college. A two-page questionnaire was prepared following the guidelines by OSHU<sup>(6)</sup> for questionnaire for evaluation of systemic evaluation of diabetic individuals and after referring the literature. The questionnaire was made in English language. The questionnaire included questions regarding:

- a. Duration of the diabetes.
- b. Patients awareness about the harmful complications of diabetes.
- c. Patients awareness about the importance of oral hygiene.
- d. Patients awareness about the oral complications of diabetes.
- e. Patients attitude about dental hygiene and awareness about the role of dentists in managing this disease.

No changes were made to the questionnaire during the course of the study.

Patients attending the department of Oral Medicine in SRM dental college, Ramapuram were included for the study. Out patients with known diabetes who were willing to participate in the study were included in the study after obtaining informed consent. Patients were asked to fill the forms either by themselves and those who did not understand English were allowed to take help from by-standers for filling the forms. A total of 106 responses obtained over a duration of 3 months. The results were compiled into graph and then analysed.

## **Results**

A total of 500 diabetic individuals were given the questionnaire study, 302 responses were obtained. 64.8% of the respondents were graduates showing that diabetes is a life style disease which commonly affects the educated individuals. 40% of the respondents reported a history of diabetes for more than 10 years with 37.1% of individuals being affected for a duration of 2-5 years. 53.3% of the individuals reported no history of other systemic illness whereas 46.7% of the individuals reported other related health problems. 72.4% of the diabetic individuals check their blood sugar levels regularly. 39% of the individuals reported that they take insulin injection to manage their blood sugar levels.

Out of the 302 responses obtained, 48.1% of the individuals consult their physician only when need arises. Again, 80% of the patients go to dental check-up only when they have any symptomatic problem (Fig1). 35.8% of the patients noticed loosening of teeth or mobility of teeth, i.e., periodontal problem (Fig2).

70.5% of the individuals were aware that uncontrolled diabetes can cause delayed wound healing and 61.9% reported that they are aware of the increased risk of developing cardiac diseases. 52.4% of the diabetic patients were unaware of the risk of dryness of mouth associated with diabetes (Fig 3). 61.9% of the individuals had no idea that dryness of mouth is associated with increased risk of infections and caries development (Fig 4). 24.8% of the respondents have suffered from burning sensation of mouth. 35.2% of the patients suffer from frequent ulcer formation in their mouth.

64.8% of the respondents reported to have not been demonstrated proper tooth brushing technique (Fig 5). 62.9% of the respondents were informed about the importance of maintenance of oral health by their dentist. While enquired as to whether they discuss about their diabetic status to their dentist 41.9% reported that they donot see a dentist (Fig 6).

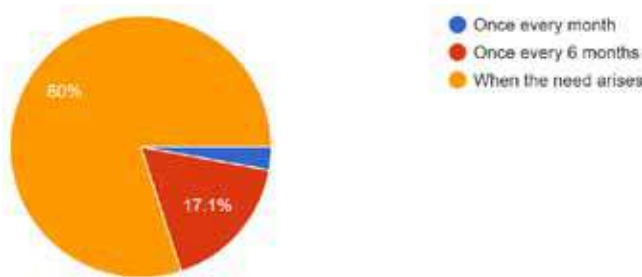


Figure 1: Dental check up

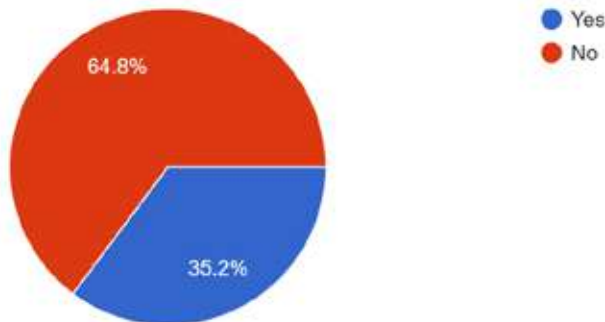


Fig 2: History of mobile tooth

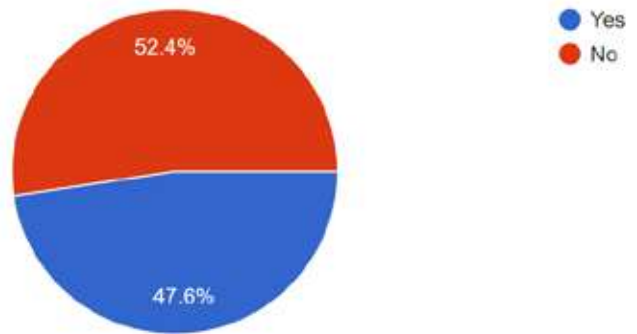


Figure3: Risk of dryness of mouth

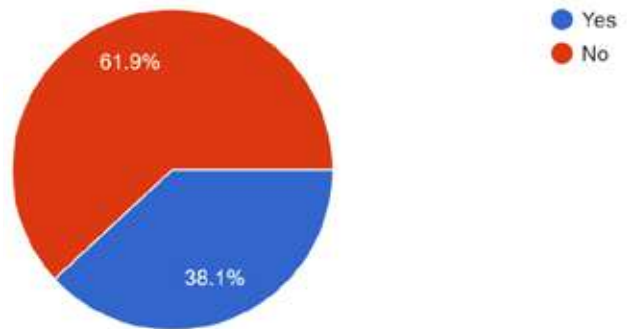


Figure 4: Risk of infections caused by dryness of mouth

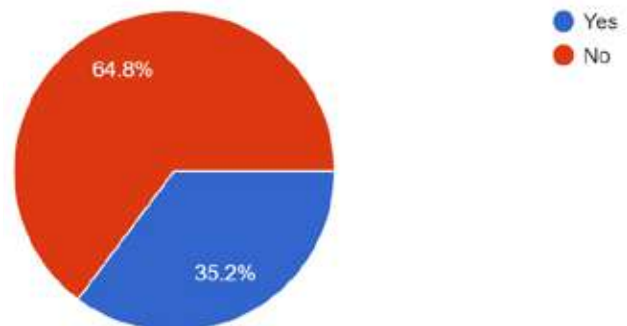


Figure 5: Demonstration of toothbrushing technique

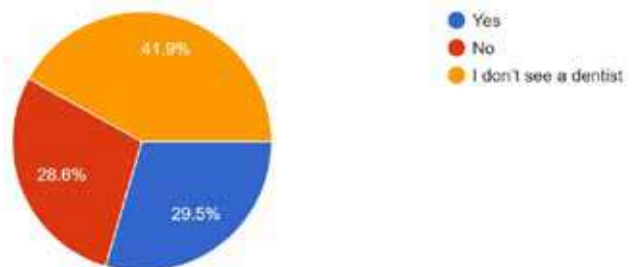


Figure 6: Discussing about diabetic status to Dentist

### Discussion

Incidence of Diabetes mellitus has increased exponentially in the past two decades with 1.6 million

cases being diagnosed every year in India. It shows high prevalence among elderly and individuals affected with diabetes mellitus how a two to four fold increased risk of developing cardiovascular disease, peripheral vascular disease and stroke. The complications of diabetes account for about 65% of the mortality caused by it, making it the seventh most common cause of death in the country.<sup>(1)</sup>

The surge in the number of new cases reported every year can be attributed to lack of proper platform for spread of awareness about the disease. Many of the patients as well as their caretakers are unaware of the devastating effects of this disease.<sup>(7)</sup> The complications of this disease are product of the effect of either the reduction in the level of hormone or due to effect of the drugs administered to maintain blood sugar level. The number of individuals affected by diabetes mellitus is estimated to be around 552 million.<sup>(1)</sup>

Diabetes mellitus is a disease whose causation is primarily attributed to lifestyle factors and genetics.<sup>(8)</sup> Diabetes is considered to be a product of insulin sensitivity as a result of insulin resistance where there is a fall in the amount of insulin produced by the pancreatic beta cells of Islets of Langerhans.<sup>(9)</sup> There is a dysregulation of level of blood glucose level. The amount of hepatic glucose and glucagon that are increased during fasting are not reduced with meal because of lack of insulin.<sup>(10)</sup>

In 2019, the American Diabetic Association gave 5 important guidelines for the Standard of Medical Care in Diabetes, which is directed in providing clinical practice recommendations and treatment goals and guidelines and tools to evaluate quality of care. In these guidelines the ADA has emphasised on the importance of diabetes self-management education and support as well as participation of the diabetic patients in achieving knowledge on the skills, ability necessary in diabetic self-care.<sup>(2)</sup>

In our study, we have performed a questionnaire study for assessing the awareness of the possible complications of diabetes mellitus in diabetic patients. Our results showed though 50-60% of the participants were aware about the different aspects of the disease still there is a part of the population who still don't understand fully the complications associated with this disease which will hamper the management of the disease.

In another study by Allen et al 2008, they assessed

the knowledge of diabetic patients regarding the increased risk of development of periodontal diseases showed that around 7% of the patients that participated were unaware of the type of diabetes they had. Also, the authors concluded that there is a need for awareness in diabetic patients regarding the potential association between diabetes, oral health and general health.<sup>(11)</sup>

In a cross-sectional study conducted by Ahmed et al 2011, they compared the perceived health status in both hypertensive and diabetic patients who visited the primary health centres in Oman, they found that even though the mental scores in both the diseases were similar, the physical scores in patients with diabetes mellitus was lower than that in hypertensive patients.<sup>(10)</sup>

In 2012, Bharateesh et al, conducted a case-control study on diabetes patients to assess the prevalence of common dental infections like dental caries and periodontal disease and found that the prevalence was significantly higher in patients with diabetes than in non-diabetic individuals.<sup>(4)</sup>

In 2011, Bowyer et al, conducted a questionnaire study to assess the knowledge of diabetic patients visiting general dental practitioners in UK about the importance of oral health as well as on the complications in diabetes mellitus, they found that there was a poor knowledge and stressed on the need for awareness in patients as well healthcare professionals. They also wanted to recheck the role of dental care professionals in diagnosis of diabetes.<sup>(5)</sup>

Adults with diabetes mellitus were found to have poor awareness of the complications of diabetes and also lacked proper knowledge on the importance of oral hygiene in preventing many of these complications<sup>(12)</sup>. Majority of the patients who participated in our study admitted to visit dentist only when the need arises and many of the patients deter from visiting dentist. This is due to lack of knowledge about the importance of oral health care.

Despite the study's limitations, our study suggests that patients are receiving inadequate oral health care advice from dental and non-dental health professionals it is important to provide knowledge as well as preventive measures to prevent oral complications of diabetes as some of these may be debilitating. We would like to suggest the need for oral hygiene camps as well as awareness campaigns with emphasis on the oral health care and its role in diabetes.

## Conclusion

Diabetes mellitus is a lifestyle-based disease with dangerously increasing incidence rates in the past few decades. Health professionals should be provided with knowledge about the oral manifestations as well as the proper complications of the disease. Diabetic individuals should be encouraged to get regular dental check-ups done and more frequently than non-diabetic individuals to seek active care for their problems for better prognosis and improved quality of life.

**Ethical Clearance:** Ethical clearance was obtained from the Institutional Review Board of SRM DENTAL COLLEGE, Ramapuram.

**Conflicts of Interest:** Nil

**Source of Funding:** Self

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# Effectiveness of Nursing Intervention on Knowledge of Family Caregivers of Patients with Paraplegia

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## Abstract

Paraplegia creates debilitating effect on patient and family. The patient with spinal injury requires creative nursing management in all phases of care. The treatment and rehabilitation period is long, expensive and exhausting in paraplegia. Whether complete or incomplete, spinal injury rehabilitation is a long process that requires patience and motivation of the patient and relatives. The present study focussed on the effectiveness of nursing intervention on knowledge of family caregivers of patients with paraplegia. The research design adopted in the study was quasi experimental pretestpost test control group design and was conducted in physical medicine and rehabilitation wards. The sample consisted of 80 family caregivers who satisfy the inclusion criteria. Nursing intervention consisted of the structured, individual patient and caregiver education of 3 sessions of 45 minutes duration using power point slides on exercises, nutrition, skin care, sexual functioning, psychological aspects, bladder training, bowel training, demonstration and return demonstration of exercises and provision of an information booklet describing the interventions to be followed by the patients and family caregivers. Post test was conducted on 25<sup>th</sup> day and 90<sup>th</sup> day. The effect of intervention was found to be significant which indicates that there exists a significant difference in knowledge scores of family caregivers of patients with paraplegia.

**Keywords:** *Nursing intervention, knowledge, paraplegia.*

## Introduction

The international symbol of disability is the wheel chair and the stereotype of a person with disability is a young man with paraplegia. Paraplegia is the impairment of the motor or sensory functions of the lower extremities and comes from the Greek word which means “half-striking”. It is truly a devastating injury with profound consequences to the individual, his family and society. Someone in the prime of their life becomes disabled in an instant. The consequences of paraplegia are either premature mortality or at best social exclusion.<sup>1</sup>

Spinal injury creates debilitating effect on patient and family. The patient with spinal injury requires creative nursing management in all phases of care. The treatment and rehabilitation period is long, expensive and exhausting in paraplegia. Whether complete or incomplete, spinal injury rehabilitation is a long process that requires patience and motivation of the patients

and relatives.<sup>2</sup> Education during rehabilitation may help with the attainment of effective problem-solving abilities, or at least provide the patient with the factual knowledge. Providing education about bladder and bowel management and skin customarily falls within the nursing domain while patients with SCI are in the acute rehabilitation setting, and there is evidence that the education that rehabilitation nurses provide focus on these topics. The planning, implementation and evaluation of educational intervention for family caregivers regarding appropriate ways to perform care and adaptation to the environment falls under the nurse’s responsibility.<sup>3,4</sup> The patients with spinal trauma and their caregivers are quiet unaware of basic information and routine activities regarding condition and its management. It was also noticed that there is a higher incidence of complications among patients with paraplegia. The lack of knowledge regarding care of spinal trauma was a major factor that nullified the effect of treatment programme.

**Objectives of the Study:**

1. To evaluate the effectiveness of nursing intervention on knowledge of family caregivers of patients with paraplegia
2. To determine the association between knowledge of family caregivers and selected socio- demographic variables

**Materials and Method**

A quantitative research approach was adopted in the present study. The research design adopted in the study was quasi experimental pretest post test control group design and was conducted in physical medicine and rehabilitation wards of Government Medical Colleges, Kottayam and Thiruvananthapuram. The subjects were selected through non probability purposive sampling technique. The sample consisted of 80 family caregivers who satisfy the inclusion criteria. Among the 80 family caregivers, 40 family caregivers were in the control group and 40 family caregivers were in the experimental group. Only one primary family caregiver was included in the study.

The tools used for data collection include sociodemographic data sheet of family caregivers and structured knowledge questionnaire. Pretest done and the routine care was provided to the control group. The nursing intervention was administered to the experimental group individually on day 2, day 3 and day 4 at their bedside in wards. Nursing intervention consisted of the

structured, individual patient and caregiver education of 3 sessions of 45 minutes duration using power point slides on exercises, nutrition, skin care, sexual functioning, psychological aspects, bladder training, bowel training, demonstration and return demonstration of exercises and provision of an information booklet describing the interventions to be followed by the patients and family caregivers. Post test was conducted with the same tools on 25<sup>th</sup> day and 90<sup>th</sup> day.

**Results**

Most of the family caregivers of patients with paraplegia (52.5% and 67.5%) both in control and experimental groups were spouses. Interestingly 30% of family caregivers in control group and 45% in experimental group were between the age group of 35 – 45 years. It is noticeable that the most of the family caregivers were females (75% and 82.5%) in both groups. Most of the participants were Hindus (60% and 65%) in control and experimental group. Nearly half of the family caregivers in control and experimental groups (42.5% and 50% respectively) were with high school education. Most of the family caregivers in both groups (65% and 92.5%) reported that they were unemployed. Nearly half of the family caregivers in control and experimental group (50% and 47.5%) reported that their family monthly income was between Rs 5001 – 10,000.  $\chi^2$  values were calculated and were not significant at 0.05. Hence it is inferred that the groups were not homogenous in terms of socio-demographic variables.

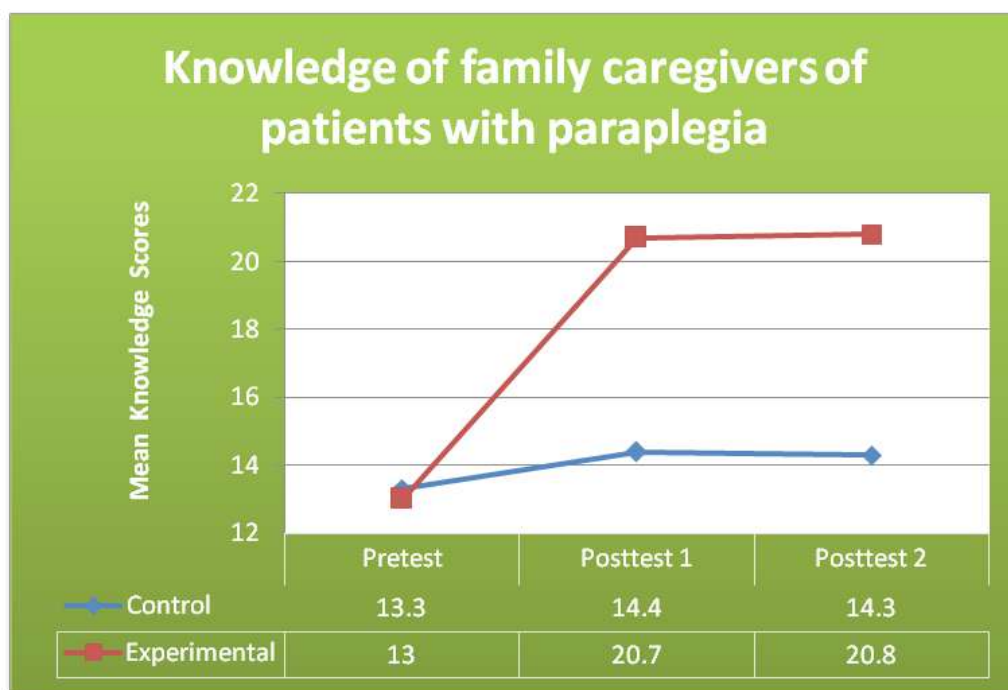
**Table 1: Comparison of knowledge of family caregivers of patients with paraplegia**

Knowledge		Mean	SD	t	p
Pretest	Control	13.3	2.5	0.5	0.616
	Experimental	13	2.4		
Post test 1	Control	14.4	2.4	12.74**	<0.01
	Experimental	20.72	2		

\*\* p< 0.01

Table 1 shows that mean pretest knowledge score in control and experimental group was 13.3 and 13 respectively. The independent t test was done and the t value obtained was not significant in pretest (t = 0.5, p > 0.05). It denotes that there were no statistically significant difference in pretest knowledge scores between control

and experimental group and hence both the groups were comparable. The mean post test 1 knowledge score in control and experimental group was 14.4 and 20.72 respectively. The t value obtained was t =12.74, which was significant at 0.01 level.



**Figure 1: Comparison of mean knowledge scores of family caregivers of patients with paraplegia indifferent time intervals among control and experimental group**

**Table 2: Repeated measures of ANOVA of knowledge of family caregivers of patients with paraplegia in experimental group n = 40**

Group	Mean	SD	F	p
Pretest	13	2.4		
Post test 1	20.7	2	670.29**	p < 0.01
Post test 2	20.8	1.9		

\*\* p < 0.01

The results show that knowledge scores of patients with paraplegia in experimental group were 13+ 2.4 in pretest, 20.7 + 2 in post test and 20.8 + 1.9 in post test 2. The main effect between the period of measurement (F = 670.29, p < 0.01) was found to be significant which indicates that there exists a significant difference in knowledge scores of family caregivers of patients with paraplegia in experimental group between different measurement period.

Table 3 shows significant difference in pretest – post test1 value (mean difference = 7.68, p < 0.05), pretest – post test 2 value (mean difference = 7.83, p < 0.05) and post test1 – post test 2 (mean difference = 0.15, p < 0.05). The finding was interpreted that there was a statistically significant difference in knowledge scores

of family caregivers of patients with paraplegia who received nursing intervention and effect was sustained in post test 1 and 2.

**Table 3: Pair wise comparison of knowledge scores in experimental group n = 40**

Sl. No.	Pairs	Mean Difference	p
1	Pretest	7.68*	p < 0.05
	Post test 1		
2	Pretest	7.83*	p < 0.05
	Post test 1		
3	Post test 1	0.15*	p < 0.05
	Post test 2		

\* p < 0.05

**Table 4: Association between knowledge of family caregivers of patients with paraplegia and selected socio-demographic variables n = 80**

Variables	df	χ <sup>2</sup>	p
Relationship	2	2.01	0.366
Age	3	2.07	0.558
Gender	1	0.01	0.926
Education	2	2.22	0.329

The above table shows that the calculated Chi square value is not significant for the selected socio-demographic variables. There will be no significant association between knowledge of family caregivers of patients with paraplegia and selected socio-demographic variables.

### Discussion

In the present study the majority of the family caregivers of patients with paraplegia had moderately adequate knowledge in control and experimental group (85% and 82.5% respectively). None of them expressed adequate knowledge. The nursing intervention was effective for making a statistically significant difference in knowledge scores of family caregivers of patients with paraplegia. The main effect between the period of measurement ( $F= 670.29$ ,  $p<0.01$ ) was found to be significant which indicates that there exists a significant difference in knowledge scores of family caregivers of patients with paraplegia in experimental group between different measurement period.

A descriptive analysis conducted in 214 paraplegic patients reported that at the time of discharge from rehabilitation, 22% of patients were found to have poor knowledge, 30% average knowledge and only 47% had good knowledge about their illness. This study showed improved knowledge scores compared to the present study findings.<sup>5</sup>

The findings of the present study were backed by an evaluative study of patient education in spinal cord injury rehabilitation. Knowledge was evaluated with a Multiple Choice Questionnaire. Problem-solving ability based on participants' responses to Life Situation Scenarios relevant to each topic area was rated on a standardized four-point criterion reference scale. There was significant improvement in knowledge scores from admission to discharge ( $p = 0.04$ ) and admission to follow-up ( $p = 0.02$ ). For problem-solving ability, there was a trend toward improvement in all content topics with significant improvement from admission to follow-up for the topic of bowel care ( $p = 0.004$ ).<sup>6</sup>

A prospective study was carried out to determine whether an integrated and an intensive outpatient programme would result in functional improvement of SCI patients. A significant increase in median total knowledge and functional independence measure scores in post treatment scores ( $p<0.001$ ) compared to pre treatment score was found. Multidisciplinary

rehabilitation programmes are recommended as safe and effective post injury rehabilitation for SCI patients in achieving long term independence.<sup>7</sup>

The finding was in accordance with an educational model for increasing and retaining the knowledge of pressure ulcer prevention and management of SCI. Results indicated that participants in the intervention group gained more knowledge during hospitalisation than those in the control group. The participants retained most of their discharge knowledge upto 24 months post discharge. The authors concluded that enhanced individualised education about pressure ulcer prevention and management was effective in improving pressure ulcer knowledge during hospitalisation.<sup>8</sup> In another study of patient and caregiver knowledge on autonomic dysreflexia, found that patient and caregiver education about SCI and related secondary medical complications, is an essential component to a successful transition to home and community. Additionally, proper education and knowledge about SCI and associated complications will help patients and caregivers direct their care throughout their lifespan.<sup>9</sup>

### Conclusion

The study explored an area which is underexplored in terms of knowledge of family caregivers of patients with paraplegia in Indian scenario. The present study sheds light on the fact that the QOL of patients with paraplegia was low. The general principles of care for paraplegia and specific nursing strategies to minimise secondary problems like pressure sore, contracture, spasticity and urinary tract infection were effective in improving the lifespan of paraplegics. The identification and acceptance of effects of paraplegia, among the patients and family caregivers and effective way of communication with them were also achieved through this research study.

**Interest of conflict:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Permission had taken from the Institutional Ethical Committee and Scientific Review Committee of Govt. Medical College, Kottayam. Consent was obtained from the subjects.

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# Effect of Video Assisted Teaching on Usage of Plastics and its Impact on Environment among Adolescent in a Selected School, Kanchipuram District, Tamil Nadu

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## Abstract

Almost certainly you will see plastic. Our homes, offices, schools, hospitals, factories indeed, our entire surroundings are dominated by products made from this material. As a consequence, the production of plastics has increased substantially over the last 60 years from around 0.5 million tonnes in 1950 to over 260 million tonnes today. The study topic was “to assess effects on video assisted teaching on usage of plastics and its impact on environment among Adolescent in selected school, Kanchipuram district, Tamil Nadu. The objective of the study were to assess the pre-test knowledge on usage of plastics and its impact on environment, to assess the effect of video assisted teaching on usage of plastic and its impact on environment among Adolescent, to associate between pre-test, post-test knowledge regarding the usage of plastics and its impact on environment with selected demographic variables. Quasi-experimental research design was used for this study. The sample consist of 84 adolescents. Self-structured questionnaire was used to assess the effects on video assisted teaching on usage of plastics and its impact on environment among Adolescent. The data collection period was one week. The data was collected in 84 adolescents in the age group between 13 to 16 years in a selected school, Kanchipuram district, the sample was selected by using simple random sampling technique. The data was analysis and tabulated. The study results shows that majority 65.4% (55) having inadequate knowledge, 33.3% (28) having moderate knowledge, only 1% (1) of them having adequate knowledge regarding usage of plastics and its impact on environment after the video assisted teaching the study results shows that majority 94% (79) having adequate knowledge, 6% (5) having moderately adequate knowledge and none of them were having inadequate knowledge regarding usage of plastics and its impact on environment.

**Keywords:** Effect, Plastic, Adolescents, Environmnet, Video Assisted Teaching.

## Introduction

Almost certainly you will see plastic. Our homes, offices, schools, hospitals, factories-indeed, our entire

surroundings are dominated by products made from this material<sup>3</sup>. We live in the age of plastics; bright, attractive, colourful, long-lasting, relatively inexpensive substances whose invention has revolutionized the manufacturing industry. Plastic certainly have advantages. Unfortunately, they also bring problems to our world, not the least among these being the generation of vast quantities of waste material<sup>1</sup>.

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Plastic bag uses are at risk of number of health hazards. These are many types of bag available today to cater the shopping needs of people. Many factor are been steadily established and harmful chemical and materials are being used in the production grow, from the time of

their origin have become an indispensable part of our life and modern society<sup>2</sup>.

## Material and Method

**Research Approach:** Quasi experimental research

**Research Design:** Quasi experimental design

**Research Setting:** The study conducted in a selected school.

**Population:** Adolescent (boys and girls) who were in a selected school

**Sample:** The age group between 13 to 16 years in a selected school,

**Sample Size:**  $n = [DEFF * Np(1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p * (1-p))]$  .84 samples .

**Sample Technique:** Simple Random sampling technique

### Findings:

**Section A:** Frequency and percentage distribution of demographic variables to effect of Video Assisted Teaching on Usage of Plastics and its Impact on Environment among Adolescent in a Selected School

**Gender:** The maximum (51%) of the sample belongs to the gender of male, (49%) were in the gender of female,

**Age:** The maximum (88%) of the sample belongs to the age group between 13-14 years, (12%) were in the age group between 15-16 years

**Income:** The maximum (38%) of the sample belongs to the income of Rs,5001-10000, (37%) were in the income up to 5000, (24%) of the samples belong to the income of Rs.10001-15001, (1%) were in the income of above 15001.

**Family Members:** The maximum (53.5%) of the sample 3-4 members, (46.5%) were 5-6 members, maximum (43%) of the sample

**Source of Information:** The maximum family and friends, (40%) were from books, (11%) of the sample from the health personals, (6%) were from media.

**Section B:** Distribution and percentage of pre- test knowledge on the usage of plastics and its impact on environment.

It shows that majority 65% (55) having inadequate knowledge, 33% (28) having moderate knowledge, only 1% (1) of them having adequate knowledge regarding usage of plastics and its impact on environment.

**Section C:** Distribution and percentage of and post-test knowledge on usage of plastics and its impact on environment.

It Shows that majority 94% (79) having adequate knowledge, 6% (5) having moderately adequate knowledge and none of them were having inadequate knowledge regarding usage of plastics and its impact on environment.

**Section D:** Comparison of Pre-test and Post-test Knowledge on usage of plastics and its impact on environment.

It depicts that Pre-test level of knowledge regarding the usage of plastics and its impact on environment mean score was 4.33 and the Post-test mean score was 8.47 which projects 't' value of -15.70 which was statistically significant at  $p < 0.05$  level. The 't' value is greater than the table value hence the research hypothesis is accepted. The post-test knowledge score is greater than the pre-test knowledge score. There is a significant difference between pre and post test score. This indicates the Video assisted teaching on the usage of plastics and its impact on environment is effective in increasing the knowledge level among adolescents.

**Section E:** Association between post-test knowledge regarding the usage of plastics and its impact on environment.

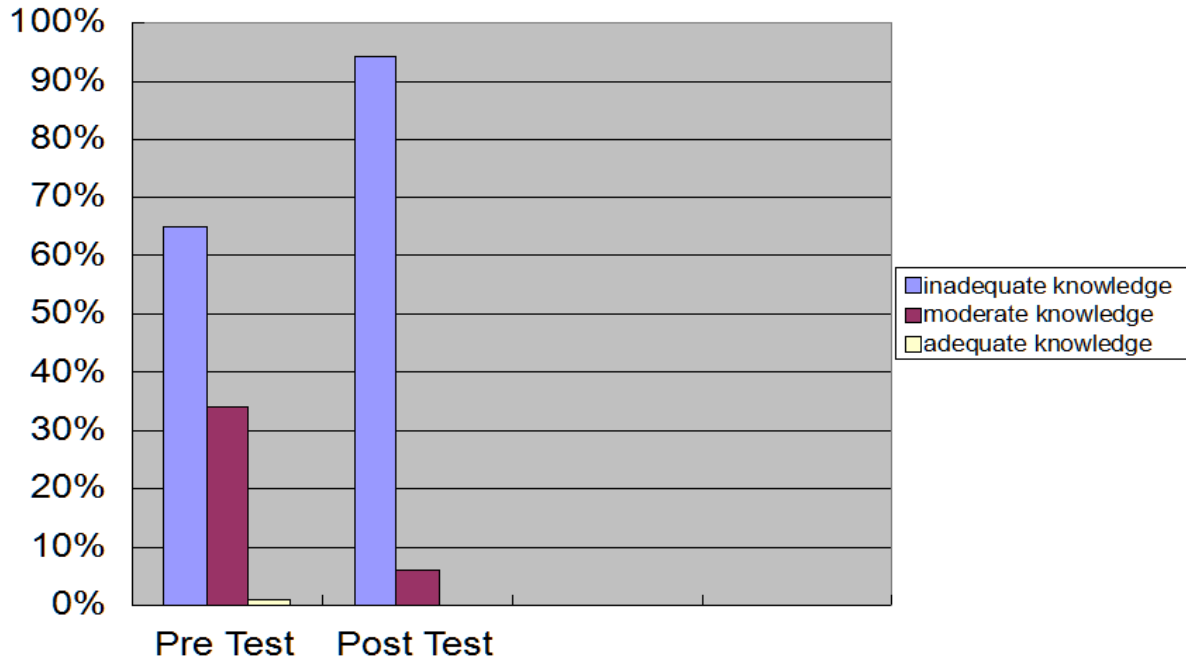
It reveals that there is significant association between the levels of knowledge regarding the usage of plastics and its impact on environment with gender, monthly income, members of the family and source of the information  $p < 0.05$ . Thus the researcher rejects the null hypothesis and accepts the research hypothesis. Other demographic variable such as age has no association with the of knowledge regarding the usage of plastics and its impact on environment

## Discussion

It deals with the discussions in accordance with the objective of the study and hypothesis. The study was conducted to the assess effects on video assisted teaching on usage of plastics and its impact on environment among Adolescent in selected school, Kanchipuram

district, Tamil Nadu. A total of 84 samples were selected by using Simple Random sampling technique the knowledge level of samples was assessed using a self-structure questionnaire. The collected data were

analysed by using the descriptive statistic and inferential statistics. This chapter discusses the findings of the study derived from statistical analysis and its pertinence to the objectives set for the study



**Summary:** This chapter deals with the analysis and interpretation of the collected data from the effect of Video Assisted Teaching on Usage of Plastics and its Impact on Environment among Adolescent in selected school. The data collected was tabulated and analyzed using descriptive and inferential statistics, frequency and percentage were compared to summarize the sample characteristics. Mean, mean percentage and chi square were used to compare the effect of Video Assisted Teaching on Usage of Plastics and its Impact on Environment.

**Source of Funding:** Nil

**Ethical Consideration:** Chettinad Academy of Research and Education Institution Human Ethics Committee

**Conflict of Interest:** Nil

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# Assessment of Risk of Fall among Elderly

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## Abstract

Assessment of risk of fall among elderly in selected community area, Kanchipuram district, Tamilnadu, India. The objectives are to assess the risk of fall among elderly in selected community area, To associate the risk of fall with demographic variables in selected community area. The research approach used for the study was Quantitative Approach Purposive sampling technique was used to select 60 samples. The data were collected by using Fall Risk Assessment scale. The collected data were tabulated and analyzed. The level of significance selected was  $p < 0.05$  level. Descriptive and inferential statistics were used. The result showed that 62% of elderly had low level of risk where as 38% of elderly had moderate level of risk of fall. the showed that the demographic characteristics like Age ( $\chi^2 - 7.588$ ), Blood Pressure ( $\chi^2 - 2.00$ ), Diabetes ( $\chi^2 - 2.347$ ), Vision ( $\chi^2 - 3.45$ ) have significant association where as demographic characteristics like Gender ( $\chi^2 - (0.020)$ ), Arthritis ( $\chi^2 - 0.006$ ) have no significant association .

**Keywords:** Assessment, Risk of fall, elderly people, level of risk.

## Introduction

Falls are one of the foremost serious health concerns facing older persons. Falls are a crucial reason for morbidity and mortality within the older and are a marker of poor physical and psychological functioning. Falls within the older could also be because of either intrinsic (age-related changes) or external (environmental) risk factors<sup>1</sup>.

Falls occur additionally typically with advancing age. Each year, some half-hour to four-hundredth of individuals aged sixty five years and older who sleep in the community fall. Roughly half all falls lead to hospitalization. In nursing injury, of that 100 percent are serious, and injury rates increase with age. The direct medical costs for falls total nearly \$30 billion annually<sup>1</sup>.

Falls within the patient setting are typically outlined as “coming to rest accidentally on the bottom or lower level, undue to an acute overwhelming event” (eg, stroke, seizure, loss of consciousness) or external event to that any individual would be vulnerable<sup>1</sup>.

Falls are a serious threat to older adults' quality of life, typically inflicting a decline in self-care ability and participation in physical and social activities. The concern of falling, that develops in two hundredth to thirty ninth of individuals who fall, will result in more limiting activity, dependence on others<sup>1</sup>.

Older adults oftentimes suppose that falls are inevitable with aging however underestimate their personal risk of falling. Environmental and activity factors (eg, rushing, being distracted) are most frequently seen as inflicting falls; intrinsic (personal/health) factors are seldom recognized. Thus, medical care providers (PCPs) have a vital role in serving to patients perceive the importance of intrinsic factors in inflicting falls<sup>2</sup>.

Age is one of the key risk factors for falls. Older individuals have the highest risk of death or serious injury arising from a fall and also the risk will increase with age. For instance, within the U.S. of America, 20–30% of older those who fall suffer moderate to severe injuries like bruises, hip fractures, or head trauma. This risk level may be partly because of physical, sensory,

and psychological feature changes related to ageing, together with environments that don't seem to be tailored for Associate in Nursing aging population<sup>3</sup>.

Few older adults use well-tried fall interference method like balance exercises. When asked what they're doing to forestall future falls, individuals ordinarily report being additional careful. However, there's no proof that being additional careful alone prevents falls<sup>3</sup>.

Less than half older adults WHO fall speak with their health care suppliers concerning it. Therefore, tips specify that suppliers ought to raise all their patients aged sixty five years and older concerning falls a minimum of annually. By evaluating patients for fall risk and inspiring them to adopt evidence-based interference method, PCPs will facilitate patients cut back their possibilities of falling and experiencing practical decline, injury, or death<sup>4</sup>.

Gerontological nurse has an important role to scale back fall and its connected injuries through providing safety measures, environmental modification, eliminating risk factors and up the balance through exercise educational program. Education should be directed toward serving to older persons to spot potential hazards and ever-changing their health follow and habits consequently. Adequate physical, social and psychological rehabilitation of older with a history of falls and injury has been according to forestall more falls<sup>4</sup>.

**Statement of the Problem:** Assessment of risk of fall among elderly in selected community area, kanchipuram district, Tamilnadu, India.

#### **Objectives:**

- To assess the risk of fall among elderly in selected community area.
- To associate the risk of fall with demographic variables in selected community area.

#### **Operational Definition:**

**Assess:** Evaluate or estimate the risk of fall among elderly<sup>7</sup>.

**Risk of fall:** Risk of Fall is something that increases an older person's chance of fall<sup>6</sup>.

**Elderly:** Individuals over 60 year sold<sup>5</sup>.

**Assumptions:** Elderly are having high risk of fall.

## **Material and Method**

**Research Approach:** Qualitative approach will be used.

**Research Design:** Non experimental descriptive research design will be used for the study.

**Research Setting:** The study will be conducted in selected community area, Kanchipuram district.

**Sample and sample size:** Elderly people those who are fulfilling the inclusion criteria available at selected community area, Kanchipuram District, Tamil nadu, India.

Purposive sampling technique will be used to select the elderly and the sample size was 60 based on population proportion and the open-epi sample size determination.

#### **Criteria for Sample Collection:**

##### **Inclusion Criteria:**

- Elderly aged 60 years above, living in selected community area.
- Elderly who can able to participate in the study.

##### **Exclusion Criteria:**

- Elderly who are critically ill.

**Method of Data Collection:** The data collection procedure will be carried out for a period of 1 week. The study will be initiated after obtaining prior permission from the concerned authorities. The data will be collected from elderly living in selected village by using Fall Risk Assessment Tool.

#### **Tool for Data Collection:**

**Description of the Tool:** Tool consists of two parts

**Section A:** Demographic variables includes age, gender, education, arthritis, diabetes, hypertension, vision.

**Section B:** Fall Risk Assessment Tool is used to collect the data from elderly living in the community area.

**Analysis and Interpretation:** The study shows that the majority 48% were belongs to the age between 60-69 years and 47% of them between 70-75 years and

only 5% of them above 80 years, the gender showed that majority 53% were belongs to Male and 47% of them Female, the arthritis showed that majority 92% were having arthritis, 8% were not having arthritis, showed that majority 55% were having blood pressure, 45% were not having blood pressure. showed that majority 52% were having diabetes and 48% were not diabetes and showed that equally having that 50%. Normal and 50% Impaired Vision.

- To assess the risk of fall among elderly in selected community area.
- To associate the risk of fall with demographic variables in selected community area.

The first objective of study to assess the risk of fall among elderly

The result showed that majority 62% having Low Risk of fall, were as 38% having moderate Risk of fall .

The second objective of study was to find the associate between the risk of fall with selected demographic variables among elderly

It showed that the demographic characteristics like Age ( $\chi^2$ -7.588), Blood Pressure ( $\chi^2$ - 2.00), Diabetes ( $\chi^2$  - 2.347), Vision ( $\chi^2$ - 3.45) have significant association where as demographic characteristics like Gender  $\chi^2$  - (0.020), Arthritis ( $\chi^2$  - 0.006) have no significant association.

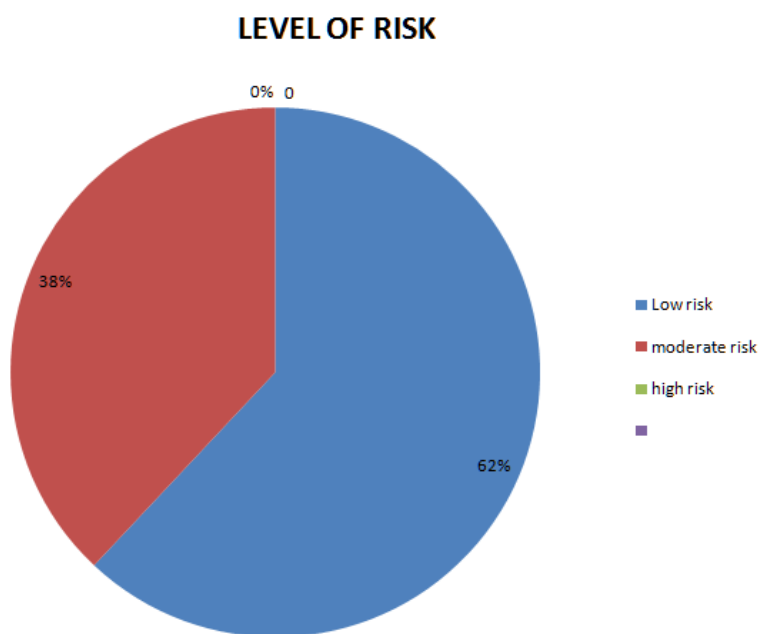


Fig 1:Percentage distribution of level of Risk of fall. N=60

Table 1: Association of risk of fall among elderly with demographic variables. N=60

Category	Inadequate Knowledge	Moderate Knowledge	Adequate Knowledge	Result
<b>Age</b>				
a) 60-69	23	6	0	$\chi^2$ -7.588 p value – 0.0225 S
b) 70-79	13	15	0	
c) Above 80	1	2	0	
<b>Gender</b>				
a) Male	23	12	0	$\chi^2$ - 0.020 p value – 0.8901 NS
b) Female	17	11	0	
<b>Arthritis</b>				
a) Present	34	21	0	$\chi^2$ - 0.006 p value – 0.9545 NS
b) Absent	3	2	0	

Category	Inadequate Knowledge	Moderate Knowledge	Adequate Knowledge	Result
<b>Blood Pressure</b>				
a) Present	14	13	0	$\chi^2 - 2.00$
b) Absent	23	10	0	<i>p</i> value – 0.1572S
<b>Diabetes</b>				
a) Present	15	14	0	$\chi^2 - 2.347$
b) Absent	22	9	0	<i>p</i> value – 0.1255S
<b>Vision</b>				
a) Normal	15	15	0	$\chi^2 - 3.45$
b) Impaired	22	8	0	<i>p</i> value – 0.0631S

\*Significant level  $p=0.05$

### Conclusion

This study concluded that majority 62% having Low Risk of fall, were as 38% having moderate Risk of fall. It showed that the demographic characteristics like Age ( $\chi^2 - 7.588$ ), Blood Pressure ( $\chi^2 - 2.00$ ), Diabetes ( $\chi^2 - 2.347$ ), Vision ( $\chi^2 - 3.45$ ) have significant association where as demographic characteristics like Gender ( $\chi^2 - 0.020$ ), Arthritis ( $\chi^2 - 0.006$ ) have no significant association .The study results which really gives us the alarm to focus on Elderly health to Reduce the risk of fall.

**Conflict of Interest:** Nil

**Source of Funding:** Self funding and no external funding.

**Ethical Clearance:** Obtained clearance from institutional human ethical committee on 04.02.2019.

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# Recharging Ground Water Using Age– Old Traditional Mechanisms

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## Abstract

*“Give back unto the Earth if water is desired in the coming generations”*

“Pawan Guru, Pani Pita, Mata Dharat Mahat” the Gurbani or word of the Gurus as embodied in the holy Guru Granth Sahib has in these words immortalized the relationship of men with Nature by saying that the “Wind is the teacher; Water is Father while the entire Earth is the mother”. When this strong bonding of men and Nature had been recognized several centuries ago it stupefied the human senses to think that man had ended up destroying the natural habitat unmitigatedly.

Since earliest times almost all natural resources have been reserved and utilized judiciously by civilizations. The Chinese, Indus valley, Mesopotamian, Roman, Aztec and most other great settlements used water conservatively. Even back then there was concern for wastage of water.

This paper is focused on looking at the systems of conserving, purifying water and utilizing it to the optimum without wasting any part of it. The objective of the paper is to determine the functioning and use of these techniques for present day communities.

**Keywords:** *Earth, Ma, Nature, habitat, water, purification, conservation, techniques, civilizations, traditional, optimum, communities.*

## Introduction

India’s population is over 1.3 billion. This population inhabits several thousands of villages in each of its states and union territories besides cities and towns. Over this and the past century, water availability to the world’s population has been declining rapidly due to increased urbanization and urban populations. In India a large percentage of surface water is contained and unusable. It is a disturbing fact that India as of today uses more ground water than China and the United States put together. Needless to say the ground water levels are rapidly declining all over the country but in some regions they are doing so at an astronomical pace.

The drinking water situation in the country is fast becoming a Pandora’s Box. On the one hand populations have been known to face death due to not having sustainable access to clean drinking water and on the other hand there is rampant waste of this precious

commodity. The villages at one time had had wells and ponds that hummed with life<sup>1</sup>. These days’ wells are obsolete while ponds have become stench holes. Most villages have their waste (solid and liquid) flowing gravitationally into their pond and they do not pay heed to the ominous degradation of this once healthy resource.

“If the villagers do not consider their ponds to be worthy of being saved they will in their lifetimes see the folly of their ways” said an octogenarian in one of the villages of the Doaba region in Punjab. Taking his concerns further it can be deduced that villagers will gradually loose:

- i. A healthy environment to live in
- ii. Be forced to live in a vector infested habitat
- iii. Be prone to diseases all the year round when neither children nor the elderly will be spared.

- iv. Loose the vital lungs of the village
- v. Become bereft of a vital water recharging source that could have replenished their water reservoirs.
- vi. Very few villagers choose to inhabit areas around the villages pond.
- vii. Gain a little bit of extra land for settlers and loose a major village asset like the pond.

In most villages it can be observed that people living near the pond are doing so only under duress. They have no choice, no alternative but to tolerate the harmful, stench saturated and unhealthy environment.

**Rejuvenation through Ponds:** Once the ponds have optimum content of oxygen in the water special blends of bacteria and enzymes can be introduced into them. These biological blends are successful at breaking down organic matter. They are efficient in consuming water borne pathogens that are causative of pollution and other bad effects of stagnation in the pond.

Access to clean water can affect the performance of milch animals markedly and is therefore very necessary for healthy livestock. With availability of clean water ponds these milk giving animals drink and eat more, and ultimately gain weight quicker. This directly affects their milk yield.

Downing<sup>2</sup> in his paper titled ‘Emerging Global Role of Small Lakes and Ponds: Little Things Mean a Lot’, presents the concept that little water bodies do a lot for the entire ecological systems. He carefully studied small ecosystems and proposed that ecosystems having small areal extent played a major role in global ecological processes of existence. He continued that the areal extent of continental waters is dominated by ponds and small lakes. They show a large functional intensity of many ecological processes and these can be seen through various seasonal cycles.

Ponds provide sustainable solutions to most of the major issues of water management being faced from the village to the global level. Thus, ponds, therefore, have been recognized as an important functional freshwater habitat<sup>4</sup>. They play a critical role in maintaining the environmental biodiversity. With sensitive planning at the village level these very ponds can bring about major benefits to the resident population in terms of:

- i. Rich, healthy Biodiversity

- ii. Promoting a Healthy Environment
- iii. Pollution alleviation and promotion of a clean environment
- iv. Conducive habitat for domestic animals
- v. Provide flood relief during heavy rains
- vi. Guards the environment against rapid climate change
- vii. Adds to an aesthetically appealing living environment for most villagers

The pond’s ecosystem is directly connected with the resident community the people, the decision-makers and the implementers. The ponds also helped maintain, to a large extent, the communities’ inherent cultural and economic resources. Ponds with good water quality are economically desirable all over the world.

The National Water Policy of India lays emphasis on the significance of ponds in India. These desirables have been underlined by several world bodies. The United Nation’s Sustainable Development Goals (SDGs) have mandated that it is essential to safeguard the planet’s water resources. By 2030 AD the world’s water requirement is expected to increase by 30%. It is important to realize that ecological and ecosystem security is a prerequisite for human and water security.

No doubt the demand for water has accelerated over the decades because of the escalating population size and unsustainable consumption and production patterns that have begun showing their debilitating impact in the current century. Competition for water has severely impacted upon the Earth’s ecosystems and biodiversity. Its worst effects are visible on populations in parts of the developing world where natural water resources have been depleted and artificial water recharging mechanisms have proven to be cost prohibitive.

**Significance of Ponds in the Village Habitat:** There is no universally accepted definition of the term pond. Ponds can be described as a body of still surface water which is either natural or man-made and is quite smaller than a lake. These small water resources are significant contributors to development of local communities, and marginalized lower income households especially in the urban areas. The village ponds are essential receptors and reservoirs for natural rainwater harvesting. They are providential for maintaining groundwater levels, naturally.

According to Dubey<sup>3</sup> who closely examined the biological diversity presented in village ponds and their crucial role in sustainable development established irrefutably that there is an undeniable equation between man and his environment.

Dubey<sup>3</sup> details that the village ponds “conserve and preserve the history, mystery and science of rural realities of developing, underdeveloped and partially developed nations.” We continue that ponds are “intricately wedded to biological identities carrying cultural concepts and social strains associated with religious tenets.”

**Biological Diversity of Indian Village Ponds:** The flora and fauna of the ponds protect and preserve a wide variety of organisms and micro-organisms. These include the amphibians, aquatic invertebrates, aquatic plants and some mammals. The smallest pond is normally infested by a huge variety of invertebrates like the dragonfly and damselfly. Species like pygmy damselfly (*Nehalennia speciosa*) and island darter (*Sympetrum nigrifemur*) are salient ones inhabiting and surviving in the pond ecosystem. These ponds are home to the medicinal leech (*Hirudomedicinalis*) and the water beetle (*Graphoderus bilineatus*) along with a number of other creatures that are determined by the lay of the land, the temperatures and the population pressures. Being a complete ecosystem the pond is home to several commonly sighted birds like the egrets, the pond herons, the red wattle lapwings, the cormorants, the kingfishers, the ducks, the geese, the swans and the cranes along with a variety of others. In some areas these ponds are breeding grounds for a large number of migratory birds.

The plants growing in the pond provide food, oxygen and shelter to animals. Ponds in the open are healthier than ponds in the shade because they have access to sunlight to make their food. The smallest plants in a pond are the microscopic phytoplankton which provide most of the food in a pond. The phytoplankton and larger algae form the first part of the pond's food chains. Pond vegetation grows in 'zones'. Plants like the great willow herb and meadow sweet grow in the bankside zone. They like damp places but are not true water plants. The yellow iris and mud-sedge grow nearest the pond edge or the marsh zone. The ponds are potent shelters for several categories of microbes. They comprise bacteria, protozoa, algae and rotifers.

#### **Dynamism of Pond Life and Biodiversity Value:**

Ponds have a distinctive life in which are featured different kinds of organisms which live in a number of networks that are interdependent and inter reactive. They share the available food to live and reproduce. Different types of foods are found in ponds because each animal eats different things. A pond, thus, may have combinations of three variant food webs. The first one is based on larger plants, the second one is based on decayed plants and the third is based upon algae. Ponds therefore provide significant sources of biological diversity in any geographic landscapes not only for plants and animals but it can be observed that ponds are central to the life and wholesomeness of the entire ecosystem in rural India. Since earliest civilizations villages have been known to originate around ponds. Rain water gets harvested naturally by the pond. It gets stored up, recharging the ground water and indicating the level of the water table in the village. Each pond has its own unique biodiversity, with all participants discharging their specific ecosystem functions.

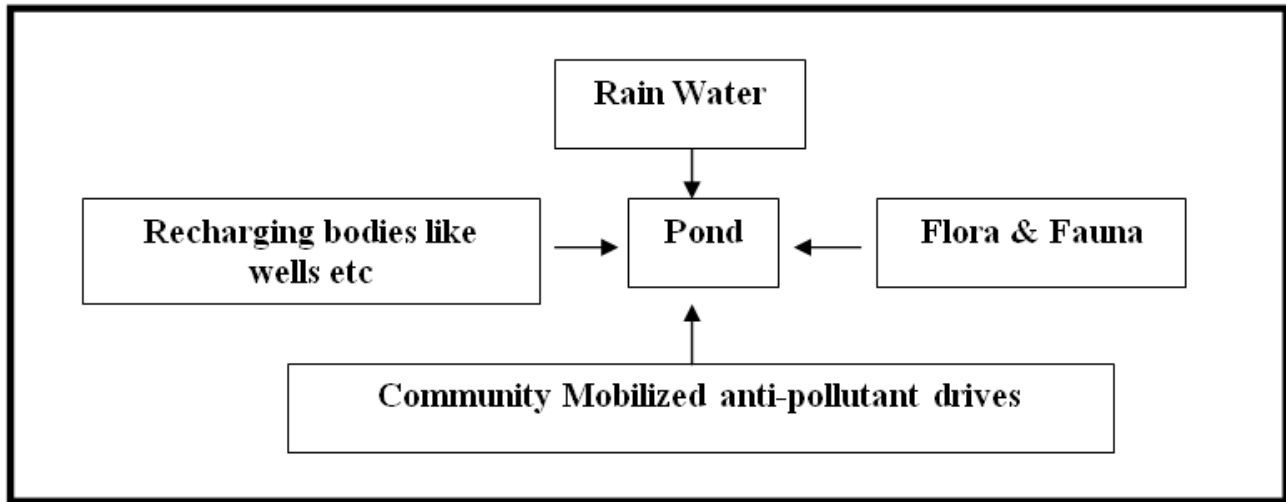
There is another important aspect that brings forth the socio-cultural significance of ponds. It is an established fact that village ponds have had and continue to have a deeply entrenched cultural and historical significance. Since centuries ponds have played a crucial role in maintaining and encouraging the vital link between people and wildlife. There are numerous socio-psychological links that have been established between ponds and their resident settlements. Several rituals are associated with ponds. There are several periodic, lesser or major monthly and annual fairs that are held on the banks of ponds. These are a significant salient reality even in the present times. The Biodiversity Value of ponds is reinforced on the basis of three fundamental truths:

- i. Their status as a critical habitat for uncommon and rare species
- ii. Their role as stepping stone habitats for upward or downward mobility of flora and fauna
- iii. Their value as thriving biodiversity hot spots

**Threats to Ponds Biodiversity:** Severe pollution of ponds is being done by the dumping of wastes, chemical pollutants like the powdery chemical fertilisers having nitrates that are washed off by rain into the nearby ponds. This rich supply of nitrogen causes water plants, like algae to grow rapidly. These plants use up much oxygen during the night and during their decaying processes that

virtually none is left for the remaining pond-life forms. This unmitigated growth also prevents sunlight from reaching the organisms below. The past century has seen about forty percent of the old village ponds being

choked and filled up for residential or pasture and even cropping purposes. Currently there are several villages in Punjab that are totally devoid of any water body.



**Figure 1: Interactive Relationships of Village Ponds**

The above figure gives the almost symbiotic relationship network that develops between ponds and their human, flora and fauna partners. These may be positive or negative depending upon the needs and exploitative overtures of the users of the pond environment.

**Government and Community Approach to Pond Restoration:** Most village ponds require a pragmatic approach for their eco-restoration. The channelization of free flowing rain water from the village catchments is essential for sustainable eco-restoration of ponds. Another significant task is the stocking of various niches of the pond with native vegetation and animals.

This essential task of systematic eco-restoration and sustained management of ponds requires several collective steps to be taken in tandem by individuals, groups and organisations acting in unison.

The Chief Minister of Punjab, had vide his D.O. letter dated 22<sup>nd</sup> March, 2012, detailed the problems related to the disposal of waste water and need of rehabilitation of village ponds in Punjab. He appraised the Minister for Rural Development, Drinking Water and Sanitation that

some pilot projects using the technology of UNICEF and Government of India had been in Ludhiana and Muktsar districts and should be replicated all over the State.

Subsequently, a team was constituted of various experts to study the situation of ponds and how they could be resurrected. The team looked into the status and survival of ponds in the following villages:

1. Village Mohlan, Mandal Malout, District Muktsar
2. Village Birk, Block Sidhwan Bet, District Ludhiana
3. Village Guru, Block Jagraon, District Ludhiana
4. Village Dewatwal, Block Ludhiana, District Ludhiana

The Waste Stabilization Ponds (WSP) do not require any electrical energy. They are extremely efficient. They efficiently remove excreted pathogens. The success and progress attained by WSPs is largely because the systematic stage-wise implementation of various steps of the process are measureable and standardized on the basis of internationally experimented and implemented procedures.

- i. The first stage of waste water treatment is the removal of large floating particles and heavy mineral particles like sand and grit. This is done by simple screening and grit removal a good duration before the raw waste water enters the other parts of the WSP.
- ii. Secondly, the measurement of the incoming waste water is important. This measurement is essential for determining diurnal flow variations and for constantly evaluating the performance of the treatment system.
- iii. The system comprises three treatment units:
  1. Anaerobic pond
  2. Facultative pond
  3. Maturation pond

The anaerobic and facultative ponds are designed for BOD removal and the maturation ponds are designed for faecal bacteria removal.

- a. **Anaerobic Ponds:** These are 2 to 5 metres deep tanks that receive high organic loading, more than 100 gms BOD/cum. Day. It is equivalent to 3000Kg./ha day, containing no dissolved oxygen and no algae. The primary function of these units is BOD removal.
- b. **Facultative Ponds:** These units are designed for BOD removal on the basis of low surface BOD loading. It is usually in the range of 100-400kg/ha day to permit development of healthy algal growth, because the Oxygen for BOD removal by pond bacteria is mostly produced by algal photosynthesis. Liquid depth usually in the range of 1 – 1.8 mts, 1.5 mts.
- c. **Maturation Ponds:** The main maturation pond reduces the number of excreted pathogens, mainly faecal bacteria and viruses present in effluents from the facultative ponds. These ponds are typically aerobic. The depth of these maturation ponds is about one metre. Shallow ponds are more efficient due to greater light penetration.

The principal mechanism for faecal bacteria removal in these and facultative ponds are:

- i. Temperature
- ii. High pH values

- iii. High light intensity

## Conclusions and Policy Implications

It has been derived from the foregoing narrative that rejuvenation and resurrection of village ponds is essential for the sustained promotion of human habitation conducive environments. Water is a rare source of life with increased ability to make informed choices. The following are some suggestions that may have policy implications at the state and national level.

- i. Waste Stabilisation Pond<sup>5</sup> technology is the simplest, suitable technology to treat waste water in rural areas.
- ii. Places having high water table may be in danger of ground water pollution.
- iii. A protocol for ground water quality monitoring should be developed to regularly monitor ground water quality near such WSPs.
- iv. Boulders can be used for inner embankment of ponds, up to the waste water level to check soil erosion.

Convergence with various government departments is envisaged, especially the Departments of Rural Development, Health as well as Forests and Environment besides Water and Sanitation. All these departments need to pool their efforts in giving a new lease of life to the stagnating pond wealth of Punjab. Needless to say this would not be practicable without the total participation of the community.

**Conflicts of Interest:** Nil

**Ethical Clearance:** Taken from The Rural Environmental Enterprises Development Society (The REEDS) committee.

**Source of Funding:** Self

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# **A Study on Work Life Balance and Stress of Female Employees in IT Sector: A Study with Special Reference to Employees in Chennai**

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## **Abstract**

The main aim of this study is to find the work life balance and it causing stress among the female employees working in IT sector. The primary data is collected by using primary method such as questionnaires. For this study questionnaires are used to collect primary data from the respondents. Factor analysis is used to find the result by the researcher. The results shown that Work-life-balance is an important issue in IT profession. In today's competitive era, with changing demands, regulations and so much pressure the work needs have increased a lot. This leads to increase in stress level of the female IT employees. Majority of the respondents expressed that there is no separate policy for work life balance in their organisation and many people were doing work overtime.

**Keywords:** *Work life balance, Stress, Job Performance.*

## **Introduction**

Every individual is an integral part of the family in particular and the society in general. In today's business world, employee performance is key determinant in the achievement of organizational goals. As a result, organizations look for different ways of motivating their employees, in order for them to give their best to the organization. Employee performance is a focal point in any establishment. Every policy should be geared towards increasing the employee performance. For organizations to remain on top they should be able to improve their employee performance and monitor it. In a situation where this does not occur, they are liable to face several challenges which stands as a set back to the organization in the sector where they belong.

Work life balance is a very important phenomenon that is of great concern to various employees in both private and public sector. It goes beyond prioritizing the work role and one's personal life. It also affects the social, psychological, economical and mental well being of the individual. All these is been reflected in the output of the individual, which affects his or her performance in the work place on the long run. Work life balance

has implication on employee attitudes, behaviours, wellbeing as well as organizational effectiveness (Eby, Casper, Lockwood, Bordeanx and Brindley, 2005). The competition for market leadership in the banking sector, may lead to bank managers giving their employees excessive work load in order to meet up with their target. Employees try their best to be retained in the organization by putting in more time at work which may be at detriment of their personal life. All these may affect the upbringing of children, lead to broken and unhappy homes and poor social life.

The conventional wisdom indicates that a happy worker is a better worker. But it seems that the employers find it difficult to understand this fact. We all experience pressure on a daily basis. We need it to motivate us and enable us to perform at our best. However, when the pressure becomes excessive, it leads to stress. Many of the stressful life events are related to the workplace, e.g. lack of job security, changes in working hours, changes in working conditions, layoffs, downsizing, organizational readjustments, etc. IT industry in India has long been exempted from labour regulations in order to facilitate its rapid growth and competency in the global market.

Although this is a sound argument in the wake of our developing economy struggling to sustain and expand economic growth, yet it needs to be checked whether the burden is not being borne by the industry's labour force.

The recent past is a witness to changes in work schedules. A larger part of the IT sector is hence moving from a standard eight-hour a day regime to operating twenty four hours a day for seven days of the week. Many employees need to work on Saturdays and Sundays too. Moreover, there is a changing pattern in the working hours which is quite different from the standard one, which normally operates from 9 am to 5 pm. While some employees work in the standard time some others need to be available for work that normally starts early in the evening and continues well through the night. Sometimes they need to even work beyond the normal eight hours. Increasing workloads have pressurised employees to demonstrate their commitment to work in more obvious ways. Consequently, a larger part of them have tended to be present at their work place for longer periods of time, thereby reducing the time for which they are available at home.

Employees who start to feel the pressure to perform are likely to get caught in a downward spiral of increasing effort in order to meet rising expectations but no increase in job satisfaction. The internet and mobile phones have made it possible for the organizations to keep in constant touch with the employees both during the day and at night. To a large extent in the IT sector, the employee is expected to be engaged on the job almost at all times. Consequently, there are growing reports of stress and work imbalance. The constant requirement to work at optimum performance takes its toll in job dissatisfaction, employee turnover, reduced efficiency, illness and even death in some cases. Absenteeism, alcoholism, bad or snap decisions, indifference and apathy, lack of motivation or creativity are all by-products of an over stressed workplace. So the distinctions between work-life and family-life have vanished.

**Review of Literature:** Chassin et al. (1985) found three types of conflicts in their research on a sample of 83 working parents who have pre-school kids. These differences were related to (a) the demands of multiple roles, (2) between role expectations of self and spouse, and (3) lack of congruence between expectation and reality of roles<sup>4</sup>.

Frone et al. (1992a) in their randomly drawn sample

of 631 comprising 278 male and 353 female respondents also found that work to family conflict is more prevalent than family to work conflict. Their study suggested that family boundaries be more permeable to work demands than are work boundaries to family needs<sup>8</sup>.

Bachmann (2000) found that work arrangements such as flexi-time, telework ethic are depicted as an important component of an individual's work preference towards work time. There is a suggestion that such work arrangements will help the employee achieve a better blend between their work and non-work activities. This will assist the organizations recruit, retain and motivate their workforce<sup>1</sup>.

Hochschild (1997) has observed that to enhance commitment to an organization, the promotion of work life balance policies is of a compulsory interest to the governing body<sup>10</sup>.

**Burke (2002)** noted that an organization that supports work life balance is preferred by both women and men. The benefit for Men appeared to be more than women. Satisfaction was more for Men when their achievement in job was more even at the cost of ignoring the family. On the other hand, women emphasized the need to strike a balance between work and family sources for their gratification. Women feel unhappy, disappointed and frustrated when work prevents them from taking care of their family. Women do not like the crisscrossing of the boundaries between work and home<sup>3</sup>.

**De Bruin and Dupuis, (2004) and Greenblatt (2002)**, emphasized the integration of the work and non-work roles of employees. Then the levels of multiple-role conflict, and the associated stress and job-dissatisfaction, can be minimized or avoided<sup>5</sup>.

**Doherty (2004)** in the study on working life balance initiatives for women in the hospitality industry explored the main barriers to advancement into managerial roles. It was found that managerial roles called for long working hours<sup>7</sup>.

**Grady and McCarthy (2008)** in their study defined that work-life integration is an outcome of the complex relationship between the dynamics of employment and personal factors. They found the balance between work and life is achievable through the funding and coordination of multiple activities which included the organization's interest. Children were given first priority by the respondents exhibiting a deep sense of motherhood.



Factors like work stimulation, challenges, achievement and enrichment were given high importance and sought more self-care time to balance work and family<sup>9</sup>.

**Baral (2010)** studied 485 employees working in varied organizations in India found that working men and women in India experience more work family enrichment than the work family conflict. It was also found that there were no gender differences in the employee perception of work family enrichment<sup>2</sup>.

**Desai et al (2011)** found that home-based working women had less stress, able to adjust better and were more satisfied with their careers<sup>6</sup>.

**Objectives of the Study:**

- To find out problems faced by women employees in IT sector
- To determine the factors affecting work-life balance and causing stress
- To examine the effect of work life balance on Job performance

**Hypothesis of the Study:**

1. There is no significant difference among the factors influencing work-life balance.
2. There is no significant impact of Work life balance on the Job performance of the female employees.

**Research Methodology:** Research methodology is a method to solve the research problem research systematically. It involves gathering data, use of statistical techniques, interpretations and drawing conclusions about research data. Keeping in view the objectives of the study, data is collected from the following sources. Source of data are:

- Primary data
- Secondary data

**Primary Data:** The primary data is collected by using primary method such as questionnaires. For this study questionnaires are used to collect primary data from the respondents.

**Secondary Data:** Secondary data collected from various journals, websites and other research reports.

**Sample Size:** Under this research 50 respondents in Chennai opinion are being to obtained on the basis of convenient sampling method.

**Analysis and Interpretation:**

**Factors affecting work-life balance:** The factor analysis results in five important work-life-balance factors of the respondents and the names were considered based on the list of items under each component and the respective loadings of the item. The Eigen value and the percent of variance explained by factors are presented in the below table

**Table 1: Factors Constituting Work-Life-Balance**

Sl. No.	Factors	Number of variables	Eigen value	Percent of variation explained	Cumulative percent of valuation
1.	Job Nature	9	13.001	12.841	12.841
2.	Work Load	7	2.081	11.336	24.177
3.	Work environment	10	1.838	13.303	37.480
4.	Organizational support	6	1.428	10.864	48.343
5.	Family Domain	3	1.316	7.838	56.182

**Source:** Computed Data

It is clear from Table 4 that five dominant work-life-balance factors, which consist of thirty five work life-balance components, accounted for 56.182 percent of total variance.

**Inference:** ‘Job Nature’ is the dominant factor that influences the work-life-balance since its Eigen value

and percent of variation explained are 13.001 and 12.841 respectively. Work load is the next significant factor with Eigen value of 2.081 and percent of variation explained is 11.336. ‘Work environment’ is the third important factor followed by ‘Organisation Support’ and ‘Family Domain’ in terms of their Eigen value of 1.838, 1.428

and 1.316 and percent of variation explained with value of 13.303, 10.864 and 7.838 respectively. It is concluded that ‘Job Nature’, ‘Workload’, ‘Work Environment’, ‘Organizational Support’ and ‘Family Domain’ are the predominant factors of work life balance.

**Relationship and Impact of Work Life Balance on Employee’s professional life:** Correlation analysis was carried out to study the relationship between work

life balance and professional life of working female employees. The results were shown in the below table.

**Table 2: Professional Life**

Work life balance	Pearson Correlation	.594
	Sig. (1 – tailed)	.000

Source – computed data

**Table 3: Showing Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	6.053	1.30	.594	5.231	.000
Worklife balance	.612	.085		6.943	.000

Dependent Variable: Professional Life

Source: Computed data

Value of t for human resource system comes out to be 6.943, p value is .000 and beta value is .594 which is significant at 5 percent level of significance. Thus null Hypothesis 2 was not accepted in this regard.

**Inference:** The result depicted significant positive relationship between work life balance and employees’ professional life. Coefficient of correlation 0.594 is significant at 5 percent level of significance. The result depicted that there exists a significant positive relationship between work life balance and female employees’ professional life.

Thus there is significant impact of work life balance on employees’ professional lives. Hence there must be focus on improving the work life balance which will further improve their professional life leading to more productive and efficient staff.

**Findings and Conclusion**

Work-life-balance is an important issue in IT profession. In today’s competitive era, with changing demands, regulations and so much pressure the work needs have increased a lot. This leads to increase in stress level of the female IT employees .Majority of the respondents expressed that there is no separate policy for work life balance in their organisation and many people

were doing work overtime. Also management has not done much in terms of designing and implementing effective work life balance policies and practices. If the personal and professional lives of female employees are balanced, they can devote more time to their children and can focus on their upbringing. It was found that the number of hours worked per week, the amount and frequency of overtime, and inflexible work schedule increase the likelihood of employees to experience conflict between their work and family roles as it kills their time to perform family related activities.

Also there is significant positive relationship and impact of work life balance on employee’s professional life. Study also revealed some of employees feel so stressed that they are not able to handle family responsibilities even after coming from workplace as they feel so tired and exhausted because of long working hours. Breaks are also very short so they were not able to take proper rest. However, their company provides no policy as such to help their employees meet their family commitment. Thus focus must be there in making policies that can help the female employees to have balance between the two.

The study was also able to measure women IT employees’ work-life-balance and found that ‘frequently extended work schedule’, ‘frequent

changing requirement of clients', 'role overload', 'lack of flexible options' and 'unrealistic deadlines' are some important determinants which influenced women employees' work-life-balance. The analysis also reveals that five factors namely, Job Nature, Work Load, Job Environment, Organizational Support, and Family Domain constitute work-life-balance of women professionals. The result of correlation analysis also confirms the positive correlation among the above five factors. The companies in IT industry may consider the above five factors and modify their HR policies suitably and create conducive work environment to maintain work –life-balance among women professionals so as to improve their performance.

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from UGC Committee

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# Comparison of the Masticatory Efficiency and Biting Force between Conventional Complete Dentures and Implant Retained Over Dentures with Different Types of Attachments

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## Abstract

**Background:** The prosthodontic management of the edentulous patient has always been a major challenge to prosthodontists. Patients wearing conventional complete dentures often complain about the instability and dissatisfaction especially with lower dentures. Implant retained over dentures help to solve this instability problem. Masticatory efficiency and biting force is a major indicator of functional state of masticatory system and its measurement is an important parameter during treatment planning.

**Materials and Method:** This study involves the use of miniature load cell to determine the maximum biting force and color changing chewing gum to evaluate masticatory efficiency in 20 edentulous patients wearing conventional complete dentures and comparing it with implant over dentures retained ball and bar retained over dentures. Paired t-test and Anova test were applied to statistically evaluate the data.

**Results:** Indicated that patients with bar retained implant over dentures demonstrated significant levels of masticatory biting force and masticatory efficiency as compared with ball retained over dentures and ball retained over dentures showed better results upon conventional complete dentures.

**Keywords:** Conventional complete dentures, Implant Retained Overdentures, Maximum Biting force, Masticatory efficiency.

## Introduction

The prosthodontic management of the edentulous patient has been a major challenge to prosthodontists. Most prosthodontists consider treating such patients with complete maxillary and mandibular dentures as a traditional standard of care. Mandibular residual ridge provides less than 1/4<sup>th</sup> of the support offered by the periodontium to natural teeth, yet patients expects that

their prosthesis to replace natural teeth. Most elderly patients face problems adapting to their lower denture due to lack of bone support resulting in less retention and stability resulting in difficulty to chew and eat.<sup>1</sup> This instability leads to a feeling of insecurity, inefficient function, and overall dissatisfaction with the prosthesis. Patient's expectations urge and desire for better masticatory functions is prime factor for treating with implant-supported or retained dentures.

Prosthodontists focus on the restoration of osseointegrated dental implants has evolved dramatically in the two decades.<sup>2</sup> An axiom of treating patients with implants is to provide the most desirable and predictable yet cost-effective modality of treatment that satisfies the patient's anatomical needs and personal expectations.<sup>3</sup> Many studies conducted to evaluate the masticatory performance and oral function showed a significant

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improvement in cases treated with implants in the mandibular arch.<sup>4-7</sup> Researchers recommend fabricating over dentures by placing two mandibular implants rather than treating with traditional conventional complete denture prosthesis as the first treatment option.<sup>8,9</sup>

Implant overdentures can be retained using a variety of attachment types and designs. Most companies are fabricating and marketing newer and better attachment systems. Amongst the varieties available, a few systems are quite popular and frequently used are ball and socket, bar and clip, magnets and newer mechanical attachments. Prosthodontists select a system based on his experience, ease of use, availability and patient's economic status. Either splinting implants with a bar or individual un-splinted implants connected to the overdenture using O-ring attachments have been preferred. The precise selection and placement of attachments may, however, affect the clinical success of implant-retained overdentures.<sup>10</sup>

The rehabilitation of edentulous patients, primarily to restore the masticatory functional status may be of critical value. The rationale that patient's masticatory efficiency and bite force improves is a bit point of concern before fabricating a conventional complete denture and comparing with implant-supported or retained dentures.<sup>11-15</sup> The aim of this study was to evaluate and compare the masticatory efficiency and masticatory bite in conventional complete dentures and implant retained over dentures with different types of attachments.

## Materials and Method

Twenty edentulous patients participated in this study, aged between 40-65 years (Mean 54±1.2 years). Patients selected were free from any systemic/local, acute or chronic diseases that might contraindicate the placement of the implant. All subjects had good oral hygiene, class-I type of ridges with enough height and width covered by normal thickness of muco-periosteum. The informed consent was obtained from all the subjects prior to the start of treatment. This study was approved by the Ethics Committee, Pacific Dental College, Udaipur, Rajasthan, India. Detailed Intra and extra-oral along with radiological examinations (OPG and CBCT) and routine blood investigations were carried out for each patient.

Fabrication of Conventional complete dentures (CCD): It was fabricated in heat cure Polymethyl-methacrylate resin with all standard procedures for

each patient and inserted and left for one month to get accustomed to the denture (Figure 1).



**1. Dentures after insertion**



**2. Surgical drilling for implant**

Fabrication of surgical template: By duplicating each patient's lower dentures, template was fabricated. 2mm diameter metal balls were placed at inter canine region. The stent was checked in patient's mouth for correct positioning.

**Patient preparation for implant surgery:** According to standardized two-stage protocol, two implants with 3.3 or 4.1mm diameter and length of 10 or 13 mm. were placed per patient at the right and left mandibular canine and first premolar regions (B and D positions) under local anesthesia and single dose of prophylactic antibiotic coverage (Figure 2). The implants were left submerged for 3 months to osseointegrate. The patient was instructed to discontinue denture for 15 days following implant surgery and was recalled after two weeks for relining with softliner.



**3. Ball abutments fixed on implant**



**4. Bar fabricated and tried on cast in lab**

After three months, second-stage surgery was performed to place healing caps. 1-week later healing caps were removed; ball and socket attachments were replaced over the fixture (Figure 3). The intaglio surface of the denture was modified that to accommodate O-Ring attachments and the denture was reinserted and left for 2-3 weeks. The patient was recalled, and evaluation of the masticatory efficiency and bite force was done, the ball and socket attachments were replaced by bar and clip attachment with standard prosthodontic technique (Figure 4). Masticatory efficiency and masticatory biting force were evaluated with predetermined methodology and the data collected was statistically evaluated.

**Bite force measuring appliance:** It is measured by several devices as reported in literature most commonly used is the sieving method.<sup>24</sup> Nowadays, sensitive electronic devices which are more precise (80%) and accurate (10 N) to record the bite force (50-800 N) are available. These devices use load cells (transducers) to

convert force to electrical energy which is amplified directly and then transferred to threshold-detection circuit in which the output signals are recorded on computer screen.

**Measuring the biting force:** One month after dentures insertion, the subjects were recalled and bite force recording procedure demonstrated. The Ultra-Miniature Load Cell transducer was covered with putty rubber base and fitted onto the occlusal surface between second premolar and first molar. Similarly, a metal piece with same dimensions of the load cell was also covered in putty and placed in the same region but on contralateral side to counterbalance the force. Patient was instructed to occlude in desired position until the material sets to form a bite (Figure- 5). Later again the patient was directed to bite on both sides for three seconds and repeat thrice with a one-minute rest between trials. Thus, biting force on both sides for conventional complete dentures and average values were recorded. After replacing the healing caps with ball and socket attachments, the patient was recalled after 3 weeks; the bite force test was recorded on both sides as mentioned above for conventional dentures and was similarly repeated after replacing the ball and socket attachment with bar clip attachment. All the data recorded was collected was statistically evaluated.



**5. Load cell and metal piece in silicone putty**



**6. Xylitol color changing gum.**

**Masticatory efficiency:** It was evaluated with a color changeable chewing gum XYLITOL as a test item. The color of this chewing gum changes as the patient bites and the chewing strokes proceeds, masticatory efficiency can be evaluated by visual assessment. Subjects were given one-third quantity (1g) of chewing gum(Figure 6) and instructed to chew with 15, 30, and 45 strokes, respectively. All patients chewed the gum at a constant pace of one stroke per second until the assigned strokes this was repeated thrice. Every bolus of the chewing gum was picked immediately after 15, 30, 45 strokes and placed between two polyethylene films and compressed between two glasses plates to a thickness of 1.5mm to evaluate its color with scale provided by the manufacturer.

## Results

The data collected was statistically evaluated using SPSS software. The masticatory bite force was evaluated statistically by *t*-test. The mean bite force in patients using implant retained overdentures was more than double compared with conventional dentures. The mean bite force range for *n* = 20 patients. The paired sample *t*-test showed that no significant differences for the mean and standard deviation values for right and left sides within the same groups of conventional complete dentures, Ball IOD and Bar IOD (Table 1). However, it was observed that there were high significant differences in patient’s ability for maximum biting force when comparing for the right and left sides between CCD and both of Ball IOD & Bar IOD. In contrary, there were significant differences of maximum biting force in the right and left sides between Ball IOD and Bar IOD (Table 2).

**Table 1. The mean values and standard deviations of maximum biting force in Conventional complete denture (CCD), Ball retained implant overdenture (Ball IOD) and Bar retained implant overdenture (Bar IOD).**

		Mean ± S. D	Std. Error Mean	t	P
CCD	Right	4.823± 0.419	0.081	1.421	0.170
	Left	4.615± 0.402	0.077		
Ball IOD	Right	9.778± 0.666	0.147	1.801	0.083
	Left	9.367± 0.666	0.148		
Bar IOD	Right	9.862± 0.684	0.151	1.432	0.161
	Left	9.859± 0.691	0.152		

**Table 2. The mean difference values and standard deviation difference values of maximum biting force between CCD & Ball IOD, CCD & Bar IOD, and Ball IOD & Bar IOD.**

Side	Pair	Paired Differences		t	p
		Mean ± SD	Std. Error Mean		
Right	CCD – Ball IOD	-6.912 ± 0.6117	0.1000	-57.634	0.000**
	CCD – Bar IOD	-7.058 ± 0.5418	0.104	-58.366	0.000**
	Ball IOD – Bar IOD	-0.089 ± 0.1396	0.027	-3.309	0.003*
Left	CCD – Ball IOD	-6.971 ± 0.6073	0.099	-57.776	0.000**
	CCD – Bar IOD	-7.054 ± 0.5488	0.105	-57.985	0.000**
	Ball IOD – Bar IOD	-0.097 ± 0.1322	0.026	-3.626	0.001*

**Masticatory efficiency:** No significant differences in color scores was noted using paired sample t test between the right side and left side with conventional

dentures during the 15, 30 and 45 strokes (*p*>0.05) and during the 15 and 30 strokes with Ball IOD and Bar IOD. However, with 45 strokes, significant difference

was reported between the right side and left side in all the three groups (Table 3). When comparison was done using paired t test, the results indicated that a very high significant difference in color scores with 15 chewing cycles as compared between the CCD versus Ball IOD and CCD versus Bar IOD ( $p<0.001$ ). However, significant difference was noted between the Ball IOD versus Bar IOD ( $p<0.05$ ). For 30 chewing cycles, high significant differences in color was noted between the CCD versus Ball IOD, the CCD versus Bar IOD and the Ball IOD versus Bar IOD ( $p<0.001$ ). High

significant differences in color scores was recorded with 45 chewing cycles between the CCD versus Ball IOD, the CCD versus Bar IOD and the Ball IOD versus Bar IOD ( $p<0.001$ ). In case of Bar IOD, a high significant difference in color scores between 15 versus 30 chewing cycles and 30 versus 45 chewing cycles ( $p<0.001$ ) was noted. The one-way ANOVA (F) test showed that with 15, 30 and 45 chewing cycles there were high significant differences in color scores between the CCD, Ball IOD and Bar IOD ( $p<0.001$ )(Table 4).

**Table 3. The mean values of color scores during chewing color changeable gum with CCD, Ball IOD and Bar IOD.**

	Strokes	Sides	Mean± SD	Std. E	t	P
CCD	15	Right	1.630 ± 0.500	0.100	-1.000	0.327
		Left	1.660 ± 0.526	0.095		
	30	Right	2.163±0.473	0.095	-1.445	0.161
		Left	2.238±0.523	0.104		
	45	Right	2.540±0.507	0.101	1.809	0.083
		Left	2.300±0.476	0.095		
Ball IOD	15	Right	2.080±0.702	0.141	-1.319	0.200
		Left	2.136±0.727	0.145		
	30	Right	2.640±0.569	0.114	-1.000	0.327
		Left	2.680±0.559	0.114		
	45	Right	3.020±0.653	0.136	-2.130	0.044*
		Left	3.164±0.746	0.149		
Bar IOD	15	Right	2.840±0.542	0.108	0.549	0.588
		Left	2.736±0.458	0.091		
	30	Right	3.610±0.577	0.115	-1.644	0.113
		Left	3.692±0.502	0.101		
	45	Right	3.710±0.489	0.097	-2.449	0.022*
		Left	3.920±0.374	0.078		

\*:A significant difference ( $p<0.05$ )

**Table 4. Comparison of CCD, Ball IOD and Bar IOD for mean difference values, R square values and paired sample t test at different number of strokes.**

	CCD.		Ball IOD		Bar IOD	
Strokes	15 vs 30	30 vs 45	15 vs 30	30 vs 45	15 vs 30	30 vs 45
Mean diff	-0.6122	-0.2041	-0.4490	-0.5714	-0.7551	-0.2857
R Square	0.6122	0.2041	0.4490	0.5714	0.7551	0.2857
T	8.706	3.508	6.254	8.000	12.17	4.382
P	0.0003**	0.010*	0.0008**	0.0055**	<0.0001**	<0.0001**

N.S.:No significant difference ( $p>0.5$ ); \*: A significant difference ( $p<0.05$ ); \*\*: High significant difference ( $p<0.001$ )



## Discussion

The teeth loss in elderly patients not only disables their stomatognathic system but also their psychological status, social status, self-esteem and quality of life.<sup>16-19</sup> The rehabilitation of these patients using conventional dentures, regardless of the quality, fails to completely solve either functional or psychological problem.<sup>20,16</sup> Mandibular implant-supported removable overdentures have shown to provide significantly superior function and patient satisfaction in chewing ability and comfort.<sup>21-24</sup> Bite force evaluation in edentulous patients has been investigated by many researchers with an objective to understand the mastication mechanism and its therapeutic effects on prosthodontic appliances.<sup>25</sup>

In this study, masticatory bite force was measured by using miniature load cell. When comparing the effect of conventional complete denture and over denture attachments on the maximum biting force. The result of the present study found that the maximum biting force when using over denture supported by bar attachment was significantly highly increased, than with the conventional denture and over denture supported by ball and socket attachment. This was similar to the results obtained by similar studies.<sup>26-29</sup> Also the maximum bite force generated by subjects with Ball IOD was significantly lower than that generated with a bar-clip or bar IOD. This was similar to results obtained by Haas R et al.<sup>30</sup> The result of the present study found highly significant differences in masticatory efficiency between the conventional denture with overdenture supported by bar attachment (Bar IOD) and the conventional denture with overdenture supported by ball and socket attachment (Ball IOD). This was in accordance with the results of Chen et al.<sup>31</sup>

While, when comparing the effect of over denture supported by bar attachment and over denture supported by ball and socket attachment on the masticatory efficiency at different masticatory cycles (15, 30 and 45). The result of the present study found significant increase in the masticatory efficiency when using overdenture supported by bar attachment. The results also demonstrate that the patients restored with implant supported overdenture showed higher masticatory efficiency than those restored with conventional dentures. However, between bar and ball the differentials were significantly different. This was in agreement with the results obtained in other studies.<sup>27,30</sup>

## Conclusion

This study concluded that the mandibular implant Over Dentures (both Ball and Bar) were found to be clinically more retentive and stable than the Convention complete dentures. This insufficiency of conventional denture treatment makes mandibular implant overdenture a preferred option, furthermore it is simple, minimally invasive, highly predictable, efficient, affordable and attractive treatment option. Bite force is very important parameter for implant selection and prosthodontic case planning especially in edentulous patients who can deliver very high occlusal loads. Patients rehabilitated with overdenture retained by ball or bar clip attachments had significant improvement in masticatory performance (bite force) and masticatory efficiency when compared with conventional dentures. However, the masticatory performance and efficiency still was found to be significantly lower in ball IOD as compared to Bar IOD subjects. The result of the present study concluded that the maximum bite force increased significantly (more than the double) after implant treatment. Also, highly significant increase in maximum bite force occurred with the bar clip attachment in comparison with conventional denture and over denture supported by ball and socket attachment.

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# Concept Mapping as a Clinical Learning Strategy on the Competency Scores of Nursing Students

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## Abstract

**Background:** Nursing students are valuable human resources. Therefore, its crucial to detect potential clinical difficulties experienced by the nursing students and identify appropriate ways to enhance their learning as well as academic and clinical outcome.

### Objective:

1. To determine the effect of concept mapping on the clinical competency scores of nursing students.
2. To compare the clinical competency scores of the subjects during the first few weeks of training in concept mapping

**Method:** Quasi experimental research study with Posttest only design was used to accomplish the purpose of the study. The study setting comprised of two private nursing colleges offering diploma, degree and PG program in nursing. Data was collected from the II and III B.Sc. Nursing students in both the college. Convenient sampling was used in the study. The study sample consisted of 136 student nurses. The data collection tool comprised of assessment of 1) Baseline Performa of the students and 2) Concept map clinical grading rubric to evaluate the concept maps

**Result:** Based on the findings of the study there was a significant improvement in the competency of concept map preparation. This was evidenced by the increase in competency scores from week one to week two and three.

**Conclusion:** The technique was beneficial for the students as well as educators who had noticed change in the performance of the students who practiced the concept mapping technique. It also enhanced the students to prioritize the need and the care to be provided to the patient.

**Keywords:** *Concept mapping, clinical learning strategy, competency, nursing students.*

## Introduction

Nursing students are valuable human resources. Therefore, its crucial to detect potential clinical difficulties experienced by the nursing students and identify appropriate ways to enhance their learning as well as academic and clinical outcome. Identifying factors affecting productivity among nursing students can help nursing educators to find ways to increase the learning as well as academic outcome<sup>1,2</sup>

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Certainly, stress in the college setting cannot be eliminated, but preparing the student nurses to manage it properly can do a better task<sup>3</sup>. The researchers has observed that traditional nursing education is not optimal in promoting learning and is laden with problems<sup>4</sup>. Traditional education also known as basic, conventional education refers to long established customary education that society has traditionally used in schools. It is concerned with the teacher being the controller of the learning environment<sup>5</sup>. Recent advances in technology have unlocked entirely new directions for educational research. Many institutions are moving towards innovative method of teaching as a solution to produce graduates who are creative, think critically, be analytical and able to solve problem independently<sup>6</sup>.

Today technology has made teaching and learning interesting and interactive. There are many different method like concept mapping, blended learning, e-learning, virtual and hybrid labs which are widely used today for teaching students. Concept mapping is the visual presentation of the key concepts in relation to a specific subject matter. They are useful tools that are utilized in order to represent the structure of knowledge in a form that is mentally compatible with the way human beings construct meaning. Students who use meaningful learning method tend to retain knowledge over time. They also find ways to connect new information with prior learned materials<sup>7</sup>. Concept mapping can influence student's perceptions of the learning environment and subsequently their study experiences, learning outcomes, and ultimately the clinical judgment and patient care<sup>8</sup>.

Concept mapping learning strategies in nursing education is expected to promote nursing students to be actively involved in self-regulated learning, to transform traditional one-way delivery of knowledge to cultivate patient-centered teaching and learning model<sup>4</sup>. There were not many studies done in India, especially in the clinical setting to assess the development of clinical competency in the application of theoretical knowledge to the clinical setting, the researcher felt the need to identify the effectiveness of concept mapping on the clinical competency scores of nursing students.

Objective: To determine the effectiveness of concept mapping as a clinical learning strategy on the competency scores of nursing students

## Materials and Method

Quasi experimental research study with Posttest

only design was used to accomplish the purpose of the study. The study setting comprised of two private nursing colleges who are offering nursing education for more than 25 years and were offering diploma, degree and PG program in nursing. Data was collected from the II and III B.Sc. Nursing students in both the college.

Convenient sampling was used in the study. Statistical power analysis was calculated to determine the required sample size and was estimated as 100. The actual sample consisted of 136 B.Sc. Nursing II and III-year students. The subjects were in the age group of 18 to 25 years and 9% of subjects were males. Total enumeration sampling technique was used for the study in order to help eliminate potential bias occurring through sampling technique.

Thirteen clinical teachers assisted the students in the clinical area for the study. The clinical teachers comprised of both nursing educators with more years of teaching experience and those who have just obtained their graduation in nursing.

Non - probability convenient sampling technique was used for the study and based on the inclusion and exclusion criteria the subjects were selected for the study.

### Instruments Used for the Study

**Baseline Performa of subjects:** This was designed to collect the baseline information of the subjects such as age, gender, year of study, religion, clinical and academic details

Evaluation tool for concept map: Concept map clinical grading rubric was used to evaluate the concept maps that were prepared by the subjects. This consisted of a rating scale with 10 items according to the components of the care plan such as history, lab investigations, medications, nursing problems & interventions.

The Likert type scale consisted of 10 items and the score ranged from 10 to 40. A score of 1-10 was considered as Unsatisfactory, while 11-30 was satisfactory score whereas a score of 31-40 was considered as exceeds expectation.

**Method of Data Collection:** Ethical approval was obtained from the college authority and consent from the participants was voluntarily taken after they had been instructed about the research. Data was collected before the training session on Baseline characteristics of the

sample. The students were trained on the preparation of concept map and its technique. The preceptors were provided with the skill orientation program. The subjects were asked to prepare a concept map for the given case vignette. The prepared concept map was evaluated using concept map clinical grading rubric and scoring was done. During the clinical posting students were made to prepare 1 to 2 concept map per week for 3 weeks duration based on their patient assignment. The students worked individually to collect relevant information from their assigned patient to design concept mapping. One map each per week was considered for the evaluation.

Initially this was a group activity and after 2-3 maps they developed the requisite skill in preparing the concept map. Then they proceeded to individual activity. Student's benefited from the peer discussions during the individual and group activity. Students also had to familiarize themselves on referring the textbook and preparing the relevant content. Once they were familiar with the process of concept map preparation, they were trained to use the tool in the clinical setting.

**Findings:**

**Table 1: Comparison of competency scores for assessing concept map during the first few weeks of training n = 13**

Competency of concept map over the weeks	Mean	Std Deviation	95% CI	
			Lower Bound	Upper Bound
CM Week1	15.59	4.81	14.78	16.40
CM Week2	24.39	5.66	23.44	25.34
CM Week3	29.94	4.93	29.12	30.77

Table 1 shows the level of student's competency in preparation of concept maps during three different observations. The first test was done during the 1<sup>st</sup> week immediately after the training on concept mapping. This was designated as CM<sub>1</sub>. At a gap of 1 week the 2<sup>nd</sup> and 3<sup>rd</sup> test was done. The table indicates that the competency mean score has increased from CM1

(15.59± 4.81) with 95% Confidence interval (14.78, 16.40) to CM2 (24.39±5.66) with 95% Confidence interval (23.44, 25.34) to CM3 29.94 ± 4.93 with 95% Confidence interval (29.12, 30.77). The data shows that there was significant improvement in the student's clinical competency scores during week 1, week 2 and week 3 from the application of concept mapping.

**Table 2: Test for Homoscedasticity in repeated measures ANOVA**

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.94	8.42	2	.015	.944	.956	.500

Table 2 represents the extend of violation of sphericity. Using repeated measures of Analysis of Variance Mauchly's Test of Sphericity shows that Chi Square value = 8.42 with 2 degree of freedom and

P=0.015, indicating the variance in the data are unequal and therefore further analysis is carried out using Greenhouse- Geisser test for ANOVA

**Table 3: Distribution of mean difference in Concept mapping Competency scores over the weeks**

Mean Difference in CM scores from week 1, 2 & 3	df	Sum of Squares	Mean Sum of square	F	P
Weeks	1.887	14560.523	7714.194	396.885	<0.001
Error	260.475	5062.811	19.437		

Table 3 showed that, over a period of time from week one score (CM1) to week three score (CM3) there is a significant improvement in competency score among the group. The repeated measures ANOVA for concept mapping is found to be statistically highly significant (F = 396.885, P < 0.001). Hence a post-hoc test was carried out to test the significance difference of means from

Week1 to week2 and Week2 to week3. The post hoc test revealed that the mean scores differed significantly during each week. Hence it is inferred that there was statistically significant improvement in the competency scores of subjects after 3 weeks from the application of concept mapping in the clinical care setting.

**Table 4 Comparison of concept mapping scores from week 1 to week 3**

Comparison of CM score over the weeks	Week	df	Sum of Squares	Mean Sum of square	F	P
Weeks	1 to 2	1	10760.640	10760.640	241.052	<0.001
	2 to 3	1	4287.655	4287.655		
Error	1 to 2	138	6160.360	44.640	118.196	<0.001
	2 to 3	138	5006.345	36.278		

The first test was done during the 1<sup>st</sup> week immediately after the training on concept mapping. This was designated as CM<sub>1</sub>. At a gap of 1 week the 2<sup>nd</sup> and 3<sup>rd</sup> test was done. The post-hoc test shows that there is a highly significant improvement in the competency score from CM1 to CM2 (F= 241.052, P= <0.001). Similarly, a significant improvement was also observed from CM2 to CM3 (F = 118.196, P= <0.001)

It is evident from the above table that training program on concept mapping has an effect on the competency scores of subjects which improved from week 1 to week 2 and week 3.

**Discussions**

The usefulness of concept mapping as a learning strategy was determined by monitoring the competency scores of subjects. This was compared over the first three weeks of the training program. Findings of this study was consistent with the previous studies on concept mapping and the mean concept map scores increased significantly<sup>9,10</sup>.

In the beginning, the nursing students expressed some difficulty & concerns and it was necessary to make them comfortable with the process of preparation. Hence initially the preparation of concept map was done as a group activity and when the subjects attained requisite skill in preparation of the map it was converted to individual activity. Several other studies have reported that some students felt “lost” while others expressed difficulty in choosing the right words or phrases<sup>11,5</sup>. This was considered to be difficult in the beginning.

The first concept maps were poorly written and structured making them not very useful, but with practice it improved. One of the students stated that “This is a new method and we are finding it interesting and fun”. With time and effort, the competency scores improved indicating improvement in the nursing student’s knowledge and skill. Some of them expressed “we wish we could have used this method from the beginning of the academic year”.

The competency score of the nursing students increased significantly from week 1 to week3. The average and slow learners were found to benefit more

by the use of concept mapping techniques. During the orientation as well as post clinical discussion subjects had to be reinforced regarding data gathering from the textbook as well as from the patient and records.

Thought most of the nursing teachers involved in the present study were not aware of the concept mapping technique, with skill orientation program and follow up mentoring they were able to equip themselves with the requisite skill. There is a lacuna related to the nursing teacher awareness and use of concept mapping. The continual use of concept mapping from the beginning of the academic year will help improve their competency<sup>12,13</sup> post test control group design was used. The IV year B.Sc nursing students were included as experimental group (n=40).

**Conclusion:** The technique was hence beneficial for the students as well as faculties who had noticed change in the performance of the students who practiced the concept mapping technique.

The study provides substantial information regarding the need for a strategy to make learning more meaningful and interesting for the nursing students. Certain barriers that can come across are also mentioned so that it can effectively be overcome in order to make teaching and learning process a memorable and less stressful one.

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# A Study on Nutritional Value and Sensory Evaluation of Wheat Gateaux by Addition of Jaggery

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## Abstract

The most delightful sweets are prepared with sugar and artificial sweeteners in order to give sweet taste and flavor in the prepared dish or refreshment, these sweeteners used in various forms like granulated, powdered or as a syrup according to the type of food preparation. The refined sugar is rich in carbohydrates especially the sugar obtained from sugarcane and acts as best sweetener for making deserts like gateaux. There are many varieties of gateaux prepared and it is commonly available dessert from generations, an enticing slice of gateaux makes a choice to opt for it. In recent days health has become a primary concern especially with over nutrition which leads to obesity. Although the sugar is considered as a daily commodity in foods, gateaux contains large amount of sugar content, consuming in regular basis may lead to health implications. This study is focused towards the Nutritional Value of jaggery and the usage as a substitute for sugar by incorporating it in the preparation of Gateaux, Lastly to distinguish the sensory evaluation of gateaux made out of jaggery.

**Keywords:** Jaggery, Gateaux, Cake, Healthy Diet, Nutritional Value.

## Introduction

The Jaggery is obtained from sugarcane by reducing the sugarcane juice in an open container or pan. India is the major producer of jaggery in world<sup>[1]</sup>, even it is considered as an unrefined sugar, the characteristic of Jaggery (Gur) is sweet and has medicinal values due to its nutritional content it is also loaded with natural minerals, nutrients with a value of sucrose as 50% and rich in iron content, that assist in curing anemia and helps in carrying oxygen to blood, Vitamin B6 present in jaggery reduce depression, heart disease and supports in treating disease like Alzheimer, Vitamin D2 of jaggery aid in curing the individuals suffering from hypoparathyroidism<sup>[2]</sup>, this

vitamin is also helps in curing the people who have the symptoms of rickets, most importantly the vitamin e found in jaggery improves the immune system, as it has lot of medicinal properties it is considered as a good substitute for sugar in making desserts<sup>[3]</sup>, Jaggery is already used as a normal sweetening agent in traditional food preparation of south India, so as to use jaggery instead of sugar, gateaux are prepared by swapping sugar with jaggery<sup>[4]</sup>. The added ingredients for making gateaux are eggs, Wheat flour, shortening along with jaggery. The gateaux prepared with jaggery has similar attributes with an adequate quality identified by a sensory evaluation through experts. The jaggery has its unique flavor and characteristics while cooking as an additional amount of jaggery used in comparison with sugar and a higher amount of sticking temperature is observed<sup>[5]</sup>.

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## Materials and Method

The raw materials are taken for making wheat gateaux are wheat flour, Jaggery, Butter, eggs, Baking powder, and vanilla essence which was purchased from a marketer of provisional products in Chennai,



Tamilnadu, India. The healthy wheat gateaux recipe is formulated with ratios of ingredients and its value. A commercial oven is used to bake the Wheat Gateaux with a cake mould. The Nutritive value of the ingredients are identified by calculating the protein, carbohydrates, vitamin and fat available in the ingredients and a sensory evaluation of wheat gateaux is done by 15 panel judges from school of Hotel and Catering Management of VISTAS using 9 points Hedonic Scale from Like extremely to dislike extremely. There were two sorts of strategy pursued to discover the outcomes in the most precise way. The strategies are nutritional value and sensory assessment technique, the examination is carried on in a food production unit.

## Results and Discussion

**Nutritional Value of Gateaux prepared with Jaggery:** A total number of 1144 calories will be available in a gateaux prepared for 5 to 6 servings with the nutrients and minerals available as mentioned below. Due to the addition of Jaggery with this preparation this dish showing significant nutritional value comparing with sugar. There are many ingredients that contributes the Nutritive value like wheat flour, butter as a shortening, eggs for softness and jaggery as a sweetener, the main reason for swapping refined sugar to jaggery is to have lesser carbohydrates<sup>[6]</sup>. The monosaccharide's  $C_nH_{2n}O_n$  present in jaggery as single sugar compound whereas the polysaccharides present in refined sugar is a condensed form of sugar<sup>[7]</sup>.

The purpose of swapping sugar to jaggery and all-purpose flour to wheat flour in gateaux is to have a better nutritional value and healthier comparatively, because jaggery has lot of minerals and nutrients in comparison with sugar<sup>[8]</sup>, especially the sugar has more carbohydrates in relation with Jaggery which will lead to over nutrition in regular diet, since Jaggery has fructose, sucrose along with minerals and vitamins, it will be a right alternative for refined sugar in the preparation of a gateaux further more to make this dish as more healthier

wheat flour is used instead of all-purpose flour. As the natural sugar sucrose and fructose available in Jaggery 130- 170 grams of sucrose and 20 – 30 grams of fructose will helps in converting in to energy whereas the carbohydrates present in sugar will increase the sugar level in blood. The ingredient like wheat has higher amount of fibre considered as good substitute for all-purpose flour in making deserts<sup>[9]</sup>, in the preparation of gateaux around 100 grams of wheat flour is used which has 10 - 11 grams of fibre along with that 100 grams of butter is used instead of commercial margarine, butter has saturated fat which contains conjugated linoleic acid (CLA) with antioxidants that have anti-cancer as well as anti-tumor properties. There is an ample amount vitamins available in butter like Vitamin A, E and K. Hence making a gateaux with Jaggery, Butter and Wheat is a best option as it has very good nutritive value.

**Table 1. Show the Nutritional Value present in Wheat Gateaux in addition of Jaggery**

S. No.	Nutrients and Minerals	Quantity
1.	Sucrose	130 – 170 grams.
2.	Fructose and glucose	20–30 grams.
3.	Iron	22 mg, or 70% of the RDI.
4.	Magnesium	140-180 mg, or 30% of the RDI.
5.	Potassium	1050 mg, or 25% of the RDI.
6.	Manganese	0.4– 1 mg, or 12–24% of the RDI.
7.	Phosphorus	40-180 mg
8.	Protein	4.2 grams.
9.	Fat	0.2 grams
10.	Vitamin A	1183IU
11.	Vitamin B6	0.02 mg
12.	Vitamin D2	14 mg
13.	Vitamin E	222.60 mg
14.	Saturated Fat	62 Grams
15.	Cholesterol	180mg
16.	Fibre	10.7 grams

## Preparation Method of Wheat Gateaux

**Table 2. Method of Baking Wheat Gateaux**

S.No.	Ingredients	Quantity	Procedure	Calories
1.	Jaggery	100gms	Melt and make a syrup out of jaggery	383
2.	Wheat Flour	100gms	Sieve the flour with the baking powder	364
3.	Eggs	2nos	Add the eggs to the butter	156

S.No.	Ingredients	Quantity	Procedure	Calories
4.	Butter	100gms	Cream the butter with the eggs and jaggery syrup	717
5.	Milk	100ml	Add the milk to the egg, jaggery and butter mixture	44
6.	Baking powder	1/2 tea spoon	Add the baking powder and flour mixture to the batter and mix. Pour in into a baking tray and bake	
7	Vanilla Essence	Few Drops	Mix well	
	Total			1664

This wheat gateaux need be prepared with equal amount of wheat flour, butter and jaggery along with eggs, 100 grams of wheat flour is added with baking powder, this flour mixed well and kept separate. A bowl is taken two whole eggs are added whisked well with a whisker 100 grams of butter is added gradually with the mixture and few drops of vanilla essence is added then the little by little jiggery syrup is added later wheat is mixed with mixture gradually in order to avoid lumps, pour the whole mixture in a baking tray and keep it in a preheated oven with a 190° C for 30 minutes, take it out allow it become cool and demould it. This gateaux will have 5 to 6 serving.

**Sensory Evaluation:** A Sensory evaluation is carried out to evaluate the composition of food by its look, Aroma, smoothness, hotness and palatability<sup>[10]</sup>. This study is to identify the quality of product as the new ingredients are added like the incorporation of jaggery and wheat. This product is examined for its sweetness and texture especially to appraise and acquire the response. Around fifteen judges are finalized to evaluate the sensory features of wheat gateaux with satisfactory level of the panel judges, using 9 point hedonic scale extending to know the likes and dislikes on look, smell, consistency, palatability and for an overall acceptance. This evaluation is done in a bright and ventilated area in order to evaluate exactly<sup>[11]</sup>.

**Table 3. Overall Scores through Sensory Evaluation**

S.No.	Sensory Attributes	Overall Scores of Judges about Wheat Gateaux	Overall Scores of Judges about Gateaux with Refined Sugar
1	Aroma	7.7	8.1
2	Texture	7.2	9.2
3	Taste	8.5	8.8
4	Look	8.8	9.1
5	Overall Acceptance	8.1	9.1

In table 3. There are various sensory attributes indicates the characteristics of food along with overall hedonic scores of gateaux with jaggery and another one with refined sugar. This analysis was done dependent on the ignored natural sweetener Jaggery to know the importance of using by its nutritive value with a compact method for fusing jaggery into wheat gateaux for a health dish that contains good nutritional source in order to give an happy and healthy life style especially for the individuals who face issues like Putting on weight, hormonal lopsidedness, diabetes and so forth. The aroma got the score 7.7 in jaggery gateaux might be lesser than 8.2 of the gateaux made out of refined sugar was not

showing a phenomenal change and in the part of tastes it was varied with 8.5 – 8.8 having a minute variation of .3.

The fundamental point of the investigation is to substitute the refined sugar which is considerably contains synthetic substances that become a reason for numerous different complexities over the long haul. This investigation on Wheat Gateaux dishes were set up so as to give out examples of it and get the reaction of 15 panel judges in a board who tried this dish and gave their perspectives on it. Physical assessment was the subsequent technique utilized in this investigation where the prepared Wheat gateaux were passed out to

the specialists and were given a sheet which is a tactile score card which had the characteristics which were taste, smell, appearance, aroma and so on.

The outcome got was sure and good towards the examination and the mean scores were brought down in table 3, therefore the scores were got the most noteworthy which was 8.8 for the appearance and 8.5 for taste this is considered as a good remark on the study carried for adding jaggery for making gateaux instead of using refined sugar, along with that wheat flour is substituted for all-purpose flour for a fibre rich food, this results shows 7.2 for its texture and 7.7 to its aroma with an overall acceptance 8.1 out of 10. The wheat gateaux having quality attributes nearer to gateaux prepared with refined sugar and all-purpose flour, the measure of egg and jaggery required was 92% for 100 g of wheat flour. Adding wheat flour and Jaggery in making wheat gateaux will a nutritional food as it is required for a balanced diet.

The general quality score of Wheat Gateaux with jaggery was lower than the Gateaux prepared with refined flour and refined sugar. As this study shows 9.1 as an overall acceptance comparatively higher than the gateaux prepared with Jaggery proves a normal gateaux having better texture and acceptance as a gateaux with jiggery has 7.2 overall score for texture whereas the gateaux made with refined sugar shows the score 9.2. The jaggery syrup had higher sogginess, crumbly stuff and lower absolute sugar when contrasted with refined sugar was the main reason in texture difference. The gelatinization temperature and highpoint consistency of wheat flour were seen to raise with inclusion of jaggery gives rigidness in gateaux.

### Conclusion

The Wheat Gateaux made out of jaggery confirmed the little amount of softness, more degree of reddish brown pigmentation and yellowish than in comparison with refined sugar and all-purpose flour gateaux<sup>[12]</sup>. The Wheat Gateaux made out of jaggery also had higher sogginess, browning, lower protein, fat and little amount of sugar substance when contrasted with the gateaux with refined sugar and flour. Despite the fact that there was contrast in vapor pressure of the food and acidic values shows variation in terms of storage with the texture attributes, this can be managed by reducing storage time. Nevertheless the quality score for the Wheat Gateaux with jaggery while distinguished with

normal Gateaux with refined sugar, there is a minimum amount of variance is observed. Thus it is proved very well that Jaggery can be utilized as substitution for refined sugar on equivalent weight. In any case, it could be utilized in the advancement of making any deserts<sup>[1]</sup>. The dampness substance of wheat gateaux goes far in recommending the time span of usability of the item for shorter duration. But consuming wheat gateaux instead of gateaux prepared with refined sugar will have higher nutritional value with vitamins and nutrients. This will help in safeguarding from diabetes cause by excess of carbohydrates.

**Ethical Clearance:** Not required for this article.

**Conflicts of Interest:** Conflict of Interest declared none.

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# Thyroid Disease Classification Using Decision Tree and SVM

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## Abstract

Thyroid is one of the disease that can be increasing day by day due to their lifestyle. Thyroid disease is a very common disease among humans. A Thyroid disorders are the conditions that affects the thyroid gland and also the butterfly-shaped gland at the front of the neck. The thyroid gland is located on the below of Adam's apple that wrapped around the trachea. The Hydroxide is also known as T4 and it is the primary hormone produced by the gland. Thyroid hormone that regulates the body numerous metabolic mechanisms throughout the body. When compare to male, female is more affected than male due to the thyroid disease. In thyroid, there are two types of diseases, They are Hyperthyroidism and Hypothyroidism. Hypothyroidism that produces a lots of thyroid hormone in the blood and in Hypothyroidism that produces less thyroid hormone in the blood. This is controlled by the pituitary gland and hypothalamus. The disorders of these tissues can also be affecting a thyroid function and it causes the thyroid problems. There are the Specific types of thyroid glands are includes: Hypothyroidism, Hyperthyroidism, Goiter, Thyroid nodules and Thyroid cancer. This paper describes about the diagnosis of thyroid disorders using decision tree attribute splitting rules. The proposed method, classifies the thyroid nodules accurately and efficiently. In this study, the comparative thyroid disease diagnosis were performed by using the Machine learning techniques that can be a method which is Support Vector Machine (SVM), Naïve Bayes and Decision Trees. The accuracy of this classification is to be 99.89%. This result is very efficient when compared to our previous work that used the Decision tree.

**Keywords:** *k Nearest Neighbours, Support vector machine, Decision tree and Naïve bayes.*

## Introduction

Classification techniques that plays a vital role and there is a major role for analyzing diseases and providing facilities to reduce the cost for the patients. Nowadays, the peoples are more suffering from the diseases they are diabetes, heart disease, typhoid, tuberculosis and kidney disease, etc., Thyroid disease can be affected by the people in worldwide, after affecting the peoples becomes a serious health problem<sup>[1]</sup>. In India, it is expected that about 42 million people suffer from thyroid disorders. Symptoms that includes, Weight gain, tiredness, weakness as well as feeling cold etc<sup>[2]</sup>. The hormones made in the thyroid gland affected almost every organ in the body including the heart. There are Hypothyroidism, hyperthyroidism and goiter deficiency disorders. Hypothyroidism can cause the heart beat more and

slowly and the hyperthyroidism causes fast heartbeat<sup>[3]</sup><sup>[4]</sup>. The evaluated levels of thyroid hormones can also lead to increase the blood pressure level. The Symptoms that includes weight loss/weight gain, swollen neck, changes in heart rate, Hair loss and other symptoms like problems in vision, Diarrhea, Irregularities for women's in the menstrual cycle then Trembling hands and Muscle weakness<sup>[7][8]</sup>. Goiter and Iodine Deficiencies, Goiter is one of the abnormal enlargements of your thyroid gland. Iodine is the element that can be needed for the production of thyroid hormone. The recent population that shown in the studies nearly about 12% of adults have been affected by the palpable goiter<sup>[9]</sup>.

The main aim of this paper was to build an integrated model using competitive Machine learning algorithm to predict thyroid disease. Specifically, this research uses

recognized variables (input and output) for diagnosing the thyroid disease (through the published research) and to develop an integrated framework model and validated with Decision-tree model. A variety of these algorithms including Decision trees, Random forest, Support vector machine, Artificial Neural Network and Logistic regression have been widely used in development of predictive models of thyroid disease.

Thyroid function testing is the most used diagnostic evaluation in endocrine practice and is used as a screening tool, to verify the clinical diagnosis of hyperand hypothyroidism, to assess adequacy of medical treatment, and in the followup of differentiated thyroid cancer<sup>[10][11]</sup>.

It may predict the patients and doctors in handling thyroid disease with care and there'll fully be suggestions for a social development by applying an integrated model. Classifying possible variables (both input and output) affecting the diagnosis of thyroid disease and investigating the relationships among such variables<sup>[6]</sup>.

**Pre Processing:** Types of pre-processing: Data cleansing, Data editing, Data reduction, Data wrangling. The pre-processing is to resolve the several types of problems that includes the noisy data, redundant data and missing datas and values, etc.,<sup>[2][8]</sup>. The high quality of data that will be lead to the high quality results and also by the costs that reduced for the data mining. The Missing data can be pre-processed and it is also to allow the whole data set to be processed. It undergoes the pre-processing<sup>[13]</sup>. The numbers are not a missing number that constraints are checked using masking method. If the missing values or not a Number values that can be presented and it is replaced by the mean value of the column. Pre-processing, it refers to the program that processes the input data values and also to produce output used as input to a compiler<sup>[11]</sup>.

**Dataset Explanation:**

1. The datas are collected from the thyroid patients. (500 patients).
2. It is a blood samples.
3. There are three categories of patients.

**Thyroid Classification:** Classification is a machine learning task that predicts the classes according to some constraints. Supervised learning is a classification algorithm in data mining<sup>[2][7]</sup>. The main desire of the classification issue is to diagnose the class for new data.

Various classification algorithms are used to diagnose the classes. In this thyroid dataset using classification algorithm it.

**Specific kinds of thyroid disorders:**

- Hypothyroidism
- Hyperthyroidism
- Goiter
- Thyroid nodules
- Thyroid cancer

**Method and Methodology**

**K-Nearest Neighbor (K-NN):** A k-nearest-neighbor is often abbreviated as k-NN algorithm. It is the data classification that estimates likely as a data point into the member of one group or into the other depending on grouping the data points that may be nearest. The k-nearest-neighbor is also called as a “lazy learner” algorithm that not be built on a model that is using in a training set until the query of the data set is performed<sup>[9]</sup>. It is the classification algorithm, to determine the attempts of the data groups that points by looking the data points that looking the data at one points in group A or it is in group B. It is to look at the states of the points that may nearest<sup>[2]</sup>. The range of arbitrarily is the point to take a sample of the patients data and analyze it. If there is a many points in the group A, then it is likely that the data point will be A rather than B and a vice versa.

**Algorithm:** The algorithm is in the case, is classified by the majority of vote to its neighbors, with the case being assigned to the class, the most common among its K nearest neighbors. Measured by a distance function. If the value K = 1, then the Case value is simply assigned to the class of its nearest Neighbor. The three distance measures are noted as a valid continuous Variables.

In the instance of the Hamming distance must be used. When the values are 0 and 1 it is used to brings the issue of the standardization of numerical values as well as a mixture of numerical and categorical Variables in the dataset.

$$(x + Sa)^n = \sqrt{\sum_{i=1}^k (xi - yi)^2} \dots (1)$$

**Naive Bayes (NB):** It is the simple classification algorithm for predicting modeling with clear semantics,

representing and the probabilistic learning method based on Bayesian theorem. Naive classifier assumes the value of the one attribute is not dependent on the value of another attribute and it assumes that the presence or absence of particular attribute of the prediction process does not affect. Suppose there are m classes say K1, K2...Kn having a unidentified data sample X, Naive Bayesian classifier will predict an unknown sample X to the class Ki on the basis of the classes having highest probability<sup>[3][9]</sup>.

$$P(K_i | X) > P(K_j | X) \text{ for } 1 \leq j \leq m, j \neq i \dots (2)$$

**Applications:** Real time prediction of the Naive Bayes is an eager learning classifier and it is the fastest one. It is used for making predictions in real time. Multi class Prediction algorithm is also called as a multi class prediction feature. Text classification or Spam Filtering or Sentiment Analysis, Naive Bayes classifiers are

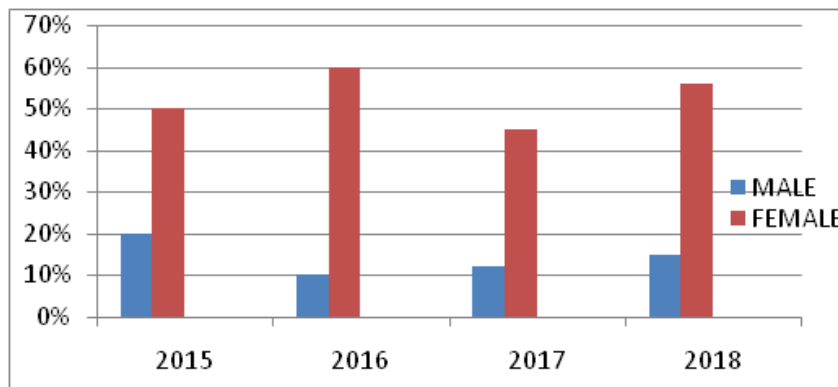
mostly used in text classification that have the higher success rate when compared to the other algorithms. In result, it is widely used in Spam filtering and Sentiment Analysis.

Recommendation System, Naive Bayes classifier and Collaborative Filtering that makes together to build a recommendation system, uses machine learning and data mining techniques to filter unseen information and also to predict the user is liking a given resource<sup>[13]</sup>.

**Support Vector Machine (SVM):** Support Vector Machine is one of the managed machine learning algorithm used for both the classification and regression issues and it is usually used for a bit of arrangement problems. The estimation of selected organize is of the each half being the estimation. Then the tendency to perform characterization by finding the hype-plane, is completely have categories<sup>[11],[12]</sup>.

**Table 1: Percentage of peoples affected by thyroid**

Percentage of peoples affected by Thyroid	2014	2015	2016	2017
Male	20%	10%	12%	15%
Female	50%	60%	45%	56%



**Fig 1. Peoples affected in thyroid gender wise year by year**

Mentally disturbed. All the newborns are given by screening the blood test in hospital to evaluate the thyroid function.

**Accuracy Metrics:** Note, the accuracy of this model is very high at 97.3%

- The disease that spread very quickly, who is in sick condition.
- The positive that represent here as a fraud case

- The positive value represents terrorist and also as the model says it's a non-terrorist.
- Idea about the costs that having a mis-classified actual positive value is very high there.

**Precision and Recall**

**There are two new metrics are:**

- Precision is True Positive/True Positive + False Positive.

- Recall is True Positive/true positive + false positive.

**Precision:** The Precision that explains about that how precise or the accurate model is out of those predicted positive and then the actual positive value predicts how many how many positive values occurred<sup>[11]</sup>. The Precision that is good to measure and determine about the costs, if the False Positive is high, mail spam detection. In email spam detection there is a false positive means they have an email that in non-spam has been identified as a spam message that is unwanted. This email user might lose important emails if there is a precision is not high for the spam detection model.

**Precision = True Positive/True Positive + False Positive**

**Recall:** The same logic to recall the application. Recall is also calculated.

True positive/True positive + False Negative is an Actual Positive

**Recall= True positive/Total actual value.**

Recall calculates that how many positives values in our model captures labeling as Positive. Applying the same as we recall that shall be the model metric and to select the use of our best model, high cost that associated with the False Negative values.

In fraud detection or the sickness of patient detection. If a fraudulent transaction is predicted as a non-fraudulent, then the consequence can be very bad and in sick patient detection, If a sick patient goes through the test and it can be predicted as not sick then the cost can be associated as a False Negative then it will be extremely high, the sickness is contagious.

**Recall= True Positive/Total Actual Positive.**

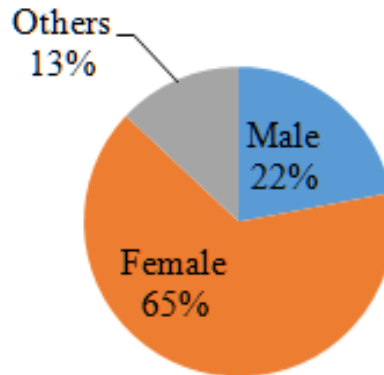
**Score:** There is a lots on Precision and Recall; cannot avoid the other measure of F1, which is a function of Precision and Recall.

**Score = 2\*Precision\*Recall/precision+ Recall.**

Score is needed to seek a balance between the Precision and Recall. So, the difference between F1 Score and if the accuracy is previously seen then that accuracy can be largely contributed by a large number of True Negative values which is the most business circumstances and do not focus, because the False Negative and False Positive is usually having the

business costs then the Score is more better to measure the use of the need to seek a balance between a Precision and Recall<sup>[15]</sup>.

### Percentage of people affected by Thyroid in Genderwise



**Fig 2: Overall percentage of peoples affected in thyroid.**

#### Result Analysis:

**Table 2: Percentage of Algorithm comparison result**

	Classification Model			
	Naive Bayes	Decision Tree	SVM	KNN
Accuracy	91.62%	97.35%	95.3%	94.2%

The impact of certain attributes is that the classification of model accuracy. The following attributes were ignored and query on thyroxin, hypothyroid, hyperthyroid. The classification model is based on the decision tree obtained as a best accuracy (97.35%), while Naïve Bayes obtained the weakest classification.

Accuracy of classification model after removing the three of the model attributes.

**Future Enhancement:** The major difference between the thyroid hormones and tendons disease are clinically relevant. The accurate diagnosis of diseases and providing efficient treatment are the important part of valuable medical services given for the patients in the health-care system. The unique characteristics of these databases are that the challenges for data mining are privacy-sensitive, heterogeneous and voluminous data. These types of data’s may have valuable information awaits extraction. The knowledge that has to be found as various encapsulated regularities and patterns that is not in the raw data or pre-processed data. The Feature selection method that may use to identify the



most relevant for classification and it is broadly used to categorize the subset selection method and ranking method.

### Conclusion

The medical dataset in the various data mining and the machine learning techniques are available and then the important aspect of medical data mining is to increase the accuracy and efficiency of disease diagnosis. The main objective of this research is to show the variance of thyroid after 90 days 60 days from the available raw medical dataset then the various splitting rule for decision tree attribute selection and had been analysed and compared. This helps to diagnosis the thyroid diseases through the extracted rules. It is clear and normalized based splitting rules have high accuracy and sensitivity or true positive rate. The data mining technique is applied on the hypothyroid and hypothyroid dataset and it is also to determine the positive and the negative values from the entire dataset. The experimental result provides, when compared to male and female dataset, females are more affected than male. The improved accuracy, precision and recall by comparing the Decision tree, Support vector Machine. Further enhancement has been made by using the various optimization algorithms or rule extraction algorithms. The future work is applied on validating the multiple disease dataset simultaneously like heart disease, diabetics, etc.

**Conflict of Interest:** Taken from.....committee

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**Ethical Clearance:** Nil

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# An Empirical Study on Impact of Traffic Pollution on Health of Roadside Vendors and its Effects on Their Business

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## Abstract

Clean atmospheric air plays a significant role in Humans Health. Now a days due to increase in vehicle movement there is a huge impact to the roadside vendor's health and their business. This study has been conducted with the aim to Analyse various factors impacting health of roadside vendors and its effects on their business in Bengaluru and understand various challenges faced by roadside vendor so that a kind of awareness program can be suggested with a view to improve the health of roadside vendors. In this research simple random sampling has been carried out by conducting face to face interview. A sample size of 145 Roadside Vendors have been met and data's have been collected. Quantitative Analysis were carried by using SPSS and Smart PLS software. Based on the factors identified from the literature gap a framework was developed. Dependent variable is business sustainability and Independent Variable were Intensity of Traffic Pollution, Diseases caused and remedies. The result obtained from analysis shows that Intensity of Traffic pollution has a moderate impact on business sustainability, Diseases caused has got positive impact on business sustainability and Remedies has also got a positive impact on their business sustainability. Based on the output of research analysis recommendation has been made to plant more trees in busy roads and Normal vehicles can be replaced by Compressed Natural Gas and electronic vehicles.

**Keywords:** *Traffic pollution, roadside vendors, health effects and business sustainability.*

## Introduction

In urban areas traffic pollution is considered to be substantially increasing every year and it's a known factor, in all areas of Bangalore people have been using different types of vehicles in a vast numbers to travel to their destination throughout the day, and these vehicles cause various air pollutants which majorly affects the health of roadside vendors who typically runs their business on the roadsides are been highly affected by the pollution compared to others.<sup>1</sup> From many years,

the vehicles emissions have become the major source of air pollutions. People are still trying to come up with new ideas in order to eradicate pollutions affecting the roadside vendors.

Uncontrolled urban pollution, increased number of vehicles, industries and urban population have made the problem of traffic pollution even worse. Urbanization, industrialization and population overgrowth adverse health effects ad om in ant occupation in urban areas of developing countries exposes the vendors to several environmental pollutant.<sup>2</sup> The amount of this pollutant has great impact on the local areas and other industrialized areas of Bangalore, as the vehicle movement is high and the health of the roadside vendors in this region is been affected. The level of traffic pollution is said to be high in peak hours i.e. in morning and evening as the vehicle movement is high at that point of time even the pollutant is high by forming various

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air pollutant producing significant amounts of nitrogen oxides, carbon monoxide, and other pollution into the air.<sup>3</sup> Traffic pollution is Caused by vehicles in order to reduce traffic pollution and its impact on roadside vendors health and there should be proper awareness regarding planting more trees and barriers which blocks the smoke and other dust particles on the roadside. This will reduce traffic pollution caused by vehicle emission. There is less space for emission or pollutions created by traffic to escape because urban and metropolitan city is fully surrounded by buildings. The research objective of the study is to analyze the factors influencing various diseases, intensity of traffic, framework on remedial action, and finally suggesting suitable recommendation for the business sustainability caused by traffic and its pollution.<sup>4</sup> The vehicles which aren't in good conditions and still used produce bad emissions which affects the overall health of the roadside vendors. Every year about 200,000 people in Bangalore die due to air pollution which is caused mainly by traffic pollution and there is clear evidence that the mortality rate is higher among people living in areas with more polluted air.<sup>5</sup>

Urbanization, industrialization and population over-growth adverse health effects a dominant occupation in urban areas of developing countries expose the vendors to several environmental pollutant. Over recent years there are several factors faced by roadside vendors such as Chronic Respiratory problems, Skin Allergy etc.<sup>6</sup> The number of vehicles being driven has increased every year and has also led to several traffic congestion and affects the business sustainability of the street vendors, there are many researches from past years focusing on various ways to reduce traffic pollution and also steps to prevent risk of health affecting roadside vendors.<sup>7</sup> Proper awareness has to be created in order to ensure proper use of face mask which will at least prevent them from the diseases caused due to traffic pollution.

### Methodology

After the above problem is identified, the problem is described in a process through proper selection of methodology to collect related data and the analysis of the data is been taken for interpretation of solved data. The study was done to know exactly what were the issues and problem caused by the traffic pollution and its effect on roadside vendors health as well as their business, and to provide a proper conceptual framework and other remedial aspects. The collection of data was collected through survey on a face to face conversation with the

roadside vendors. Survey was been collected with the sample size of 145 was achieved. The questionnaire was mainly developed with an objective to obtain the information that the respondents possess about traffic pollution affecting roadside vendor's health. The survey was conducted after doing relevant literature reviews along with the expert panel opinions. The first section of the questionnaire deals with the demographic details of the respondent. The demographic detail contained a total of 4 sub variables. The second section included questions regarding Disease caused due to traffic pollution and its 69.0% and female with 31.0% and the percentage of the cumulative frequency within each interval is been calculated.<sup>8</sup> The third section mainly deals with the opinion of respondents regarding Intensity of traffic pollution. The aim is to understand the knowledge of Roadside Vendors. The third section included questions regarding Remedies and intention of respondent for using the sharing platform. The collected data was analyzed and implementation of tools and other statistical measures and process is been analyzed by developing the data by solving various data analysis of demographic profile of the respondents, statistical analysis i.e. Cronbach's alpha, KMO and Bartlett's test analysis which was done with the help of the SPSS software and Partial Least Square (PLS) analysis through Smartpls software. The Findings of the research shows that many people are suffering from various diseases caused through traffic pollution which in turn affects their business

### Results and Discussion

To verify the validation of hypothesis formed and explain the findings of the research, the data samples are statistically calculated with SPSS and PLs software, the following is the overview of the results obtained: The data obtained is checked for internal consistency i.e., how reliable is the data collected for this Cronbach's Alpha test is utilized for which the value obtained should be greater than 0.7, for our data sample the Cronbach's Alpha value obtained is 0.815 as shown in Table 1 below, which is greater than 0.7. This proves that the data collected through our survey posses' high internal consistency i.e., the data obtained is highly reliable.

Following the Cronbach's Alpha test is the KMO and Bartlett's test which is conducted to verify if the factor analysis that will be carried out on the data collected for the research will be useful or not for the study and the Bartlett's test of Sphericity checks whether the

hypothesis that our correlation is an identity matrix, if it is identity matrix then the variables will be unrelated. The significant variable must be less than 0.05 for Bartlett’s test. The Fig 1 below shows the conceptual frame work considered for the research, where the independent variables are intensity of traffic, diseases caused by the traffic pollution and remedies against traffic pollution and business sustainability is the dependant variable, Fig 2 shows the output for the conceptual framework, where it shows the factors and sub factors affecting the business sustainability of roadside vendors.

The main results are the validation of the alternate hypothesis formed from the objective of the research is analysed using Regression analysis, Regression (Symbol  $R^2$ ) is carried out to analyse the variance between the dependant and independent variable i.e., how well the independent variable can explain the dependent variable. Table 2 shows the result  $R^2$  value obtained for the alternate hypothesis  $H^1$ : Intensity of Traffic is directly affecting business sustainability of roadside vendors, for which the value obtained is 0.230, which shows that the intensity of traffic doesn’t have a greater impact on business sustainability of road side vendors.

Next alternate hypothesis  $H^2$ : Diseases caused due to traffic pollution has positive impact on business sustainability of roadside vendors, for which the regression result obtained is shown in Table 3 below, the  $R^2$  Value obtained is 0.453 which shows that diseases caused has much greater impact on the business sustainability of roadside vendors i.e., independent variable diseases caused can explain the dependent

variable Business sustainability. For the last alternate hypothesis  $H^3$ : Remedies against the impact of traffic pollution has positive effect on business sustainability of roadside vendors, has a considerable impact on business sustainability of roadside vendors as the  $R^2$  value obtained from regression analysis is 0.324 as shown in Table 4 below.

Overall the results obtained from the statistical analysis carried out for the data obtained, variables show that the considered variable and data collected from the survey has a great internal stability and reliable, the alternate hypothesis formed relating dependent and independent variables were proved of having a significant impact on dependent variable

- i. From the analysis the results that are obtained are, as the traffic pollution causes severe chronic respiratory problems in roadside vendors, they have difficulty in running their business as there will many off days of business due to illness caused, which will hinder them from achieving their full potential.
- ii. By following the provided remedies against the traffic pollution, its effects can be reduced which can help in bringing up the business sustainability of the roadside vendors and also reduce the effects on their health.<sup>12</sup>

**Table 1: Cronbach’s Alpha**

Reliability Statistics	
Cronbach’s Alpha	N of Items
.815	17

**Table 2: Regression analysis output 1**

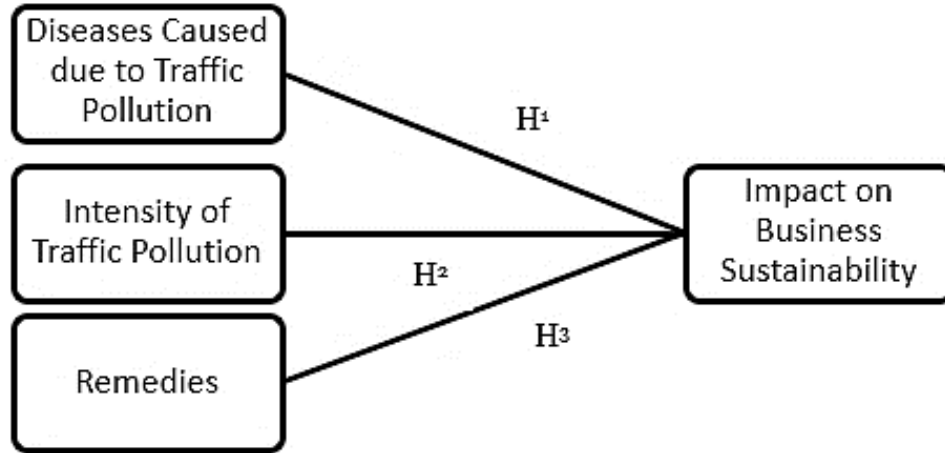
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.479a	.230	.213	2.114	.230	14.024	3	141	.000

**Table 3: Regression analysis output 2**

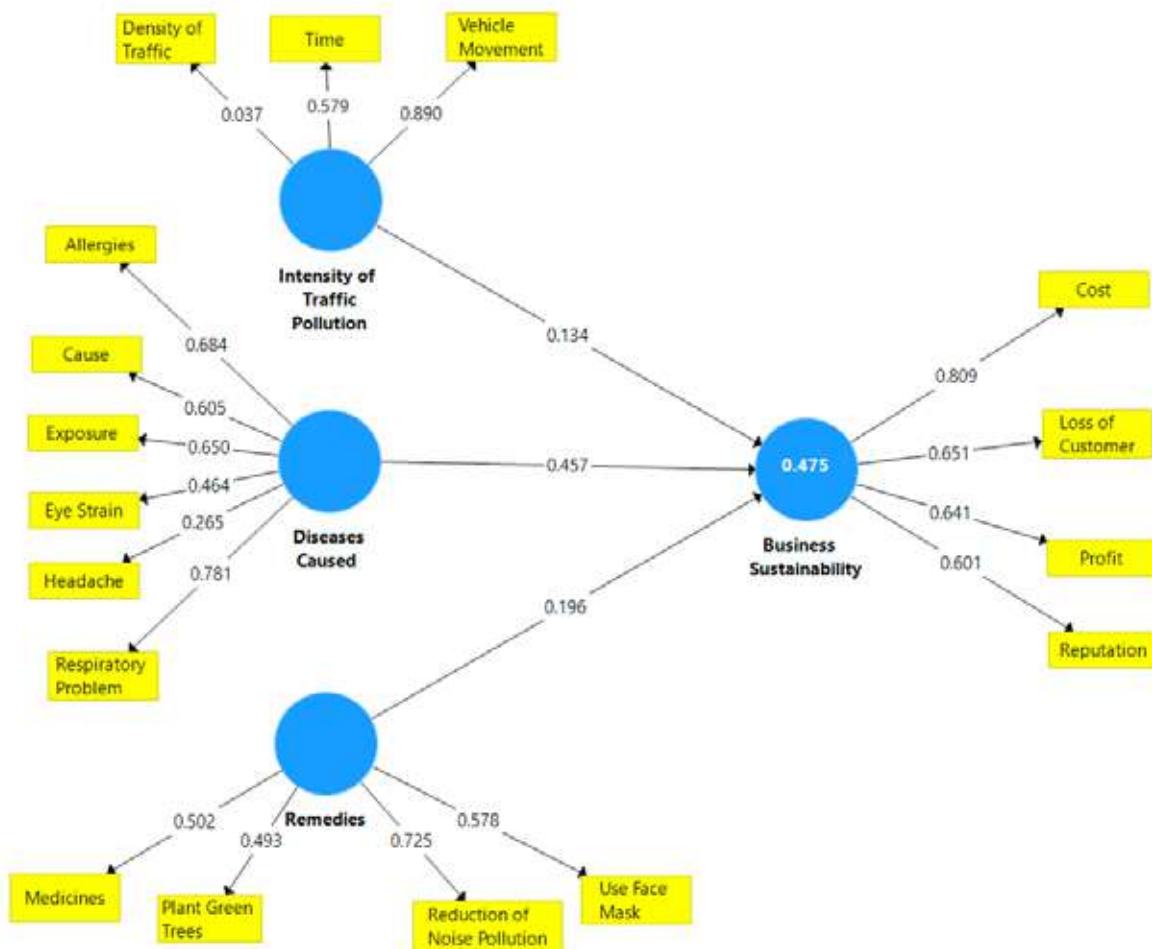
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.673 <sup>a</sup>	.453	.429	1.802	.453	19.009	6	138	.000

**Table 4: Regression analysis output 3**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.569a	.324	.304	1.988	.324	16.747	4	140	.000



**Fig 1: Conceptual frame work**



**Fig 2: Output of factor analysis**

## Conclusion

To conclude, Traffic pollution has an impact on the health of roadside vendors and their business. There are many new technologies like CNG vehicles (Compressed Natural Gas) is significantly less expensive than gasoline.<sup>9</sup> Out of 145 respondents 115 said that traffic pollution affected their health and their business. Most of the respondent was unaware of remedies to safeguard them self from traffic pollution.<sup>10</sup> Choose low polluting model of vehicles and replace existing vehicles with electronic vehicle because main cause of traffic pollution was vehicle emission. Plant more trees along busy road will help to eradicate traffic pollution.<sup>11</sup> Therefore, Proper Awareness has to be created in order to improve health of roadside vendors.

**Financial Disclosure:** There is no financial disclosure.

**Conflict of Interest:** None to declare.

**Ethical Clearance:** All experimental protocols were approved under the Ramaiah University of Applied Sciences; Bangalore and all experiments were carried out in accordance with approved guidelines.

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# A Study to Analyse the Reliability and Validity of the Smartphone Goniometer Application (G-PRO) by Measuring the Elbow Joint Range of Motion

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## Abstract

Universal goniometer (UG) is commonly utilized as a standard evaluation tool to assess range of motion (ROM) as portion of joint movements. It has certain imperatives, such as including both hands of the therapist, which leads to precariousness of hands and blunder. In the modern era the smart phones usage has been increasing due to its accessibility. Hence, a trial version of goiniometer application in smart phone is used for this study. The reason of the research was to analyze the unwavering quality and legitimacy of the smart phone goniometer app. and Universal Goniometer in evaluation of range of motion of elbow. The maximum Range Of Movement of elbow in position of flexion was examined for 100 healthy subjects with Universal goniometer and smart phone. Data was analyzed and synthesized by statistical analysis using kappa score and specificity and sensitivity were calculated to find the specificity and validity of the goniometer application

The findings of this research showed equal Universal goniometer reliability and validity of the smartphone. The strength agreement of Kappa score is considered to be "GOOD" Smart phones can be excellent options for Universal Goniometer owing to easy access and use for the therapist and the patient

**Keywords:** Smartphone, Goniometry application (G-PRO), Elbow Joint, Range of Motion.

## Introduction

The goniometer was used for measuring joint range of motions (ROM) due to more cost, portability and reliability and was considered a normal methodology for range of motions determination. One of the limitations of this method is that the practitioners should use their two hands for the examinations and in this situation maintaining the limbs stable is just too hard and may result in some mistakes reading the angles. Digital tools are lightweight and portable for measuring joint motion (electrical inclinometer) and are similar to goniometer use<sup>1</sup>.

The only downside of this device is its price greater than the goniometer. The digital inclinometer (inclinometer application on a smartphone) was another application. In this situation, the phone is positioned at the angle along the horizontal line indicated by its implementation to evaluate the angle<sup>2</sup>. Smartphone's use as a digital inclinometer has an important advantages, such as accessibility, considerable price of inclinometer applications; and straight forward measure because of the business band that fixes the device in respective locations. Therefore throughout the examinations, examiners don't need both hands, and also it permits the patients to evaluate their method of healing and also the effectiveness of therapy on its own<sup>3,4</sup>.

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**About the Goniometer application:** Smartphone applications like G-PRO and Dr G (in android and ios phones) developed by 5fuf5 co, U. S., released on May 2013) was employed in this study to measure the correct joint range of motion<sup>5,6</sup>. Goniometer pro



has been designed together with health care providers (HCP) in an attempt to develop a simple to use and reliable ROM measure tool, a stronger goniometer app. The advanced Smartphone application is a digital tool that has been proven to be accurate equivalent to the universal goniometer by numerous studies and analysis. It's very helpful for Physical Therapists in serving to assess treatment effectiveness. it's conjointly utilized by radiologist in x-ray interpretations (e.g. to determine the degree of scoliosis)<sup>7</sup>.

**Advantages of the goniometer application:** Focal points of the smartphone goniometer application Using smartphone as a advanced inclinometer has critical points of interest such as – accessibility, calculable cost of inclinometer application, and simple estimation owing to the commercial band that fixes the gadget in considered areas<sup>8</sup>. Thus, physical therapist do not require both hands amid the examinations, and it too permits patients to evaluate their recuperating prepare and the adequacy of treatment at domestic on their own

## Methodology

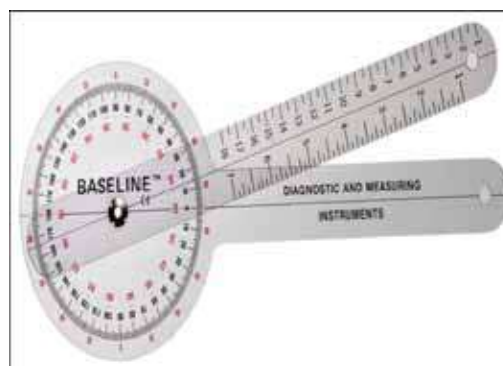
Experimental study, 100 subjects participated in this study, Agerange of 19 - 22 years. Duration 3 months.

**Inclusion criteria :** Healthy subjects were identified for this research without chronic orthopedic disorders, such as old fractures, articular pain or discomfort, Cubitus valgus or varus deformities for this study were healthy subjects without having chronic orthopedic disorders, such as old fractures, articular pain or discomfort, Cubitus valgus or varus deformities. This study was designed to use of digital tools and UG (standard and common technique) in the measuring of elbow joint maximum ROM.

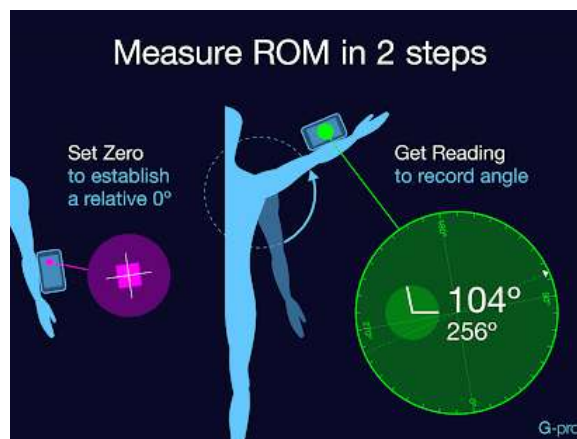
**Instruments:** For evaluation, two techniques including UG and smartphone were used. The UG had a 360° conveyor with two 12-cm arms - one stable arm and one movable arm and a smartphone (VIVO model) with Android operating system and equipped with G-pro version app (version-2.9, offered by 5fuf5 co, United States, released on May 2013) was used in the present study (Figure 1 and Figure 2).

**Measurements:** This study was double blinded and study details were not known to assessors and statistical analyzers. To determine the range of movement as a large extremity joint, the dominant hand elbow was selected and therefore the range of active movements

was measured. The students evaluated the computer memory of elbow by the two devices as well as Universal Goniometer and Smartphone and active Movements of elbow joint and the measurements were matched between them. The Universal Goniometer was considered as a clinical standard technique. the information sheets were used to collect the data. The subjects were examined in two separate rooms with same facilities once a quick interview concerning the method of the study. During the research, the participants were blinded. At first, the arm and forearm longitudinal axes were determined. in the sitting position, the subject arm placed in a relaxed position for measurement of elbow joint range of motion Then the elbows and forearms were located in the neutral position and Universal Goniometer was placed on the lateral epicondyle and stable arm was placed toward the accordion process. Also, the Smart phone was set on the zero point of horizontal line along the elbow. the subject was asked to flex his/her elbow and therefore the angle was evaluated by the moving arm of Universal Goniometer and placing phone on the subject arm, the wrist strap was used. There was one hour rest for subjects after initial evaluation by goniometer and the second one by Smart phone.



Figures 1: Goniometer



Figures 2: ROM Measurement Technique

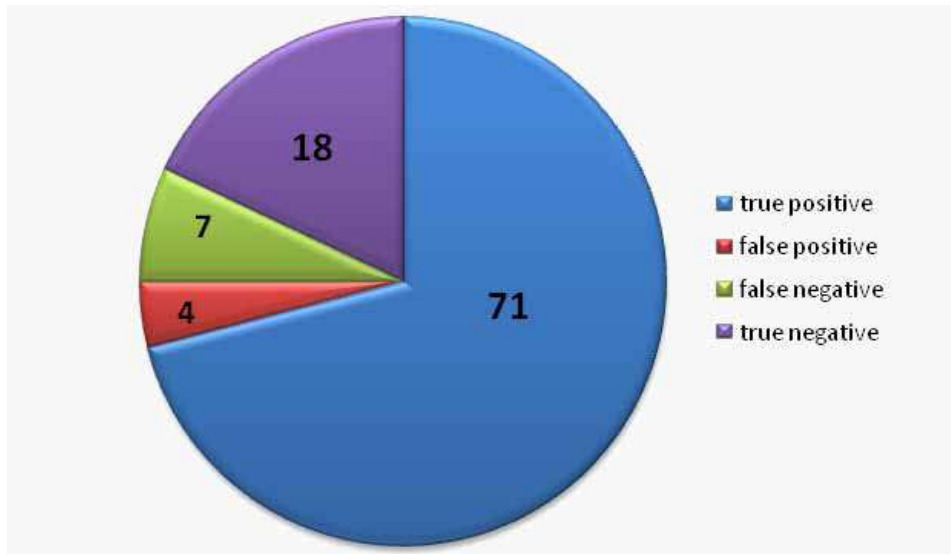


**Figure 3: Range of motion measurement method using Smartphone**

**Statistical Analysis:** The data was collected and synthesized to analyse the specificity and sensitivity and also the kappa score was calculated to find out the reliability of the goniometer application.

**Sensitivity:** Probability that a test result will be positive (true positive)

**Specificity:** Probability that a test result will be negative (true negative)



**Figure 4: Sensitivity and Specificity**

**Kappa score**

**Kappa:** A measure of agreement between two individuals when two binary variables are attempted to measure the same thing. The strength of the agreement is considered to be “GOOD”.

**Discussion**

A few ponders have been conducted to work out

the range of motion of the elbow joint<sup>9</sup>. There are a few Reports on the comparison of Smartphone and Universal goniometer within the range of motion movement of the overwhelming hand elbow joint as a huge joint within the upper appendage. Universal goniometer and advanced strategies are comparative in terms of education, versatility and light weight. However, both hands ought to be utilized in deciding the range of motion of the elbow joint by goniometric

technique. In this manner not exclusively it's harder be that as it may conjointly a few mistakes might happen amid totally distinctive measurements. The initial state of the rotation center conjointly the long pivot of the appendage were visually calculable as an occasion this may result within the action blunders<sup>10,11,12</sup>. The findings showed that both Smartphone and Universal goniometer techniques had greater agreements on all evaluations of motion. Smartphone's measurements were like a universal goniometer. Similar studies to verify the Universal goniometer and inclinometer method to assess shoulder joint motions were conducted in 2012. The findings showed that Smartphone conducted the reliability and validity of the readings as goniometer readings in an exceedingly similar study conducted by (Kolber et al. 2012)

Measured shoulder joint elevation at bone level (Scaption). The results showed a maximum difference of 11 ° in the smartphone and goniometer measurement of this angle<sup>13</sup>. But, there was less variations during this research.

Mitchell et al. Evaluated the esteem of dynamic shoulder joint movement measurement by two iPhone Smartphone and goniometer strategies on 94 female cases. Like our comes about, Smartphone has been exceedingly reliable in deciding the extend of shoulder development<sup>14</sup>. The comparative studies weren't confined to shoulder and elbow joints. These tests were performed with the computerized inclinometer (Saunders demonstrate) to measure the anterior curve of the spine<sup>15</sup>.

Moreover, Prushansky et al. 2010 appeared that in healthy themes there was no vital qualification in cervical movement measurements collected from advanced instrument and ultrasound techniques. For the events around the sagittal and frontal axis, these measurements were taken. The discoveries appeared that there was a more noteworthy assortment of rotational developments, measured by advanced devices. Yaikwawongs et al. 2009 contrasted the exactness of knee joint development extend in two strategies as well as the goniometer and roentgenographic picture of the digital compass. ICC was calculated zero<sup>16</sup>.

Ockendon et al. (2012) repeated this inquire about in partitioned considers, as well as assessing the legitimacy of smartphone versus knee goniometer for five sound volunteers. The relationship between intra-observers

was zero for the smart phone

In fortytwo healthy subjects, Cleffken et al. 2007 contrasted two method of digital goniometry and digital electronic inclinometer. They showed that there were reduced excursions to active peak flexion than passive peak flexion. Furthermore, passive peak flexion showed greater reproducibility rates<sup>17</sup>. Jenny et al. (2013) contrasted smartphone measurement reliability with conventional routine knee flexion range measurements in ten TKA patients<sup>18</sup>. For each technique, the readings were carried out six folds (i.e. completely twelve times). They showed that when TKA was one of the most accurate ways to measure the smartphone consumption. Another knee goniometry is mainly based on photographic goniometry. The pictures of the knee transmitted from the camera to the computer were drawn here, and the computer program deciphered them.

Now, there is some unique software in the smartphone, called Dr Goniometer (DrG), which conducts all the process automatically. Ferriero et al. 2013 contrasted the smartphone DrG software in thirty-five topics with standard photographic-based goniometry. The intra-rater and inter-rater correlations were always calculated at zero.958 in accordance with the outcomes during this research. The findings showed that Dr. G software has been a reliable way of living the variety of knee movement and is much easier than the traditional technique<sup>19,20</sup>.

Measuring the variety of hip joint movement has an significant role to play in assessing lower limb injuries. According to past research, in both healthy topics and patients with femoro acetabular deficiency, goniometer has high accuracy in evaluating the variety of movement of the hip joint. Although this tool is less reliable than the electromagnetic monitoring scheme, Universal Goniometer<sup>22</sup>.

In keeping with the current consider, Charlton et al. 2014 surveyed the unwavering quality of Savvy phone to assess the flexion, rotation, abduction and adduction development of the hip joint. This investigate was conducted on twenty solid youthful men. The extreme comes about appeared that the Shrewd phone had keen to exceptionally great unwavering quality for numerous of the joint developments in any case it had constrained unwavering quality on snatching, adduction and outside turn. Amid this consider, all-time moo ICC was for elbow flexion, when utilizing the goniometer (0.77). In

spite of the fact that Widespread Goniometer the ICC values of smart phone for all the developments are > zero.9, the littlest sum esteem was had a place to the elbow flexion<sup>23</sup>.

However, Blonna et al. 2012 evaluated icc of visual estimation compared to clinical goniometry in fifty elbows. icc for visually-based goniometry was zero.97 for each extension and flexion estimations of elbow. Another study was conducted to evaluate the fifth meta carpo phalangeal joints which the results showed high value of icc (> zero.95).In this study, the results Universal Goniometer has high reliability and validity of Smart phone to evaluate the active movement of the elbow of dominant hand.

One amongst the necessary works physical therapy is to determine the degree of impairment. However, the results have to be compelled to be replicated in future studies by additional samples. Some benefits of this technique appear to be the simple handling of the smart phone by patients and physicians and the acceptable reliability of this device when measuring the variety of movement.

### Result and Conclusion

The findings of this research show that the smart phone inclinometer application is highly reliable and valid in evaluating the active motions of the dominant hand elbow joint. The comparison of two method shows the accuracy of the smartphone application which can be used progressive training and rehabilitation protocols. The study shows the latest development of the physical therapy instrumentations. The study shows the cost-effective method in measuring the range of motion of joints.

**Limitations:** In this study, healthy volunteer subjects without intense and incessant defects in upper limb joints were evaluated. But it ought to be taken note that in the event that there's any variation from the norm within the upper extremity, the research must be repeated. For example, on the off chance that there is a disruption in the shoulder joint, too a few measurements within the elbow joint will be affected. In this study, we had to inform subjects approximately process of procedures. So, the blindness of study can be affected. Aging as a perplexing calculate can influence the comes about. In this consider, the greatest age was 22 a long time. In any case, the subjects were suggested for preparing some time recently the estimations. Too, in

this consider sex impacts, as a perplexing figure, on the unwavering quality of estimations was not considered.

**Ethical Clearance:** IHEC approval was obtained before subject enrolment from MAHER.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Water Quality Assessment of Kanchipuram Temple Pond by Using Statistical Method and Water Quality Index

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## Abstract

The environmental change having an impact on the pond water in Kanchipuram. The holiest temple pond level is decreasing every year. The aim of the study is to assess the quality of temple pond water by analyzing the factors pH, Dissolved oxygen, Total Dissolved Solids, Chlorides, Sulphates, Iron and Total Coliforms. The results are compared to tolerance limits of inland water from ISI-IS: 2296-1982 standards (Class C). The position of temple pond water was determined by using the water quality index. The statistical (correlation & regression) analysis is done to determine the relationship between water quality parameters. The calculated WQI value for temple ponds differs from 47.50 to 96.02 (good to very poor). There is a significant positive correlation between TDS & Cl (0.932), TDS & SO<sub>4</sub> (0.941), Cl & SO<sub>4</sub> (0.960). The results found that all measured parameters within the limit expect dissolved oxygen. Hence pond water is not directly suitable for drinking; it can be suitable for fish culture.

**Keywords:** Temple pond water, Water Quality Index, Correlation, Regression, Dissolved Oxygen.

## Introduction

Water is the elementary requirement for the social culture. Surface water is the vulnerability pollution, mainly due to easy access for disposal of pollutants and wastewater. This is most important tools of the environment and an integral part of the biological cycle. Ponds and tanks are recognized to be environmental indicators of the strength of a city. The quality of surface water is governed by the natural processes and difficult anthropogenic activities. Surface water bodies have an effect on the groundwater board and subsurface water values of the close aquifers due to the presence of direct contact between the surface and groundwater<sup>1</sup>. The pond water is the main important role in the environmental bio-monitoring due to the reasons such as groundwater recharge, bases of water surface and discharge for irrigation, nourishment, overflow control and preservation, regeneration, environment change for bio biological cycles, persistence of fishes and animals, precipitation harvesting. The ecological condition of any lake or pond structure mainly depends upon the nature of that lake or pond and its occurrence to the various

ecological factors. Hence, the surface water value be determined by not only on systematic procedures but also on anthropogenic special effects<sup>2</sup>. The quality of Water also shows the relation of physical, chemical and biological properties of the surface water. The water quality design contains the study of physico- chemical and biological factors that reproduce the biotic and abiotic grade of the environment<sup>3</sup>. The Water quality index is an important tool deals with a nominal number that is denoted by definite place and time, also based on some of the water quality factors<sup>4</sup>. The current learning deals with the assessment of temple pond water and position of temple pond water on the basis of calculation of water quality index<sup>5,6</sup>. This work also deals with the Correlation and regression analysis for defining the major linear relationship among different pairs of water quality parameters<sup>7</sup>.

## Method

- i. **Study Area:** The study area is temple ponds in the Kanchipuram town. The samples were collected from seventeen locations in January 2018. Kanchipuram

is one of the distinguished cities of temples in South India. It is positioned 72 kms from Tamil Nadu state and the capital is Chennai. Kanchipuram is a town in the north portion of Tamil Nadu state. It is a famous visitor spot, with the more than 170,000 people. The topographical position of the study area lies between 12°46'30'' - 12°52'00'' North Latitude and 79°39'00'' - 79°46'20'' East longitude.

**ii. Sample Collection:** The pond water samples have been collected at seventeen different temples using well cleaned polythene container. After collecting the sample containers were tightly closed and categorized. The collected pond water samples were examined for pH, Dissolved oxygen, Total Dissolved Solids, Chlorides, Sulphate, Iron and Total Coliforms. The Class C surface water quality parameter values prescribed by ISI-IS: 2296-1982 presented in Table 1.

**iii. Water Quality Index:** Water Quality Index specifies the quality of water in terms of key number and offers a useful performance of the overall wealth of water<sup>8,9</sup>.

Water quality index value has been calculated to determine the suitability of water quality of temple pond water using the weighted arithmetic index technique<sup>10,11</sup>.

WQI value is determined by the following equation.

$$WQI = \sum (w_n \times q_n) / \sum w_n \quad \dots(1)$$

There is an amount of elements in the water sample result;

$q_n$  signifies the quality of  $n^{\text{th}}$  parameter in the water sample with reference to standard allowable value. Quality rating  $[q_n] = [100 (\text{observed value} - \text{ideal value}) / (\text{Standard value} - \text{ideal value})]$

Ideal value = 0 But for pH, dissolved oxygen ideal value is dissimilar, it can be determined by

$q_n$  for pH =  $100 (\text{observed value} - 7) / (8.5 - 7)$  and  $q_n$  for DO =  $100 (\text{observed value} - 14.60) / (15.00 - 14.60)$ . Unit weight  $[W_n] = \text{proportionality constant } (k) / \text{standard acceptable value given for } n^{\text{th}} \text{ parameter } (S_n)$  ( $W_n = K/S_n$ )

Water quality Index and Category of water quality is as follows:

Excellent Category (0–25), Good Category (26-50), Poor Category (51-75)

Very Poor Category (76–100), Unfit for drinking Category (Greater than 100)

1. Statistical analysis was carried out using statistical package for social sciences [11] (SPSS Version 17).

2. The physico-chemical parameters for all the study sites were analyzed by calculating Pearson's correlation Coefficient (r) value.

**iv. Correlation and Regression Analysis:** Correlation is essential in finding out the power of the relationship between the two interdependent variables. A regression has a statistical method for understanding the relationship between independent variables<sup>12,13</sup>.

## Results

**i. Physico-Chemical Properties:** The level of water and analytical values of physico, chemical and biological parameters for seventeen temple pond water is shown in Table 1.

**ii. Water Quality Index:** In WQI calculation quality rating of each parameter calculated by the formula

$$[q_n] = [100 (\text{observed value} - \text{ideal value}) / (\text{Standard value} - \text{ideal value})]$$

Next step, the unit weight for each measured parameters are calculated. Table 2 shows the Class C standards and unit weight for each parameter.

**iii. Correlation and Regression Analysis:** Statistical analysis was carried out by using SPSS Version 17<sup>14</sup>. Correlation coefficient (r) between pH, Dissolved Oxygen, Chloride, Sulphate, Iron, Total coliform count and regression coefficient k shown in Table 4 and Table 5.

## Discussion

**i. Physico-Chemical Properties**

**a. pH:** pH value for P12 (8.86), P3 (9.31) station were greater than the prescribed limit, remaining station ranged from 6.86 to 8.26 which is in limit, therefore, pH of fifteen station got the criteria of the quality standard of Class C.

**b. Dissolved Oxygen (DO):** DO is important for the survival of living organisms. The measured DO values varied between 6.2 mg/l to 7.8 mg/l, as per ISI-IS: 2296-1982 Class C standards DO should be less than 4 mg/l,

Hence the DO of seventeen stations was out of the standard permissible limit. The higher DO value is due to the enlarged solubility of oxygen at minor temperature.

- c. **Total Dissolved Solids:** Total Dissolved Solids denotes the presence of total dissolved elements present in water. The amount of TDS in the sample points varies from 114 mg/l to 1204 mg/L. Hence the TDS of seventeen station was within the standard permissible limit.
- d. **Chloride:** Chloride content in pond water gives the idea about the impurity of the water by solvable chloride salts, sewage discharge, etc. The amount of chloride in the seventeen stations varies from 28mg/l to 349mg/l. The standard limit prescribed is 600mg/l. The chloride concentration in all seventeen stations was below the permissible limit. Hence the pond water samples has not affected by chloride pollution.
- e. **Sulphate:** The amount of sulphate in the seventeen stations varies from 13mg/l to 184mg/l. The standard limit prescribed is 400mg/l. The sulphate concentration in all seventeen stations was below the permissible limit. Hence the pond water samples have not produce scale build up in pipes and avoid the bitter taste of water.
- f. **Iron:** Iron has not directly poisonous to living organisms. The ferric hydroxide from iron causes obstruction in breath of fish. The measured value of the iron ranges from 0.02mg/l to 0.09mg/l. The standard limit prescribed is 50mg/l. The iron concentration in all seventeen stations was below the permissible limit. Hence the pond water samples has not affected by iron.
- g. **Total Coliform Count:** The amount of the Total coliform count in the seventeen stations varies from 700 MPN to 2300MPN. The standard limit prescribed is 5000MPN. Presence of coliforms produces pathogenic diseases of fishes, the measured values of all seventeen stations was below the permissible limit. Hence the pond water samples are in safe condition.

ii. **Water Quality Index:** In this analysis, Table 4 shows the water quality index and category of temple pond water. The value of WQI ranged 47.50 to 96.02 in all the sample stations. From the results P1, P8, P17 temple pond water in a good category, these pond water fit for drinking purpose after the conventional treatment followed by disinfection (Class C). P2, P5, P6, P7, P9, P10, P11, P13, P14, P15, P16 are in poor category and P3,P4,P12 are in very poor category, these pond water fit for fish culture, irrigation (CPCB & BIS standards) comparing the results of Table 3.

### iii. Correlation and Regression Analysis:

Correlation Co-efficient matrix of different parameters as presented in Table 4. pH showed weak positive correlation with TDS ( $r = 0.090$ ), Cl ( $r = 0.154$ ),  $SO_4$  ( $r = 0.175$ ), TCC ( $r = 0.318$ ) and weak negative correlation with DO ( $r = -0.383$ ), Fe ( $r = -0.266$ ). DO showed weak positive correlation with TDS ( $r = 0.398$ ), Cl ( $r = 0.405$ ),  $SO_4$  ( $r = 0.328$ ), Fe ( $r = 0.222$ ), weak negative correlation with TCC ( $r = -0.207$ ). TDS showed strong positive correlation with Cl ( $r = 0.932$ ),  $SO_4$  ( $r = 0.941$ ). TDS showed weak positive correlation with Fe ( $r = 0.063$ ), TCC ( $r = 0.343$ ). Cl showed strong positive correlation with  $SO_4$  ( $r = 0.960$ ), weak positive correlation with TCC ( $r = 0.413$ ), weak negative correlation with Fe ( $r = -0.085$ ).  $SO_4$  showed weak positive correlation with TCC ( $r = 0.475$ ), weak negative correlation with Fe ( $r = -0.080$ ). Fe has weak correlation with TCC ( $r = -0.020$ ).

Regression analysis is a method of analytical modeling method which examines the relationship between a dependent and independent variable. Regression analysis data in Table 5 showed that TDS good regression with  $SO_4$  ( $k = 0.885$ ), TDS good regression with Cl, ( $k = 0.845$ ). Cl good regression with  $SO_4$  ( $k = 0.941$ ). The regression equation of TDS with  $SO_4$  & Cl; Cl with  $SO_4$  as presented in Table 5. Scatter diagrams for regression analysis shown in (Fig.1,2 and 3).Regression analysis shows a positive linear regression model between TDS with  $SO_4$ , Cl and Cl with  $SO_4$ .



**Table 1: Analytical values of physico, chemical and biological parameters for seventeen temple pond water**

Sl. No..	Pond No.	Name of The Temple	Level of Pond Water	pH	DO (mg/l)	TDS (mg/l)	CL (mg/l)	SO <sub>4</sub> (mg/l)	Fe (mg/l)	TCC MPN
1	P1	Lakshmi Narayana Temple	High	7.03	6.8	159	56	22	0.07	800
2	P2	Kamakshi Amman Temple	High	7.32	6.5	744	84	53	0.09	1600
3	P3	Kailasanathar Temple Sevilimedu	High	9.31	6.3	164	41	19	0.04	1600
4	P4	Kasi Viswanatha Temple	High	8.26	6.2	436	30	17	0.03	1100
5	P5	Astabhujakoram Temple	Medium	7.91	6.2	148	28	16	0.08	2100
6	P6	Puniya Koteeswarar Temple	Medium	7.68	6.4	183	35	13	0.03	1200
7	P7	Kusala kottam	Medium	8.04	7.6	744	158	94	0.08	2100
8	P8	Kachabeshwarar Temple	High	6.86	6.8	114	32	17	0.02	1700
9	P9	Varadharaja perumal Temple (front side)	High	7.58	6.5	172	32	14	0.07	2000
10	P10	Varadharaja perumal Temple (back side)	High	7.62	7.5	740	130	67	0.07	700
11	P11	Sonnnavannam Saitha Perumal Temple	Medium	7.8	7.4	1146	312	138	0.03	2200
12	P12	Dharmalingeswarar Temple	High	8.86	6.2	1160	349	184	0.02	2300
13	P13	Ekambareswarar Temple	High	7.52	7.5	117	32	18	0.03	900
14	P14	Santhaleeswarar Temple	Medium	7.46	6.9	1076	206	148	0.05	1900
15	P15	Vilakoli Perumal Temple	Medium	7.45	7.2	750	167	76	0.06	1400
16	P16	Kailasanathar Temple	Very High	7.66	6.4	547	108	57	0.04	1500
17	P17	Thamarai Kulam	High	7.42	7.8	1204	318	126	0.07	1400

**Table 2: Class C surface water quality parameter & Unit Weight of Observed Parameters**

Characteristics of Parameters	ISI-IS: 2296-1982- Class C Standards	Unit Weight (Wi)
pH Value	8.5	0.299588235
Dissolved Oxygen, mg/l	4	0.636625
Total Dissolved Solids, mg/l	1500	0.001697667
Chlorides (Cl), mg/l	600	0.004244167
Sulphates (as SO <sub>4</sub> ), mg/l	400	0.00636625
Iron (as Fe), mg/l	50	0.05093
Total coliform organisms, MPN/100 ml	5000	0.000509
	Total Unit Weight	0.99996

**Table 3: Water Quality Index and Category of Temple pond water**

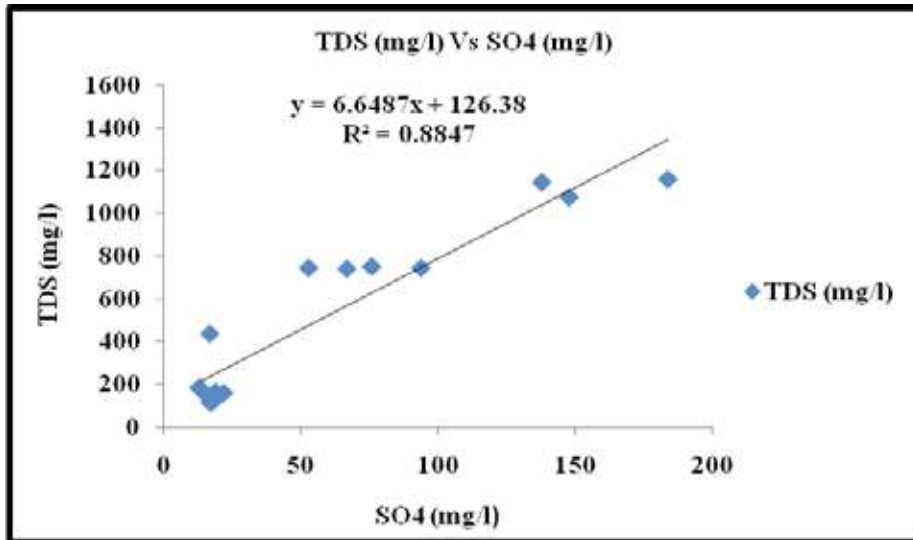
Sl.No.	Pond No.	WQI	Category of water	Sl.No.	Pond No.	WQI	Category of water
1	P1	47.50	Good	10	P10	55.27	Poor
2	P2	55.24	Poor	11	P11	59.76	Poor
3	P3	96.02	Very Poor	12	P12	88.23	Very Poor
4	P4	75.67	Very Poor	13	P13	53.06	Poor
5	P5	68.66	Poor	14	P14	55.90	Poor
6	P6	62.86	Poor	15	P15	53.72	Poor
7	P7	63.01	Poor	16	P16	62.62	Poor
8	P8	49.68	Good	17	P17	49.76	Good
9	P9	60.27	Poor				

**Table 4: Correlation Co-efficient matrix of different parameters**

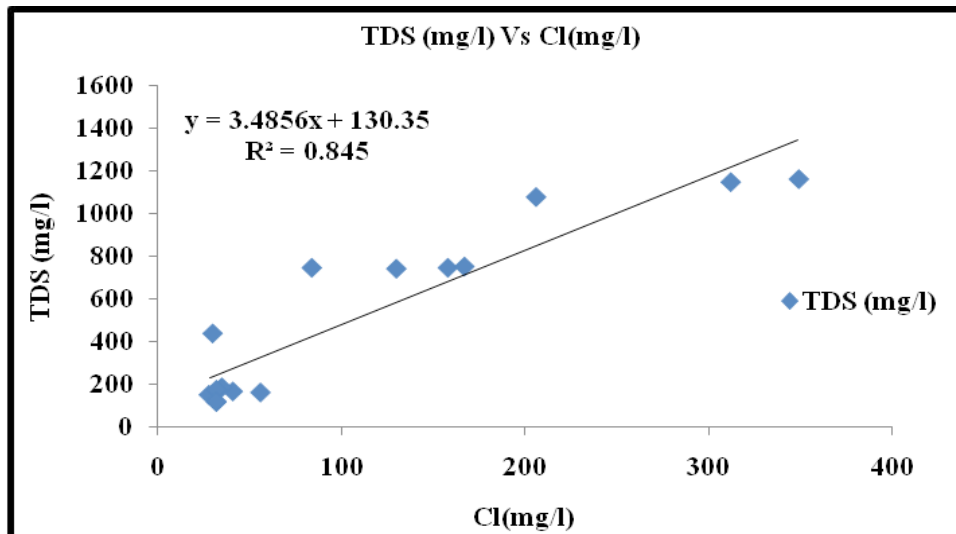
Parameters	pH	DO	TDS	Cl	SO4	Fe	TCC
pH	1						
DO	-0.383	1					
TDS	0.090	0.398	1				
Cl	0.154	0.405	0.932	1			
SO4	0.175	0.328	0.941	0.960	1		
Fe	-0.266	0.222	0.063	-0.085	-0.080	1	
TCC	0.318	-0.207	0.343	0.413	0.475	-0.020	1

**Table 5: Regression equation of TDS with SO<sub>4</sub>, Cl and Cl with SO<sub>4</sub>**

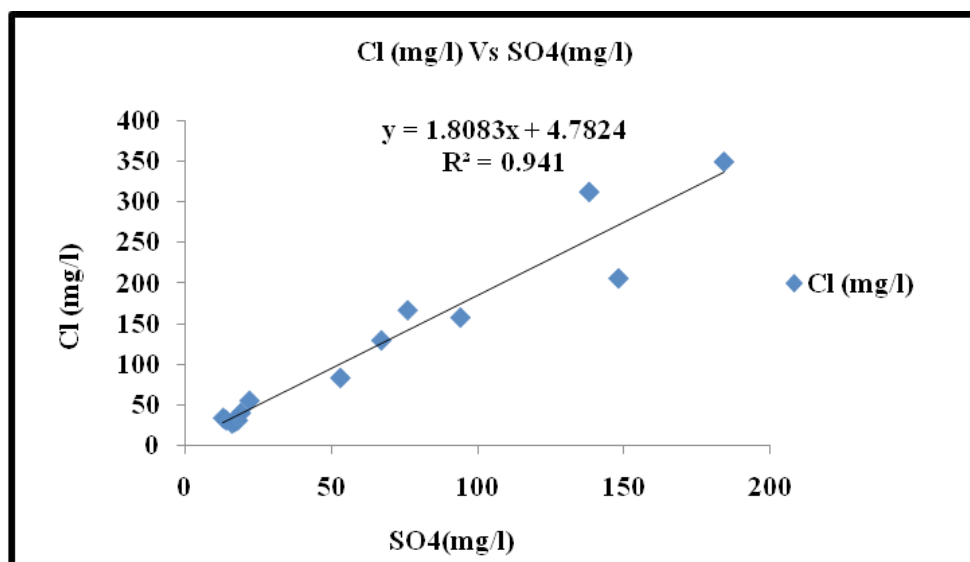
Dependent Variable (Y)	Independent Variable (X)	R <sup>2</sup>	Regression Equation (Y=aX+b)
TDS	SO <sub>4</sub>	0.885	Y = 6.6487 X + 126.38
	Cl	0.845	Y = 3.4856 X + 130.35
Cl	SO <sub>4</sub>	0.941	Y = 1.8083 X + 4.7824



**Fig. 1: Regression between TDS with SO<sub>4</sub>**



**Fig. 2: Regression between TDS with Cl**



**Fig. 3: Regression between Cl with SO<sub>4</sub>.**

### Conclusion

The outcomes of present study conclude that Lakshmi Narayana temple, Kachabeshwarar temple, Thamarai Kulam pond water was in good category according to class C standards (drinking water source with conventional treatment followed by disinfection). The rise in DO value and presence of TCC indicates the water directly not used for drinking purpose. All other temple pond water has WQI value poor to very poor. This increase value of WQI across the location points is due to anthropogenic activity, runoff, etc. The correlation and regression analysis conclude that total dissolved solids have significant positive correlation with chloride and sulphate. Some of the parameters do not have significant correlation between them indicating the different cause of pollution. The high value of WQI is mainly greater value of DO, it predict that all the temple pond water suitable for fish culture without any treatment, with proper treatment it can be used for drinking purpose.

**Ethical Clearance:** Plagiarisms checked by Urkund Software.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Awareness of Ceramic Implants among Dentists in Tamilnadu

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## Abstract

**Introduction:** Dental ceramics made of silicate glasses, porcelains, glass- ceramics, or extremely crystalline solids. They differ from the materials like metals, acrylic resins, and resin-based composites by exhibiting different physical, chemical and mechanical properties.

The present study aims at gaining knowledge on the awareness of dentists about ceramic implants.

**Materials and Method:** This questionnaire based survey study was conducted employing self-administered questionnaire at the Saveetha Dental College and Hospital. A total of About 70 participants (dentists) to be included for this survey. The survey to be conducted using a questionnaire containing closed ended and open ended questions and responses are to be analysed using appropriate statistical method.

**Results:** From the study, almost 83% of dentists possess adequate knowledge about ceramic implants.

**Conclusion:** Although the dentists possess basic awareness about ceramic implants, in order to keep up with the current trends more knowledge is required on their part.

**Keywords:** Dental ceramics, Implants, dentists, Titanium, Aesthetics.

## Introduction

Dental ceramics made of silicate glasses, porcelains, glass- ceramics, or extremely crystalline solids. They differ from the materials like metals, acrylic resins, and resin-based composites by exhibiting different physical, chemical and mechanical properties.<sup>[1]</sup> Silicate glasses differ from non-silicate glasses therein semiconducting material is that the central power ion that's guaranteed to four comparatively massive chemical element anions that link during a random order to other tetrahedra to form polymeric-type (SiO<sub>2</sub>)<sub>n</sub> chains. The properties

of ceramics are customised for dental applications by precisely controlling the types and amounts of the components used in their production.<sup>[2]</sup> The impact of the introduction of ceramics into dentistry developed a various findings in the field of Implantology.<sup>[3]</sup>

According to the history of implants, people were using various kinds of animal bones and some metals to place in the tooth socket as an implant. With evolution, Many metals like Titanium were used. Titanium is one of the good materials for implant due to its good aesthetic property and biocompatibility.<sup>[4]</sup> The rehabilitation of fully and partially edentulous patients with dental implants may be a scientifically accepted and well documented treatment modality. Presently, Titanium and Ti alloys are the materials most frequently used as an implants and became normal for tooth replacement in dental implantology.<sup>[5]</sup> These materials have earned thought use due to their glorious biocompatibility, favourable mechanical properties, and well documented useful results. once exposed to air, Ti like a shot develops a stable chemical compound layer, that forms the premise

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of its biocompatibility.<sup>[6]</sup> The principal disadvantage of Ti is its dark grey colour, which frequently is visible through the peri-implant membrane, thus impairing aesthetic outcomes within the presence of a skinny tissue layer genotype. Unfavourable soft tissue conditions or recession of the gingiva may lead to compromised aesthetics. This is of nice concern once the jaw incisors are concerned. Furthermore, reports suggest that metals are able to induce a nonspecific immunomodulation and autoimmunity. Galvanic side effects after contact with spittle and halide are delineate. Though aversions to Ti are terribly rare, cellular sensitisation has been incontestable. Due to these disadvantages, novel implant technologies that turn out ceramic Implants.<sup>[7]</sup>

Ceramic Implant provides a particular aesthetic resolution for patients with specific needs like a thin gingival genotype and for those patients who explicitly express their need for metal-free alternative. There are certain people who are either allergic or sensitive to alternative metals in their body or specific issues on having any metals within their body.<sup>[8]</sup> Ceramic implants sometimes cannot be left to heal below the gums. Usually the osseointegration procedure takes nearly six months to finish. Once surgically inserting the dental implants, they must have primary stability or a certain force worth. Implants that do not possess smart primary stability should be left for healing beneath the gums for 3 to 6 months once placement. Majority of zirconium dioxide dental implants might not heal below the gums due to their “one-piece” style, implying that they do not possess a removable abutment but one which is fixed to the implant. For dispelling such issues and having an implant option for such individuals, several companies have undertaken analysis and Development on “metal-free” implants. This has resulted in creating use of zirconia.<sup>[9,10]</sup> Use of zirconia became widespread initial in its type of crystalline (cubic form) zirconium dioxide because it resembled a perfect diamond. Several years ago single crystal sapphire implants were used; but, these days they’re not a lot of detected of. In the type of zirconia, it’s used for dental applications. Actually, it’s not a type of pure zirconia—there square measure traces of another part metallic element (Hf) and its chemical compound is combined with metal (yet another metal) to boost its properties. This yields a white opaque product and during this type, it’s tagged as ceramic, tho’ there square measure gold-bearing atoms within the material.<sup>[11,12]</sup>

Since, The ceramic implant technology is developing

in a wide range field, Dental practitioners must be aware about the ceramic implants and its wide range of uses. Our Aim of the study is to know the knowledge and awareness about ceramic implants among dentists in Tamilnadu.

## Materials and Method

**Participants and study design:** It is a questionnaire based survey study (quantitative and observational) was conducted employing self-administered questionnaire at the Saveetha Dental College and Hospital .The participants were dentists in Saveetha Dental college and Hospital .The participants were informed in advance about the objective of the study. The participation of the subjects was entirely voluntary and their identities were kept anonymous.

**Data collection method:** About 15 questions were prepared with open ended and close ended questions for the survey. With the help of 75 dental practitioners across the Tamilnadu an online survey was conducted through survey planet.com. The questionnaire contains questions which is helpful to assess the knowledge and awareness about ceramic implants among dentists in Tamilnadu. The results were collected and analysed.

**The structured questionnaire consists of three sections:**

1. Knowledge of dentists about ceramic implants
2. Awareness about Ceramic implants
3. Management and treatment plans for ceramic implants.

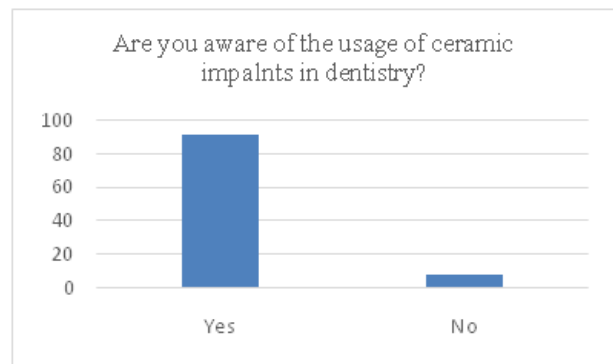
## Results

In this survey, totally 70 dental practitioners were participated in which 43 were males and 27 were females. Out of the total about 52 people were dental practitioners, 28 people were an implant doctor. The outcome of the survey varies from other studies according to the sample size and results.

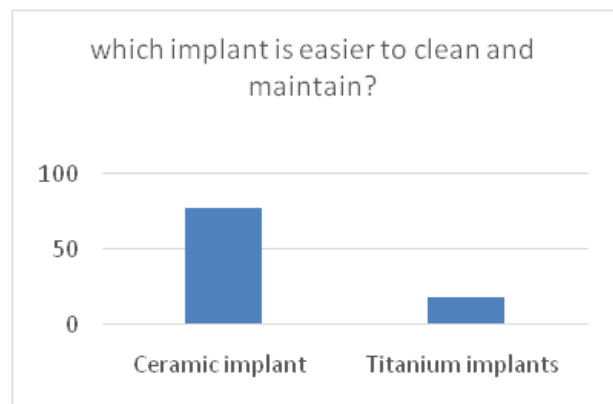
## Discussion

About 92% of the dental practitioners aware about ceramic implants where only 8% of them doesn’t know about it. (figure1). About 40% of the dentists told that ceramic implants has got better osseointegration. Whereas 60% of the dental practitioners told Titanium implants is better than ceramic implants in osseointegration. But moreover ceramic implants got somewhat better

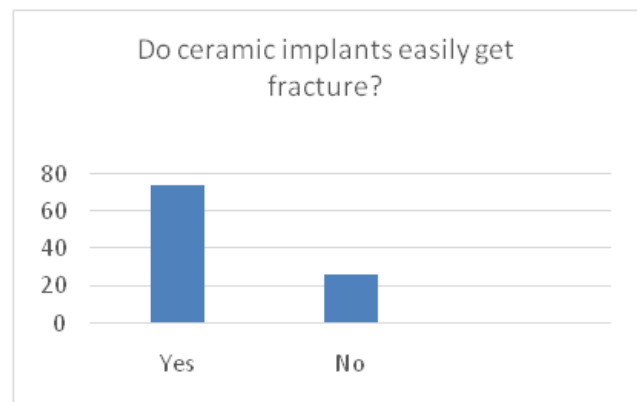
osseointegration property. About 62% of the dentists told Titanium implants has got highest crestal bone loss. So, Usage of ceramic implant may lowers the crestal bone loss. About 57% of dentists using cement retained prosthesis for ceramic implants while 43% are using screw retained prosthesis<sup>[13]</sup>. About 78% of dentists told that ceramic implants is easier to clean and maintain (figure 2). Where basically ceramics are easier to clean due to its glassy property. Because of its glassy property ceramic implants are more prone to get fracture. About 75% of dentists told ceramic implants will get fractured if we apply more pressure. The success rate of ceramic implant is almost 80% for most of the patients, who were given ceramic implants (figure3). Almost 43% of dentists told it gives 75% of success rate only 15% of dentists told the success rate is below 50% (figure 4). So almost most of them are accepting that ceramic implants are coming in good success rate.<sup>[14]</sup> Due to mechanical fractures, physical and chemical cause, almost both the titanium and ceramic implants have an equal rate of failures. So, the selection of implants will be according to the patients. Due to the physical property of porcelain and its natural appearance, ceramic implants will give better aesthetics than titanium implants. Almost 85% of the dentists accepted that ceramic implants gives better aesthetics (figure 5). About 75% of the dentists prefers ceramic implants when a patient comes with the highest bone loss. Almost, 44% of the dentists told ceramic implants do not cause more side effects (figure 6). But almost equally the results are came. So, side effects will be basically depends on the oral hygiene of the patient. Titanium implants bears more stress than ceramic implants. Because those implants are made of strong metal titanium. So, comparatively titanium implants bears more stress than ceramic implants. 60% of dentists accepted the statement. . Ceramic implants are more bio inert than titanium implants because of its chemical property. It won't react with the biological tissue when it is in placed in the mouth<sup>[15]</sup>. 84% of the dentists accepted that ceramic implants are more bio inert. About 67% of the dentists told titanium implants heals faster than ceramic implants. Like we discussed before, Titanium implants has got better osseointegration than ceramic implants. So, it heals faster than ceramic implants. 70% of the dentists told the same. About 48% of the dentists told that The ceraRoot implant system is the best to follow for the implant procedure. From this question its clear that almost 70% of the dentists using ceramic implants in their routine basis in patients. More of the patients opt ceramic implants due to its better aesthetic property.



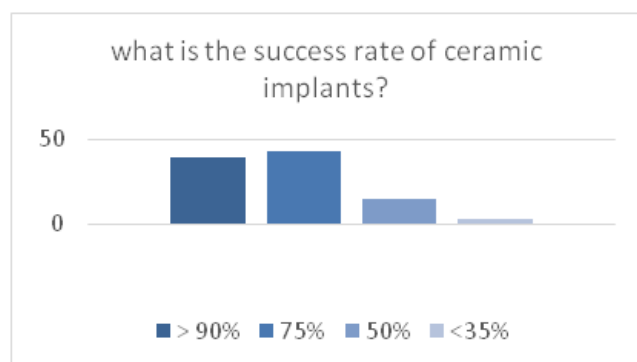
**Fig.1 Awareness about ceramic implants**



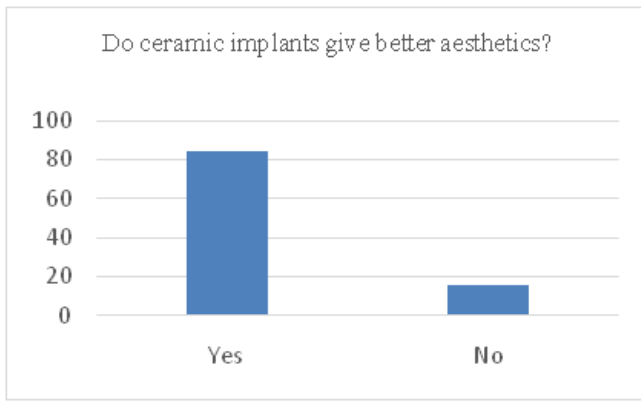
**Fig.2 Maintenance of implants**



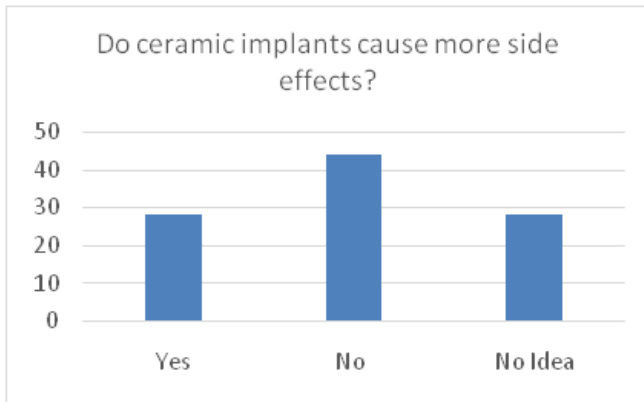
**Fig.3 Fracture capability of implant.**



**Fig.4 Success rate of ceramic implant**



**Fig.5 Aesthetics of ceramic implants**



**Fig.6 Side effects of implants**

**Conclusion**

Based on the survey, it can be well documented that almost two-third of the dentist use ceramic implants mainly because of it aesthetics. Additionally, the knowledge on the properties of the dental ceramics among dentists is appreciable. Dentists can still take measures to stay updated with the newer technologies available in the field of dentistry.

**Ethical Clearance:** Taken from Saveetha Dental college (SIMATS) committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Problems of Nosocomial Infection in Newly Upgraded and Newly Opened Government Health Institutions and their Management

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## Abstract

**Background:** Problems of nosocomial infections are arisen in health institutions due to insufficient facilities, infrastructures, finance, manpower etc as health institutions are upgraded and opened in same existing buildings or in hired buildings or in local governing bodies' buildings, in Himachal Pradesh. These infections are acquired by patients, attendants or visitors in these health institutions during their stay or visit in health institutions by susceptible patient or person, hospital care staff, in addition to infected or contaminated bed linen, equipment or air droplets, staff who are infected and from infected patients, also originates from patients' own skin micro biota, becoming opportunistic after surgery.

**Method:** The data collected by survey of about 224 newly opened and upgraded health institutions and correlated with previous research articles and researches published in different journals, by citations and observed present conditions of different health institution by survey and suspected nosocomial infections and problems which are arising in management of these nosocomial infections.

**Results:** The total newly opened and upgraded health institutions w.e.f. 01-04-2016 to 31-03-2019 are 224 which are opened in pre-existing buildings or opened in hired or local governing body's buildings There is the scarcity of resources which may lead to the problems of nosocomial infections, caused by different gram-positive and gram-negative bacteria, and different species of viruses and fungus. These are the problem of inadequate and infected water supply, availability of contaminated sinks, non-availability of water sinks, contaminated toilets, ineffective cleaning policies, in disposing off the human wastes, in laundry services, in implementing strict hand washing policies, in isolation for the patients of specific infections, in the control of the infection after the death of the patient. The major cause is the scarcity of many resources to fulfill the needs of health institutions.

**Conclusion:** In newly opened and newly upgraded health institutions, the nosocomial infections are caused by bacteria, virus and fungus because the norms and protocols of health institutions are not followed due to deficiencies of all requirements and facilities but generation of bio medical waste is started from first day of opening or upgradation of health institution which may increase risk of nosocomial infections in these institutions by direct or indirect contacts.

**Keywords:** *Nosocomial Infections; gram-positive and gram-negative bacteria; susceptible patient; micro biota.*

## Introduction

**Background:** Many health institutions are opened and upgraded in Himachal Pradesh in recent years.

These health institutions are running in pre-existing buildings or in hired private buildings or in buildings of local governing bodies with lacking of many facilities for running these health institutions. This leads to

management problems of nosocomial infections in these institutions. Different microorganisms which are responsible for nosocomial infections in these health institutions are bacteria, viruses and fungal parasites. The most common microorganism responsible for nosocomial infections are bacteria in these health institutions. Acinetobacter causes nosocomial infections in Intensive Care Units of these institutions whereas Bacteroides fragilis is a commensal bacteria causes nosocomial infection in intestinal tract and colon<sup>1</sup> which is present in these health institution abundantly. Due to lack of facilities in these health institutions the microorganisms like Methicillin-resistant S.aureus (MRSA) causes pneumonia, sepsis and surgical site infection which is transmitted through direct contact, open wounds and contaminated hands and is highly resistant towards beta-lactams antibiotic.<sup>2</sup> In these newly opened and newly upgraded health institutions, viruses contribute about 5% in nosocomial infections<sup>3</sup>

and fungal parasites like Aspergillus spp, Candida albicans, Cryptococcus neoformans etc cause nosocomial infections in immune-compromised individuals during hospital stay<sup>4</sup> in these health institutions. In upgraded health institutions, during renovation or construction, Aspergillus infections are caused by inhalation of fungal spores from contaminated air whereas Candida infections arise from patient's endogenous microflora<sup>5</sup> during the stay of patients in these health institutions.

## Material and Method

The data collected by survey of about 224 newly opened and upgraded health institutions and correlated with previous research articles and researches published in different journals, by citations, and observed present conditions of different health institution by survey and suspected nosocomial infections and problems which are arising in management of these nosocomial infections.

**Table 1 The newly opened and upgraded health institutions in Himachal Pradesh w.e.f 01-04-2016 to 31-03-2019**

S.No.	Type of Facility/Health Institution	Number of Institutions
1.	Health Sub-Centres Newly Opened	58
2.	Primary Health Centre Newly Opened	76
3.	Primary Health Centre upgraded from Health Sub-Centres.	34
3.	Community Health Centres upgraded from Primary Health Centres	36
4.	Civil Hospitals upgraded from Community Health Centres	20
	Total Health Institutions	224

## Results

The total newly opened and upgraded health institutions w.e.f. 01-04-2016 to 31-03-2019 are 224 which are opened in pre-existing buildings or opened in hired or local governing body buildings. There is the scarcity of resources which may lead to the problem in management of the nosocomial infections, caused by different gram-positive and gram-negative bacteria, and different species of viruses and fungus. These are the problem of inadequate and infected water supply, availability of contaminated sinks, non-easy accessibility of sinks in all areas and non-availability of sinks, contaminated toilets, in management of the effective cleaning policies, in disposing off the human wastes, in management of laundry services, in implementing strict hand washing policies, isolation for the patients of specific infection, in the management for the control of

the infection after the death of the patient. The major cause is the scarcity of many resources to fulfill the needs of health institutions.

## Discussion

### 1. Problem of inadequate and infected water supply:

**Causing Agents:** Pseudomonas, Stenotrophomonas, Serratia, Acinetobacter, Aeromonas, Chryseobacterium, Mycobacterium species, Enterobacter, Flavobacterium, Campylobacter, Klebsiella and sub spp Abscessus. Fungi like Fusarium, Exophiala, Aspergillus.<sup>6</sup>

**Management:** Water supply should be disinfected properly and there should be sufficient water supply with enough water filters and ROs for drinking water.

**2. Problems of availability of contaminated sinks, and non-availability of sinks:**

**Causing Agents:** Multidrug-resistant gram-negative bacilli<sup>7,8</sup> Candida like Achromobacter spp., Acinetobacter spp., Aeromonas spp., Enterobacter spp., Flavobacterium spp., Moraxella spp., Pseudomonas spp.<sup>9</sup>

**Management:** Hand washing facilities should be available with decontaminated sinks in every areas as per the needs of the employee and patients.

**3. Problem of contaminated toilets:**

**Causing Agents:** C.difficile contaminate bathroom surfaces via droplet within 90 minutes.<sup>10</sup> Staphylococcus spp. Streptococcus spp., Enterococcus spp., Enterobacteriaceae and non-Enterobacteriaceae Gram- negative bacteria methicillin-resistant Staphylococcus spp.and CTX-M-9 group extended-spectrum  $\beta$ -lactamase-producing Escherichia coli<sup>11</sup>.

**Management:** The toilets should be decontaminated twice or thrice a day. Sufficient number of toilets for males and female should be available.

**4. Problem of ineffective cleaning policies:**

**Causing Agents:** Methicillin-resistant Streptococcus aureus (MRSA), glycopeptide-resistant enterococci (GRE), Clostridium difficile, Acinetobacter species, fungi, and noroviruses, vancomycin-resistant Enterococci and methicillin resistant Staphylococcus aureus (MRSA), C. difficile, noroviruses, and Gram-negative bacilli. Acinetobacter, Klebsiella spp., Enterobacter spp., Pseudomonas spp., Serratia, and Flavobacterium.<sup>12</sup>

**Management:** The floors should be cleaned twice or thrice with disinfectant, fumigation of the disinfectant should be done daily. Other items and apparatus should be sterilized properly

**5. Problems in disposing off the human wastes:**

**Causing Agents:** Salmonella spp., Clostridium spp, Shigatoxin-producing E. coli (STEC), Vibrio spp., Listeria monocytogenes, Campylobacter spp., norovirus, Shigella spp., Yersinia spp., Hepatitis A virus, Giardia, and Cryptosporidium.<sup>13</sup> extended-spectrum-beta lactamases (ESBL)- producing Enterobacteriaceae.<sup>14</sup>

**Management:** Human wastes should be buried or

throw into the drainage after disinfection by 1% sodium hypochlorite solution.

**6. Problems of laundry services:**

**Causing Agents:** Moulds Coagulase-negative staphylococci, saprophytic Gram negative bacilli, Staphylococcus spp., MRSA, Coagulase negative Staphylococci, saprophytic Gram negative bacilli, Vancomycin resistant enterococci spp. The microorganisms like Sarcopitescabiei, microsporumcanis, salmonella spp., hepatitis A virus.<sup>15</sup>

**Management:** Laundries services should be available in the health institutions or may be hired on contract basis.

**7. Problems in implementing strict hand washing policies:**

**Causing Agents:** Staphylococcus aureus in surgical siteinfection, pneumonia, sepsis Pseudomonas spp. in lower respiratory tract infection, escherichia coli in urinary tract infection, rotavirus in viral gastroenteritis, clostridium difficile in antibiotic-associated diarrhea.<sup>16</sup>

**Management:** Hand washing policies should be implemented efficiently and strictly in every health institutions.

**8. Problem of isolation for the patients of specific infection:**

**Causing Agents:** Direct contact disease like influenza virus, mumps, parvovirus, rubella, Viral hemorrhagic fevers due to Lassa, Ebola, Marburg, Crimean-Congo fever viruses, Pneumonia: Adenovirus, H. influenzae type b (infants and children), pertussis etc are spread by droplets and disease like Influenza A, Measles, Mycobacterium tuberculosis: laryngeal and pulmonary disease, extra-pulmonary draining lesion, disseminated disease.<sup>17</sup>

**Management:** The sufficient space should be provided to the patients with specific diseases, for isolation.

**9. Problem of the control of the infection after the death of the patient:**

**Causing Agents:** Patients who died with Anthrax, Plague, Rabies, Viral hemorrhagic fevers, Human Immunodeficiency Virus infection (HIV) Hepatitis

C, Avian influenza and all other communicable disease.<sup>18</sup>

**Management:** Isolation of the dead bodies should be according to Categories specified like Category 3, red coloured, in for patients who died with diseases like Anthrax, Plague, Rabies, Viral hemorrhagic fevers. In category 2, the patients of Human Immunodeficiency Virus infection (HIV) Hepatitis C, Avian influenza, in yellow coloured. Category 1, all other than Category 2 and 3.<sup>18</sup>

### Conclusion

Nosocomial infections are hospital acquired infections which are acquired by patients, attendants and visitors during their visit in health institutions, rehabilitation centres, clinics etc. from infected patients or from healthcare providers, through the direct or indirect contacts. In newly opened health institutions and newly upgraded health institutions, norms and protocols of health institutions are not followed due to scarcity of all requirements and facilities but generation of bio medical waste is started from first day of opening or upgradation of health institution which may increase risk of nosocomial infections in these institutions. Prior to upgradation or opening of new health institutions, all norms and protocols should be considered and adhered strictly because health institutions are for improvement of health of patients instead of giving them additional diseases. Prior to upgradation of health institutions or opening of new health institutions there should be proper consideration and observation of all norms and essential conditions for upgradations or opening. The financial needs should be fulfilled timely, sufficiently and properly. Man power should be considered and provided according to need and demand of work in newly opened and upgraded health institutions. All protocols and norms regarding cleaning policies, disinfection, biomedical wastes management should be followed and assets and needs should be fulfilled time to time for this management. The infrastructure, furniture, medical instruments, medical equipment etc should be available according to need and in sufficient quantity. Health institution should not be run in local governing bodies' buildings or in private buildings as these buildings are not according to norm of health institution or if opened in these buildings, the norms and protocols should be followed. As biomedical wastes are generated from first day of opening of health institution which may increase risk of nosocomial infections much more.

**Conflict of Interest:** No conflict of interest.

**Source of Funding:** Self.

**Ethical Clearance:** No experiment has been done on any animal or human beings. This manuscript is ethically clear.

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# A Study on Brand Awareness and Customer Engagement

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## Abstract

People are choosing the brand based on the awareness and consciousness. Brand awareness created by the marketers through various factors. The main aim of this article to find the factors of brand awareness and the relationship with customer engagement. The researcher used linear regression analysis to find the result. Finally concludes that there is a positive relationship between brand awareness and customer engagement.

**Keywords:** Brand awareness, Customer engagement, Word of mouth.

## Introduction

The brand awareness has turned into an important variable that impacts customer's perceptions of a brand. Achievement in brand management arises from understanding and overseeing brand image and loyalty correctly to create strong characteristics that will impact consumers when making on their decisions. This world is a technical world and in light of the prominence of intuitive media and most recent technologies, routine marketing has changed as organizations and clients have both changed; there is a revolution in marketing and trade through giving various service, for example, interchanges, data get to and promote brand awareness, saving money, protection, advertising, training, purchasing and offering, which additionally opens up potential outcomes in the zones of marketing, costumers behavior and criticism, lower exchanges and requesting expenses, and consumers maintenance.

As there is positive impact of brand loyalty on sustainability of brand, people who are loyal with the products they are ready to pay more for the products because they believe that these products are more useful for them. The Internet has created channels for both

business manager and consumers to attain their own particular objectives as it empowers organizations to achieve their clients worldwide, and consumers of all age gatherings utilize this channel to research, select, and purchase products and service from organizations as far and wide as possible. Business and consumers must exploit this data. Managing the brands in the fast growing consumer's products industry, the brand personality is a central variable and the company makes greater efforts to communicate them to their target consumers.

The wider range of the brands extended the higher the awareness the company needs regarding how their consumer perceives the extended brand. In order to make it possible for measure such a non figurative and intangible indicator such as "brand personality". A company can measure brand awareness by different ways including brand recall, brand recognition, top of the mind brand and dominant brand. Brand awareness is important in decision making because it can be depicted into brand recall when any cue is given. It also help to choose the brand even in case of little attachment and change decisions by associating brand image.

Brand commitment is a variation in customer behavior due to his personnel predilections or emotions. It is about choosing a single brand among many brands in same category again and again at any price. It can also be referred as brand slavery. When someone is buying a product and he has the name of the brand in his mind it means that, the consumer is highly aware about that particular brand. And if the products satisfy its consumers they not only remain loyal to their brand

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but they also help the brand to grow by advertising their brand through their word of mouth. The product that has higher brand awareness will definitely grow better in the market and help the company in earning profits.

Customer engagement is a business communication connection between an external stakeholder (consumer) and an organization (company or brand) through various channels of correspondence. This connection can be a reaction, interaction, effect or overall customer experience, which takes place online and offline. In this research the researcher finds the brand awareness and its influence on customer engagement.

**Review of Literature:** Muhammad Ehsan Malik et al (2013). Importance of Brand Awareness and Brand Loyalty in assessing Purchase Intentions of Consumer. International Journal of Business and Social Science Vol. 4 No. 5; May 2013. The aim of this endeavor is to identify the effect of brand awareness and brand loyalty on purchase intention. Questionnaires were distributed to collect the responses from the employees in services sectors and conveniently available general public while descriptive statistics and regression analysis were used to analyze the data and draw the conclusions. Brand Awareness and brand loyalty have strong positive association with purchase intention. Managers all over the world should strive to promote the brand awareness along with brand loyalty as both of them contribute towards positive purchase intentions<sup>6</sup>.

Aqeel Ahmad et al (2014) The Study Of Brand Credibility And Brand Awareness As Positive Predictors For Brand Loyalty. Arabian Journal of Business and Management Review (Nigerian Chapter) Vol. 2, No. 12, 2014. This research study investigates method of brand loyalty through brand credibility and brand awareness. Simple random sampling method and Structure questionnaire were used for data collection. Data was analyzed through SPSS. The findings of this research study showed that brand loyalty has been observed to have positive association with brand credibility and also with brand awareness<sup>3</sup>.

Muhammad Asif et al (2015) Impact of Brand Awareness and Loyalty on Brand Equity. Journal of Marketing and Consumer Research www.iiste.org ISSN 2422-8451 An International Peer-reviewed Journal Vol.12, 2015. The objective of our research is to know the factors that impact on brand equity. The study considered the brand awareness and loyalty of brand,

to search out that how these influence the brand equity. The study was based on the primary which gathered from 200 respondents by means of a questionnaire. The application of random sampling technique are used and statistical tool like SPSS software was used for checking the reliability of questionnaire and for revealing the result of this research the correlation analysis are used. The research result indicates that the brand awareness and loyalty influence the brand equity. Main focus of every business is the customer attraction, the findings and recommendation of this research will help the managers to develop insight of research factors about the brand equity<sup>5</sup>.

Asaad Ali Karam (2015) An Analysis Study of Improving Brand Awareness and Its Impact on Consumer Behavior Via Media in North Cyprus (A Case Study of Fast Food Restaurants) International Journal of Business and Social Science Vol. 6, No. 1; January 2015. This is focused around the assumption that all these dimensions of customer based-brand image and loyalty will have impact on consumer's perceptions of brand. Brand awareness was treated with independently from different dimensions because of the difference in scale, and moreover media and sorts of media affecting on consumer behavior. The research studied four dimensions of consumer's based-brand equity specifically brand awareness, brand image, perceived quality and brand loyalty. Among the three dimensions, brand loyalty seems to have the minimum brand equity rating by consumers than alternate dimensions. Although, the dimension seem to have impact on consumer perceptions of brand. This paper likewise provides a solution to brand awareness via media store sellers which may help the sellers to promote their products in light of consumer behavior<sup>1</sup>.

Margarita Isoraita (2016) Raising Brand Awareness Through The Internet Marketing Tools. The opinions of different authors on raising brand awareness. The article are analyzes the opinions of different authors on raising brand awareness. The concept of internet marketing and its implementation it also describes and analyzes the concept of internet marketing and its implementation. The analysis investigation of the most urgent and the most effective online marketing tools in developing brand awareness are provided in the article. The article analyses website, internet advertising, social networks and the search engine optimization<sup>4</sup>.

Afaq Ahmed Khan (2016) Impact of Advertising



on Brand Awareness and Commitment in Female Apparel Industry. International Journal of Academic Research in Business and Social Sciences March 2016, Vol. 6, No. 3 ISSN: 2222-6990. The aim of this study is to explore the effectiveness of advertisement on brand commitment with the moderating role of quality between brand awareness and commitment. The empirical result indicates that how consumer’s present and future commitment is affected by brand awareness. The research is carried out with minimum resources and not many respondents which were not enough to observe the inclination of the whole population towards brands<sup>2</sup>

Zarlish Shahid, Tehmeena Hussain,Dr. Fareeh aZafar (2017) The Impact of Brand Awareness on The consumers’ Purchase Intention. Journal of Marketing and Consumer Research www.iiste.org ISSN 2422-8451 An International Peer-reviewed Journal Vol.33, 2017. This paper presents a review about the impact of brand equity and brand awareness on the purchasing intentions of the consumers. The purpose of the paper is to elaborate the relation between the awareness of a brand and the intention of consumer of buying that brand. This has been done by going through different literature and articles by different authors. It will help the readers to come across the work done by various well

known authors at one place and hence will help to know how knowing a brand well will affect the consumer in making decision about buying a product<sup>7</sup>.

**Objectives of the Study:**

1. To examine the factors influencing brand awareness
2. To examine the influence of brand awareness on customer engagement

**Hypotheses of the Study:**

1. There is no significant among factors influencing brand awareness.
2. There is no significant influence of brand awareness on customer engagement

**Analysis and Discussion**

Branding is the important criteria used by the marketer to get the customer engagement for their products. There are many factors used by the marketers to create customer awareness. The main factors are advertisement, target market, integrated market, positioning and social media marketing. The following tables show the influence of brand awareness factors to customer engagement.

**Table 1: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996 <sup>a</sup>	.993	.993	1.08005

a. Predictors: (Constant), AW1, AW2, AW3, AW4, AW5, AW6

Source: Computed data

The above table shows that R = .996 R square = .993 and adjusted R square .993. This implies the brand awareness variable create 99% variance over the customer engagement. The cumulative influence of six

variables of brand awareness over customer engagement is ascertained through the following one way analysis of variance.

**Table 2: ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	77894.243	6	12982.374	11129.302	.000 <sup>b</sup>
	Residual	566.921	486	1.167		
	Total	78461.164	492			

a. Dependent Variable: Customer engagement, b. Predictors: (Constant), AW1, AW2, AW3, AW4, AW5, AW6

Source: Computed data

Table 2 presents that  $f = 11129.302$   $p=.000$  are statistically significant at 5% level. This indicates all the six variables cumulatively responsible for customer

engagement. The individual influence of all this six variables is clearly presented in the following coefficient table.

**Table 3: Coefficients<sup>a</sup>**

Model B		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Std. Error	Beta			
1	(Constant)	.789	.130		6.083	.000
	Integrated Marketing	.819	.173	.095	4.723	.000
	Word of Mouth	1.644	.182	.186	9.035	.000
	Positioning	1.001	.188	.112	5.327	.000
	Advertisements	1.928	.102	.218	18.939	.000
	Social media marketing	1.288	.158	.138	8.175	.000
	Target marketing	2.255	.163	.272	13.852	.000

a. Dependent Variable: Customer engagement

Source: Computed data

From the above table it shows that Integrated marketing (Beta=.095,  $t=4.723$ ,  $p=.000$ ), Word of mouth (Beta=.186,  $t=9.035$ ,  $p=.000$ ), Positioning (Beta=.112,  $t=5.327$ ,  $p=.000$ ), Advertisements (Beta=.218,  $t=18.939$ ,  $p=.000$ ), Social media marketing (Beta=.138,  $t=8.175$ ,  $p=.000$ ) and Target marketing (Beta=.272,  $t=13.852$ ,  $p=.000$ ) are statistically significant at 5% level. This indicates that the all the six variables of brand awareness influenced to customer engagement. Moreover, advertisement is the important factor to create brand awareness and get customer engagement to the branded products.

**Findings and Conclusions**

Brand is the one of the important tool that occupy the target market by the marketer. Branding influence and attracts many customers for various reasons. They feel branded products getting some features such as quality, long life and good service. There are positive relationship between brand awareness and customer engagement. The people are getting brand awareness they are automatically engaged with the same brand till they get bad experience.

Brand awareness are created by the following factors. There are Target marketing, Positioning, Integrated marketing, Advertisement, Word of mouth and social media marketing. Among the all factors advertisement create more brand awareness than other factors. People

are getting brand awareness and they are marketer gets customer engagement from the same. Finally it concludes that brand awareness creates customer engagement to the concern products and it develops good equity level to the marketer.

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from UGC Committee

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# Linezolid Resistant clinically Significant Isolates of Coagulase Negative Staphylococci: An Emerging Therapeutic Concern

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## Abstract

Multidrug resistant Coagulase Negative Staphylococci (MDRCoNS) have emerged as a major cause of morbidity and mortality in hospital settings. A total of 706 clinically significant isolates of CoNS, were identified up to species level. Antimicrobial susceptibility testing was carried out with especial reference to linezolid and methicillin. *Staphylococcus epidermidis* (44.33%) was the predominant species isolated followed by *Staphylococcus haemolyticus* (39.37%) and *Staphylococcus lugdenensis* (5.24%). Isolates were predominantly recovered from blood 82.86%. Linezolid resistance (LzR) was seen in 2.54%. *S. haemolyticus* was the most resistant phenotype. The LzR isolates were also methicillin resistant. MDRCoNS poses a significant therapeutic challenge demanding judicious use of antibiotics.

**Keywords:** CoNS, *S. epidermidis*, *S. haemolyticus*, linezolid, methicillin resistance.

## Introduction

Coagulase Negative Staphylococci (CoNS) have been recognized as important agents of human disease.<sup>1</sup> There are more than 40 recognized species of CoNS, making them the most prominent microbes inhabiting the normal skin and mucous membranes.<sup>2</sup> Commonly implicated species include *S. epidermidis*, *S. haemolyticus*, *S. lugdunensis*, *S. schleiferi*, *S. warneri*, *S. hominis*, *S. simulans*, *S. capitis*, *S. cohnii*, *S. xylosus*, and *S. saccharolyticus*.<sup>3</sup> CoNS are important opportunistic pathogens and have been reported as causes of human infections, such as bloodstream infections, wounds infections, urinary tract infections etc.<sup>2</sup> Multidrug resistant (MDR) CoNS is a matter of therapeutic concern due to limited options left for treatment. This is the first study carried out from this geographical area which

phenotypically characterizes the clinically significant CoNS upto species level and determines their antibiotic susceptibility pattern with especial reference to linezolid.

## Method

A total of 706 non-repeat clinically significant isolates of CoNS obtained from different clinical samples over a period of one year from various inpatient units and outpatient departments was processed. The isolation and identification of CoNS was carried out as per standard bacteriological technique.<sup>2</sup> Only the Gram positive cocci, catalase positive, fermentative, slide and tube coagulase test negative were included in the study. Other bacterial pathogens were excluded from this study.

**Identification and Confirmation:** The CoNS were identified phenotypically upto species level by pigment production, clumping factor, novobiocin susceptibility, mannitol fermentation and ornithine decarboxylation<sup>2</sup> and confirmed by Vitek-2 system, using GPID card number P628 (Biomérieux, France).

**Antimicrobial susceptibility testing (AST):** AST was carried out as per CLSI recommendations 2017<sup>4</sup> using commercially available antibiotic discs (Hi Media). Methicillin resistance was tested using

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cefoxitin (30µg) disc. Susceptibility to linezolid was tested using linezolid (30µg) disc and interpreted as per CLSI 2017.<sup>4</sup> A zone diameter of  $\leq 20$  mm for linezolid was taken as screen positive and further these isolates were subjected for Minimum Inhibitory Concentration (MIC) and value of  $\geq 8$  µg/ml was taken as resistant to linezolid. Vancomycin susceptibility was tested by MIC. Staphylococcus aureus ATCC 25923 was used for quality control.

## Results

Out of the total 706 clinical isolates of CoNS processed during the study period, majority of the isolates 680 (96.31%) were from indoor samples, predominantly from wards 434 (63.82%). The isolation rate was maximum from blood 585 (82.86%) followed by pus 78 (10.89%) and urine samples 24 (3.40%). CoNS species were commonly isolated from patients in extreme of ages 36.54% (< 10 years) & 15.72% (>61 years). There was male predominance (78%) and the male: female: ratio was 1.45:1.

Among the various species of CoNS isolated, S. epidermidis 313 (44.33 %) was the most frequent followed by S. haemolyticus 278 (39.37 %) and S. lugdenensis 37 (5.24 %). S. saprophyticus, S. hominis, S. intermedium and S. warneri were other CoNS species less frequently isolated from our Hospital (Table 1).

The clinical isolates of CoNS were MDR including very high level of resistance to penicillin (Table 2). Similarly, Methicillin resistance (MRCoNS) was also high among all the species ranging from 88% to 100%. None of our isolates of CoNS were resistant to Vancomycin. However, there was emergence of linezolid resistance (LzR) among various CoNS species. Overall LzR was seen in 18/706 (2.54 %) of isolates. All the LzRCoNS, were isolated from ICUs 11 (61.11%) predominantly from blood 10 (55.55%) and pus 5 (27.8%) samples. S. haemolyticus 9 (50%) was the most resistant phenotype followed by S. epidermidis 5 (27.8%), S. lugdenensis 3 (16.7%) and S. hominis 1 (5.55%) (Table 3). All the LzRCoNS were also MRCoNS (Table 4).

**Table 1: Distribution of clinically significant isolates of CoNS (n= 706)**

S.No.	Sample	S. epidermidis	S. haemolyticus	S. lugdenensis	S. saprophyticus	S. hominis	S. intermedium	S. warneri
1	Blood (n=585)	264	237	33	1	22	21	7
2	Pus (n=78)	37	32	3	0	2	4	0
3	Urine (n=24)	2	2	0	19	0	1	0
4	Central line (n=6)	4	2	0	0	0	0	0
5	Ascitic fluid (n=4)	1	2	1	0	0	0	0
6	Stitch line swab (n=3)	1	2	0	0	0	0	0
7	CSF (n=2)	1	1	0	0	0	0	0
8	Pleural fluid (n=1)	1	0	0	0	0	0	0
9	Umbilical line tip (n=1)	1	0	0	0	0	0	0
10	Tracheal aspirate (n=1)	1	0	0	0	0	0	0
11	ICD fluid (n=1)	0	0	0	0	1	0	0
	Total (n=706)	313 (44.33%)	278(39.37%)	37(5.26%)	20(2.83%)	25(3.54)	26(3.68)	7(0.9%)

**Table 2: Percentage wise distribution of resistance pattern of CoNS**

Species	P	E	CD	CIP	COT	TE	MO	C	GEN	LZ	MRCoNS
S. epidermidis (n=313)	97.4	52.7	52.7	73.1	66.1	37.7	49.2	28.1	38	1.59	96.1
S. haemolyticus (n=278)	96.7	88.1	55.0	71.9	68.3	34.1	55	25.8	43.1	3.2	96
S. lugdenensis (n=37)	94.6	91.8	72.9	70.2	72.7	37.8	62.1	40.5	48.6	8.1	97.2
S. saprophyticus (n=20)	90	0	0	90	55	85	60	0	55	0	90
S. hominis (n=25)	96	88	60	84	70	56	52	44	52	4	96
S. intermedium (n=26)	92	42	42	42	57	23	11	7.7	46.1	0	88
S. warneri (n=7)	100	85.7	57.1	42.8	85.7	28.5	57.1	57.1	28.5	0	100

P- Penicillin, E- Erythromycin, CD- Clindamycine, CIP- Ciprofloxacin, COT- Co-trimoxazole, TE- Tetracycline, MO- Moxifloxacin, C- Chloramphenicol, GEN- Gentamicin, VA- Vancomycin, LZ- Linezolid,

**Table 3: Distribution of linezolid resistant isolates (n=18)**

S.No.	Species	n=18	%
1.	S. haemolyticus	9	50
2.	S. epidermidis	5	27.8
3.	S. lugdenensis	3	16.7
4.	S. hominis	1	5.55

**Table 4: Relation between MRCoNS and LzRCoNS**

	LzRCoNS*	LzSCoNS**
MRCoNS# (n= 676)	18	658
MSCoNS## (n=30)	00	30
$\chi^2 = p \text{ value} = 0.365$ ; Statistically not significant		

\*LzRCoNS: Linezolid resistant CoNS. \*\*LzSCoNS: Linezolid sensitive CoNS., #MRCoNS: Methicillin resistant CoNS.## MS CoNS: Methicillin sensitive CoNS.

**Discussion**

CoNS, resistance to many important antimicrobial agents including linezolid has been reported from clinical samples obtained from hospitalized patients.<sup>5,6,7</sup> Our study shows a high isolation rate of CoNS from blood (82.86%) followed by pus (10.89%) and urine samples (3.40%). Similar finding has been reported,<sup>8</sup> whereas another study reported higher rate from pus followed by urine and blood.<sup>9</sup>

Majority of our CoNS were isolated from indoor samples (96.31%), predominantly from wards (63.82%). However, Singh et al isolated majority of CoNS from ICUs.<sup>10</sup> Lesser isolation rate from ICU in our study may be because our ICU (a high risk area) is under constant surveillance and monitoring by the Infection Control team (ICT). Strict monitoring by ICT may have been overlooked in wards (comparatively less critical areas) thus emphasizing the need for equal monitoring also in the wards by the ICT team.

The isolation of CoNS was maximum in extreme of ages and there was male predominance. This may be because of vulnerability of subjects to infections in this age group due to lower immune status and sex dependent genetic factors. Similarly, a recent study has shown rising trend of CoNS in neonates with male predominance.<sup>11,12,13</sup>

S. epidermidis (44.33%) was the most frequent species isolated, predominantly from blood and pus followed by S. haemolyticus. (39.37 %) Other studies

have also reported similar findings.<sup>14,15,8</sup> However, Karigoudaret al. reported maximum isolates from pus samples followed by urine.<sup>16</sup> Other recent studies have also reported S. epidermidis as the most frequent isolate followed by S. haemolyticus.<sup>17, 9</sup> S. lugdenensis was the third commonest species isolated in our study (5.24 %), majority (89.18 %) from blood. S. saprophyticus, S. hominis, S. intermedium and S. warneri were other CoNS species less frequently isolated from our Hospital. S. saprophyticus was predominantly isolated from urine samples of female patients which is similar to a study by Sheikh et al.<sup>18</sup> Various studies from India<sup>10, 19</sup> and abroad<sup>20, 21</sup> have reported species wise distribution in different geographical areas. This may be due to the difference in colonization characteristic of patients and the varying adaptability of different species to selective pressures such as biocides and antimicrobials in the environment.<sup>10</sup>

The isolates of CoNS showed resistance to multiple antimicrobial agents including very high level of resistance to penicillin-G and ceftioxin. Similar findings have been reported.<sup>21,22</sup> High isolation rates of MRCoNS from our hospital is a matter of concern as they are resistant to multiple antibiotics leaving very few treatment options. Such strains are becoming the common causes of morbidity and mortality mainly in hospital settings. Few recent studies have reported MRCoNS ranging from 38% to as high as 62%.<sup>10,23</sup>

Antibiotics like linezolid and vancomycin are the alternative therapeutic agents for these MDR pathogens and if resistance develops to these drugs we

are left with no therapeutic options. Overall, emergence of linezolid resistance (LzR) in CoNS ranging from 0% to as high as 16% has been reported from India<sup>24</sup> and abroad.<sup>25</sup> We report LzR in 2.54% of our clinical isolates of CoNS which is comparable with data from the global surveillance studies report of 2%. *S. haemolyticus* (50%) was the most resistant phenotype followed by *S. epidermidis* (27.8%), *S. lugdenensis* (16.7%) and *S. hominis* 1 (5.55%). Species wise susceptibility to linezolid has been reported by various workers; Kalawat et al reported LzR in *S. lugdenensis* and *S. hominis*,<sup>6</sup> Peer et al in *S. cohnii* and *S. kloosii*,<sup>5</sup> Gupta et al in *S. haemolyticus*<sup>26</sup> and recently Matlaniet al in 2016<sup>27</sup> reported mucoid strain of *S. haemolyticus* showing LzR. Such high level of resistance to linezolid is an alarm for the judicious use of this drug.

Linezolid is one of the few therapeutic options shown to be effective against MDR Staphylococcal infections and is available both as oral and parenteral formulations. Studies have reported that LzR in Staphylococci has emerged due to prolonged exposure to the drug,<sup>28</sup> thus emphasizing judicious use of reserve drug like linezolid, vancomycin and tigecycline in routine clinical practice.<sup>23</sup> Due to the ease of oral administration; linezolid has been misused in clinical practice which has gradually led to emergence of resistance against this drug. Linezolid does not display cross resistance with other classes of antimicrobial agents. However, all our clinical isolates of CoNS were sensitive to vancomycin, the last resort drug we are left with, in this era of desperation.

All these LzR CoNS were isolated from ICUs (61.11%), predominantly from blood sample. Case reports of LzR CoNS in blood and pus samples have been published from India recently.<sup>21,26</sup> These LzR CoNS were also MR CoNS. The emergence of LzR in Staphylococcus poses significant challenges to the clinical treatment of infections caused by these organisms. Similar findings have been reported.<sup>5,28</sup> Studies have shown that *cfr* gene confers resistance to linezolid in *S. aureus* as well as species of CoNS.<sup>29</sup> Mechanism of resistance to linezolid is by mutations in 23S rRNA or presence of *cfr* gene,<sup>10</sup> therefore the isolates should also be tested for *cfr* genes responsible for LzR. Unfortunately the molecular typing method to detect *cfr* gene could not be performed in our isolates due to limited resources, which is one of the limitation of our study. In future genotypic method of resistance will be looked for in these isolates.

## Conclusion

Multidrug resistant CoNS is an emerging therapeutic concern and poses a significant challenge to the treatment of infections caused by these organisms. Accurate identification of resistant phenotype followed by strict infection control measures are required to prevent nosocomial spread. It is important to keep a close monitoring to track resistance to linezolid particularly when frequent and extended linezolid therapy is prescribed. Paucity of newer antimicrobials demands judicious use of linezolid.

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# Quality Characteristics and Antioxidant Properties of Bread Supplemented with Iron Rich Black Strap Molasses

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## Abstract

**Aim:** Sugar cane molasses is a rich source of various natural nutrients. The light molasses is concentrated to dark molasses which is rich in antioxidants and iron. To analyze the compounds present it nuclear magnetic resonance imaging is performed.

**Methodology and Result:** Preparation of blackstrap molasses was done, from that the antioxidants was extracted through sonication, filtered and purified by column chromatography. Antioxidant assay and iron determination for the molasses and the compounds present in molasses was identified by NMR spectroscopy. Following the conversion of molasses, the wheat bread is made using different percentage of molasses.

**Conclusion:** Significance and impact of study: End product is performed and the result showed that the end product is rich in iron. Molasses act as alternative sweetener, it has antioxidants which are used to destroy the free radicals and also have high iron content. To provide the iron rich product to reduce the effect of iron deficiency diseases.

**Keywords:** Sugar cane molasses, antioxidant, Iron, Bread.

## Introduction

Sugarcane (*Saccharum officinarum*) is a type of grass which belongs to the family of poaceae. It is an annual crop which requires huge amount of water and nutrients for cultivation. The extracted juice is boiled to crystallize the sugar. The sugar crystals are filtered from the fluid. The left over thick, brownie liquid is called molasses<sup>1</sup>. Molasses is a viscous liquid which is sweet in taste and has no more commercially extractive sugar. It is an alternative sweetener to honey. Hence it can be regarded as low price and highly nutritious commodity<sup>2</sup>.

Black strap molasses's the syrup obtained during third stage of boiling. It is the thickest liquid and very dark in color and also tends to have a bitter taste. Consumption of molasses is approved by FDA. Also, people believe that beyond sweetening molasses possess variety of nutrient supplements<sup>3</sup>. Recently, the sugarcane molasses is found to have the therapeutic applications. Some of the effects of molasses include resistance towards bacteria and viruses, stimulation of immunity and promotion of growth in animals. But there is no detailed evidence for its antioxidant activities<sup>4</sup>. The sugar cane molasses can be used as a hypertonic solution in osmotic degradation of fruits and vegetables<sup>5</sup>.

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Sugar cane juice has numerous volumes of phytochemicals which has biological activity such as anti-cancerous, antidiabetic, antibacterial, antifungal, antioxidant, anti-mutagenic, hypercholesterolemia, etc.. Molasses has a significant amount of antioxidant<sup>6</sup>. Antioxidants destroy the free radicals which cause

oxidative stress and leads to common diseases such as atherosclerosis, diabetes mellitus and chronic renal failure<sup>7</sup>. The antioxidants are intracellular product. There are various techniques such as Soxhlet extraction, reflux method for extraction. But all these methods will deactivate the bio compounds and hence new method such as micro wave assisted, supercritical fluid assisted and ultra-sonication which provides maximum concentration of bio compounds is preferred. The extracted antioxidant is quantified by DPPH<sup>8</sup>. DPPH reacts with antioxidants and produce stable radical which results in color change from violet to pale yellow<sup>9</sup>. The results showed that DPPH method can be used as a standard method for antioxidant assay<sup>10</sup>.

Over 1.6 billion people were affected by IDA (Iron Deficiency anemia). In developing countries, IDA is common among adolescent girls due to malaria, poverty, worm infection and poor diet. It leads to birth of low weight babies and fetal mortality<sup>11</sup>. Also in comparison with last decade the percentage of birth of low weight babies had not count down<sup>12</sup>. Molasses provides 85% of total bioavailability of iron compared to beef liver, oat meal, eggs and lettuce<sup>13</sup>.

Bakery products can be produced with additional nutrients with biological supplements such as molasses<sup>14</sup>. It has been evident from the recent studies that elements such as calcium, sodium, magnesium, iron and copper are essential for the development of human cells<sup>15</sup>. Addition of molasses in bread increase potassium content by 67%, calcium by 35% and sodium by 4% and iron by 4%<sup>16</sup>.

## Materials and Method

**Collection of Sample:** Sugar cane Molasses, the byproduct of sugarcane was collected from Sakthi Sugar Industry Pvt Ltd. The collected sample is stored at 4°C to control the growth of yeast.

**Preparation of Blackstrap Molasses:** The light molasses is heated at 80°C for 10-15 mins. During this process the impurities were removed in the form of foam. Once the thick brown colored viscous liquid is formed, it is cooled down and secured for further process.

**Extraction of Antioxidants: Ultra Sonication:** The antioxidant which is to be extracted is an intracellular product and hence the cell wall should be lysed to release the product. The Sugar cane molasses was extracted by ultra-sonication method. Sugar cane molasses (5ml) was

extracted by adding 30 ml of 70% ethanol using an ultrasonicator (Vibracell, 130W, 20 KHz). The extraction was done at room temperature of about 37°C for 1 hour. The extract was concentrated under fume hood to obtain the total extraction fraction. Finally, the total extracted fraction was suspended in 70% ethanol<sup>17</sup>.

**Filter Sterilization:** The ultra-sonicated Sugar Cane Molasses extract was filtered using the syringe filter. The filtered extract of 10 ml was collected in the centrifuge tube and stored at 4°C. The stored extract was purified by column chromatography and antioxidant assay was performed.

**Chromatography:** Column chromatography is the most common technique used for purification of a mixture. Since molasses is polar, silica column is used. The silica powder (1%) and the solvent ethanol (70%) were mixed initially and poured into the column. The column was packed carefully without air bubbles.

Once silica gets settled, 50ml of solvent (ethanol) is allowed to run. Then, 1ml of the extract was loaded and the flow was maintained. The separated processed molasses was collected and stored under optimum conditions.

**DPPH ASSAY:** 1mM DPPH solution was prepared by dissolving 0.04g DPPH in 100ml of 100% ethanol. 700µl of different concentrated extracts (10<sup>-1</sup>, 10<sup>-2</sup>, 10<sup>-3</sup>, 10<sup>-4</sup>, 10<sup>-5</sup>, and 10<sup>-6</sup>) were mixed with 700µl of DPPH solution. The mixture was shaken vigorously and incubated in dark at 37°C for 30min. Then the absorbance was measured at 517 nm. The assay was performed for light molasses, bread samples containing different concentration of raw molasses and processed molasses<sup>18</sup>.

**Determination of Iron:** The molasses is converted into ash as mentioned in<sup>19</sup>. 1.7g of ferric chloride is dissolved in 100ml of distilled water and labeled as 1% iron. The serial dilution for iron solution is performed to get different concentration such as 0.1%, 0.01%, 0.001%, 0.0001%, 0.00001% and 0.000001%. Take 5ml of solution from each concentration and add 0.1M KSCN solution. The sample is heated at 200°C in muffle furnace for 1 hour. The obtained ash is dissolved in 5ml of distilled water. Filter the solution and add 5ml of 0.1M KSCN solution. The absorbance at 450nm is taken for sample and standard. Then the assay was performed for bread samples containing raw molasses and processed molasses.

**NMR Spectroscopy:** The blackstrap molasses was diluted to 50% using distilled water. C<sup>13</sup> NMR (400MHz Bruker) of diluted sample was performed using deuterium oxide (D<sub>2</sub>O) and recorded.

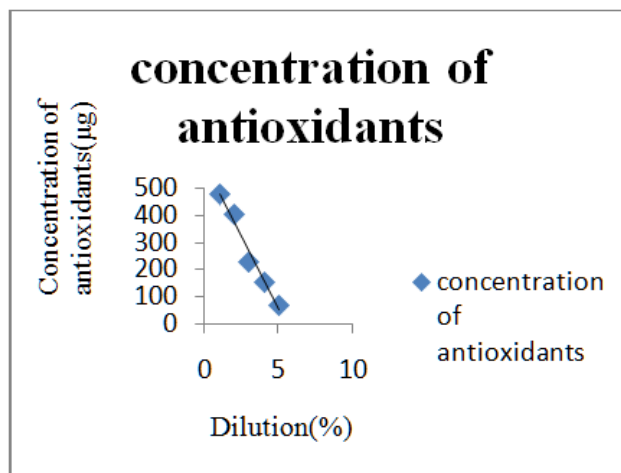
**Preparation of iron Supplemented Bread:** Commercially available wheatflour was used for making the bread. The ingredients such as wheat flour (100g), instant yeast (3g), sugar (2g), salt (1g), fat (10g), milk (25 ml), raw molasses were mixed together to get a loose dough and it was allowed to ferment for 1.5 hours and baked in preheated oven at 220°C<sup>20</sup>. Similarly, the same ingredients were mixed with the processed black strap molasses

**Results and Discussion**

**DPPH ASSAY:** Among the five different serial diluted samples, the sample with minimum dilution showed high concentration of antioxidant. The antioxidant scavenging activity of different bread samples were analyzed by DPPH assay and their response was shown in the table 2. In general, Molasses is a rich source of antioxidants. These antioxidants have a great potential to scavenge free radicals which causes mutation in living cells. Also the ultra-sonicated samples contain low percentage of free radicals.

**Table 1. Antioxidant concentration in serial diluted light molasses**

Dilution (%)	Concentration (mg/ml)
10-1	475
10-2	401.4
10-3	227.14
10-4	152.85
10-5	70.71



**Figure 1. Concentration of antioxidant in serial diluted molasses**

**Table 2. Antioxidant concentration in molasses supplemented bread samples**

Name of the sample	Volume of molasses (ml)	Concentration of Antioxidant in B <sub>a</sub> (mg/ml)	Concentration of antioxidant in B <sub>b</sub> (mg/ml)
S1	1	493	653
S2	2	521	702
S3	3	580	789
S4	4	657	820
S5	5	752	876

B<sub>a</sub> - Bread prepared using raw blackstrap molasses, B<sub>b</sub> - Bread prepared using raw blackstrap molasses

**Determination of Iron for Molasses:** The standard graph was plotted using percentage of dilution and absorbance of the ferric chloride and the concentration of iron of the sample was extrapolated and the concentration of iron was founded out. The results of the present study

showed that the molasses is rich in iron which amounted to 2.36mg/ml. The iron content in blackstrap molasses was 60% of the natural honey (4mg/ml). This makes molasses as the most economical and preferable iron supplement.

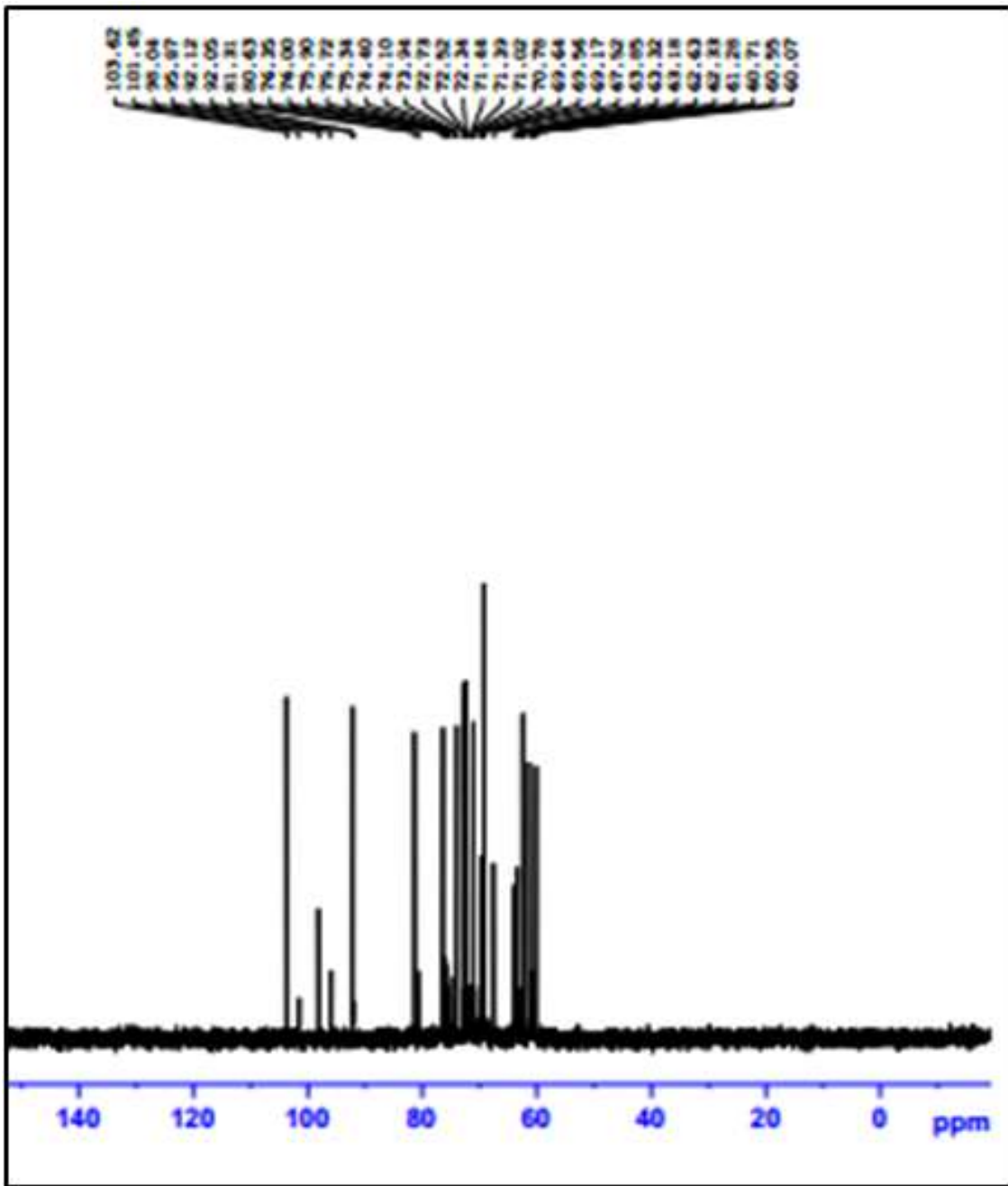


Figure 2. NMR spectrum of Black strap molasses

Table 3. Determination of iron for light molasses

Dilution (%)	Absorbance
10 <sup>-1</sup>	3.502
10 <sup>-2</sup>	2.504
10 <sup>-3</sup>	0.195
10 <sup>-4</sup>	0.025
10 <sup>-5</sup>	0.024
10 <sup>-6</sup>	0.021
Sample	1.856

B<sub>a</sub> - Bread prepared using raw blackstrap molasses, B<sub>b</sub> - Bread prepared using raw blackstrap molasses

**Interpretation of NMR:** The compounds present in the molasses have been identified by C13 NMR. And it was found that in addition to sucrose, molasses is rich in ferric oxide, magnesium oxide, potassium oxide and 18 amino acids. The compounds present in the molasses were listed in the Table 5.

**Sensory Evaluation of Bread:** Molasses possess bitter taste and hence it is mandatory to perform the sensory analysis. The color of the crust and crumb, dough and taste were evaluated. Sensory evaluation was done for the acceptability of the product by the customers. The parameters such as taste, odor and appearance of the crust and crumb were analyzed for the bread samples. These evaluations were done by the 15 panel members<sup>20</sup>.

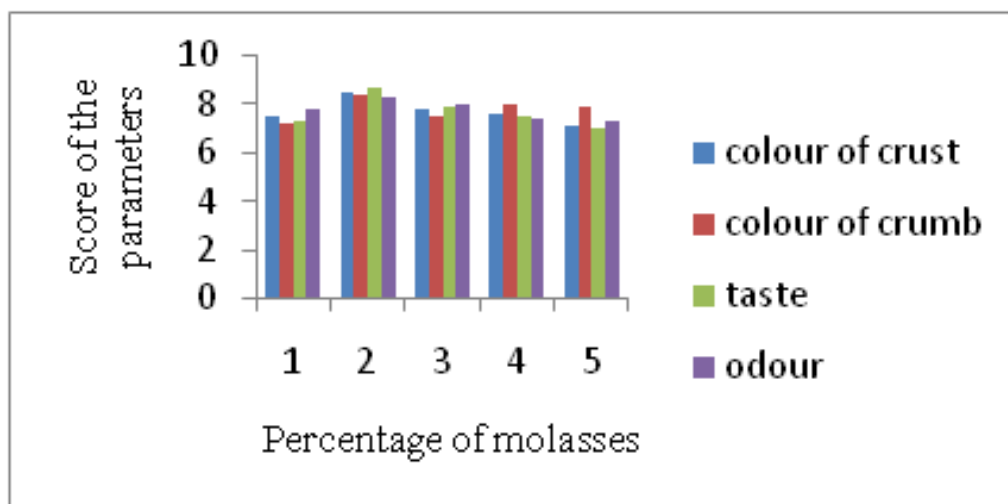


Figure 3. Sensory evaluation of bread (five different concentrations of molasses)

## Conclusions

Molasses is an organic waste product from sugar cane industry which is a source of many economically beneficial products. The current work involves the extraction of such compounds from the molasses. In general, molasses is used as a raw material for production of ethanol. DPPH assay evidently shows that molasses contain antioxidants and hence it showed antioxidant scavenging property. The presence of polyamines in molasses makes it difficult for handling. This can be rectified by performing ultra-sonication. This reduces the formation of super radicals, enhancement of bioavailability and increase in surface volume ratio. From the results of NMR, it has been identified that molasses is a very good source of iron. Molasses has 60% of iron contained in natural honey. In addition to iron, molasses also contain magnesium, potassium, calcium, phosphorous and 18 amino acids. Since molasses is bitter in taste, milk bread is prepared using different concentrations of molasses for the ease of consumption.

From the sensory analysis, 2% molasses containing bread is preferred.

**Declaration:** The author's report no conflict of interest.

**Source of Fund:** Self

**Ethical Clearance:** Nil

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# Personal Health Record Using Cloudcomputing Technology

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## Abstract

Personal Health Record (PHR) empowers the patient to deal with their own therapeutic records in a digitalized and centralized path, which extraordinarily facilitates the storage, access, and sharing of PHR with the development of cloud computing. PERSONAL HEALTH RECORD contains sensitive knowledge that ought to be protected against unauthorized users. In this paper, a novel technique is proposed for access control of PHRs, and leverage RSA (Rivest, Shamir, Adleman) algorithm is used to encrypt each patient's PHR file. Other than the previous works related to secure data outsourcing, focus is made on the multiple data owner scenarios and dividing the users in the PHR system into multiple security domains that significantly reduce the critical management complexity for owners and users. A high degree of patient privacy is guaranteed simultaneously by exploiting multi-authority ABE. This method enables dynamic modification of access policies or file attributes, supports efficient on-demand user/attribute revocation and break-glass access under emergency scenarios.

**Keywords:** Personal health record, cloud computing, access control, RSA algorithm.

## Introduction

In recent years, a personal health record (PHR) has emerged as a patient-centric model of health information exchange. A PHR service allows a patient to create, manage, and control her personal health data in one place through the web, which has made the storage, retrieval, and sharing of the medical information more efficient<sup>[1]</sup>. Notably, each patient is promised full control of her medical records and can share her health data with a wide range of users, including healthcare providers, family members or friends. Due to the high cost of building and maintaining specialized data centers, many PHR services are outsourced to or provided by third-party service providers, for example, Microsoft HealthVault. Recently, architectures of storing PHRs in cloud computing have been proposed in <sup>[2]</sup> <sup>[3]</sup>.

Due to the high value of sensitive personal health information (PHI), third-party storage servers are often the targets of various malicious behaviors which may lead to exposure of the PHI <sup>[4]</sup>.

To ensure patient-centric privacy control over their own PHRs, it is essential to have fine-grained data access control mechanisms that work with semi-trusted

servers. A feasible and promising approach would be to encrypt the data before outsourcing. Basically, the PHR owner herself should decide how to encrypt her files and to allow which set of users to obtain access to each file. A PHR file should only be available to the users who are given the corresponding decryption key, while remaining confidential to the rest of users<sup>[5]</sup>.

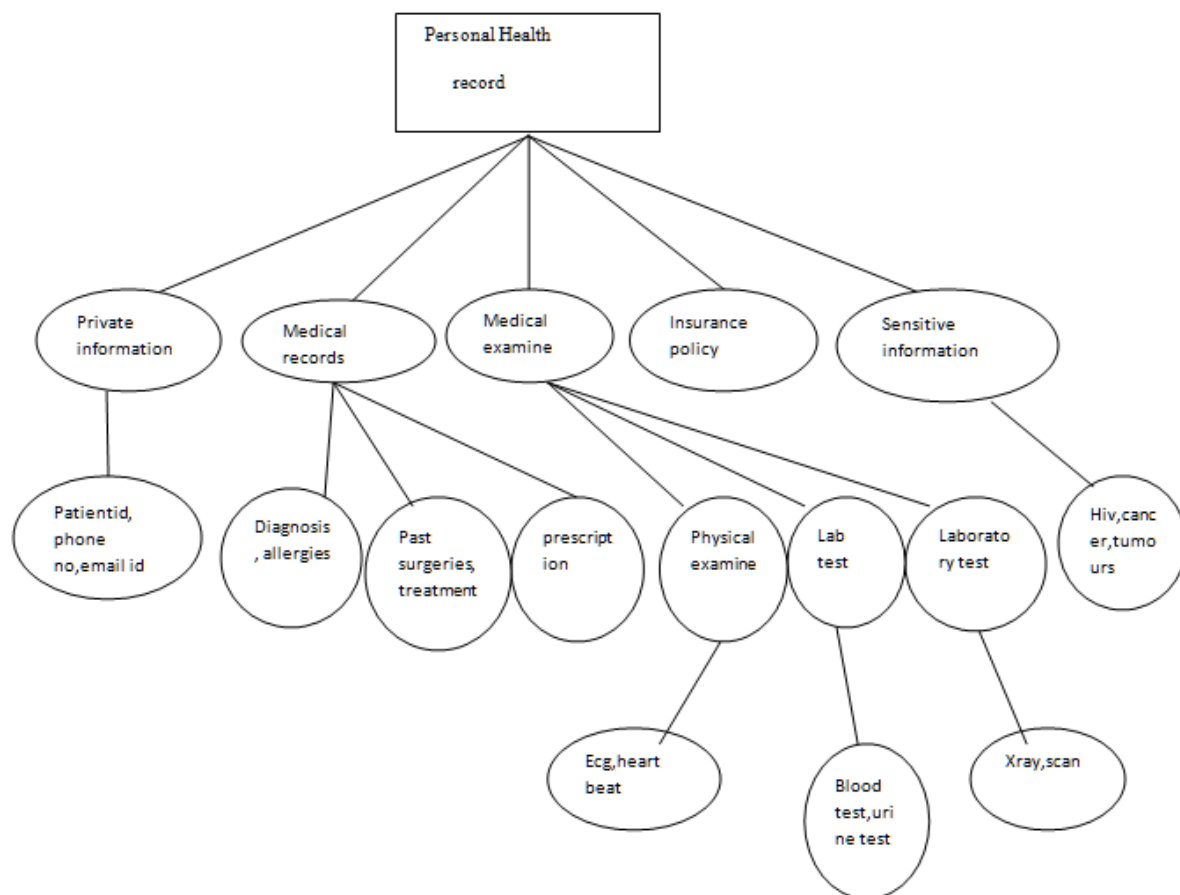
**Personal Health Record:** The term personal health record (PHR) has been connected to both paper-based and processed system; current utilization typically suggests an electronic application used to gather and store health information. An electronic health record associated data on personal health that follows to across the country recognized inhuman operability needs which will be drawn from multiple assets at the identical time as being controlled, shared and managed with the help of the individual. whereas associate degree electronic health record (EHR) could be a computer-based mostly record that originates with and is managed by doctors, a personal health record (PHR) will be generated by a general practitioner, patients, pharmacies and totally different assets however is controlled by the affected person<sup>[6]</sup>.

In figure 1.1 the personal health record model



is based on the role-based access control technique. These techniques introduced many roles like patient information, medical records, medical examine, pharmacy, insurance policy, and sensitive information. This technique will include another method which is called role-based authentication. This method is used for default website will be created the role fields such

as patient information contains name, age, sex,height, weight, patient id,etc.All the personal information are presented here and the medical history contains health conditions, medicated prescriptions, allergies and medical examine contains physical examination ,lab test, laboratory test and insurance policies and sensitive information like HIV, PCOD cancer, tumor etc<sup>[7]</sup>.



**Fig 1: Personal Health Record Model**

In this paper, study on the patient-centric is endeavored, secure sharing of PHRs stored in semi-trusted servers and focus is done on addressing the complicated and crucial challenging management issues. In order to protect the personal health data stored on a semi-trusted server, the RSA (Rivest, Shamir, Adleman) algorithm is adopted as the first encryption primitive. The complexities per encryption, key generation, and decryption are only linear with the number of attributes involved.

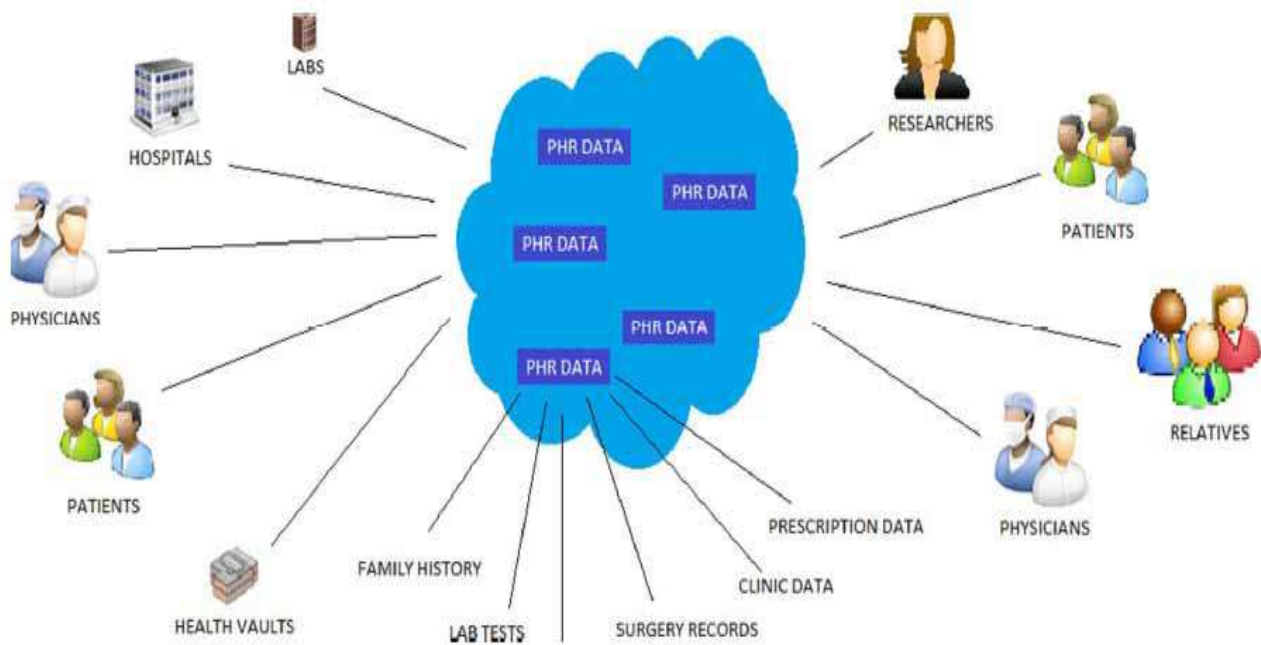
**Personal Health Record (PHR) in Cloud:** Personal Health Record (PHR) is a flourishing online service

model for sharing health information. It helps patients to create, control, and share their health information with other users as well as healthcare providers. The owners, i.e., patients, are ultimately responsible for making decisions about their health. The structure of the PHR is shown in Figure 2. A PHR should be designed to provide complete health information to patients. Also, it should be accessible anywhere, anytime and accurate. Medical records contain compiled health information such as diet plans or data from home monitoring systems, as well as patient contact information, diagnosis lists, medication lists, allergy lists, immunization histories, etc., maintained by healthcare providers<sup>[2][16]</sup>.

The difference occurs in the way a PHR is used to improve the quality of healthcare services. PHR owners play an active role in monitoring their health information in healthcare systems by creating their own PHR. Generally, PHR allows a user to create and track his/her personal data pervasively through the web. It has made the storage, retrieval, and sharing of medical information more efficient. Each PHR user possesses control over their own health data, and they can effectively share their records with a broad range of users, including doctors, family, friends, researchers and insurance agents in a cloud environment.

**The personal health record is logically partitioned into the following five portions. There are:**

- (i) Private Information.
- (ii) Medical Records.
- (iii) Medical Examine.
- (iv) Insurance Policy.
- (v) Sensitive Information.



**Fig 2: Structure of PHR in Cloud**

**Literature Review:** According to previous studies, cryptography algorithms are used in personal health record for security purpose. The authors as in [8] used general framework mechanism for secure sharing of personal health records in cloud. The authors L. Ibraimi, M. Asim, and M. Petkovic [9] are used cipher text policy-attribute based encryption (CP-ABE) scheme. This scheme is used to transfer the encrypted information and solely authorized users who satisfy the access policy will decrypt done the information. The curiosity of our development is that properties can be from two security areas: social space (for example family, companions, or individual patients) and expert area (for example

specialists or medical caretakers). F. Xhafa proposed a multi authority cipher text-policy ABE scheme which has been used for access policy can be hidden and user access privacy has been protected. This scheme can be very secure and efficient<sup>[10]</sup>. C.Leng et al. [11] proposed a methodology is fine grained access control and proposed the technique which is proxy reencryption to enforces sticky policies and furnished clients with compose benefits for PHRs. Whenever clients complete the process of composing information to their PHRs, they sign the altered PHRs. Notwithstanding, clients sign the PHRs utilizing the signature key of the PHR owner and it is along these lines hard to accurately

check who signed the PHR. Prajakta Solapurkar, Girish Potdar are proposed the scheme is patient-centric access control. The purpose of this scheme is confidentiality, integrity, authenticity of personal health data in cloud storage. key aggregate cryptosystem has been used for revocation of access control<sup>[12]</sup>. The authors <sup>[13]</sup> proposed the methodology is sesphr which can be used for securely hold on transmission of the private health records to the approved entities within the cloud storage. PHR owner storing the encrypted data on cloud storage and only authorized person can be access the valid re encryption keys provided by a semi trusted proxy can be decryption of PHR. Personal health records (PHRs) modify customers to electronically store, create, and share their own health data, isolated from electronic or paper medical records maintained by their health care suppliers<sup>[14]</sup>. The authors are proposed the elgamal encryption and proxy encryption scheme can be used for privacy purpose<sup>[15]</sup>.

**RSA Algorithm with Bilinear Group:** In the personal health record system, there are many risks involved in patient security. But the patients are in the dilemma of whether they can share and store their personal records which are stored on a third-party server. The fine-grained access control technique increases the level of security and privacy for the data owners and data entities that can access the data. The technique is very flexible, and it allows access control policies. The fine-grained access control technique is straightforward and efficient to use. So Patients may be comfortable to share their records when their disease is fully cured. Hence all patients wish that their health record is fully secured in order to secure this that is a system called PHR cloud computing system.

**Algorithm:** RSA algorithm is stands for (Rivest, Shamir, Adleman) in 1978 which is used for encrypt and decrypt the data and it is an asymmetric cryptographic algorithm. In this algorithm there are two keys. One is public; another one is private. Every user in the network having both the keys the private key should not sharable between all. It must be kept secret. so only users can use the private key if one key is used in the encryption side and we have to use the other key of the same way in the decryption process the public key is used at encryption, and we have to use a private key of the same user in the decryption process.

The RSA algorithms classified into four processes there are set up, key generation, encryption algorithm,

decryption algorithm.

**Algorithm:**

$$CK = g^x \text{ mod } n \quad \dots(1)$$

$$CK = g^y \text{ mod } n \quad \dots(2)$$

**Setup:** The bilinear mapping group of prime order  $N=PQ$  and  $e: B*B \rightarrow B_1$  is a non-degenerate bilinear map, that is (i) Bilinear: for all  $b_1, b_2 \in B$  and  $y, x, y < L$ ,  $e(b_1^x, b_2^y) = e(b_1, b_2)^{xy}$ . (ii) Non degenerate: for generator  $b$  of  $B$ ,  $e(b, b)$  generator  $B_1$ .

Let  $B_p$  and  $B_q$  denote the subgroups of  $B$  of order  $p$  and  $q$  respectively.

Then  $B = B_p * B_q$ . If  $b$  is a generator of  $B$  then  $bp$  and  $bq$  denote the generators of  $B_p$  and  $B_q$  for all random elements  $L_p \in B_p$  and  $L_q \in B_q$ . So we have  $e(L_p, L_q) = 1$  because  $e(L_p, L_q) = e(bp^x, bq^y) = e(b, b)^{p^x q^y} = 1$  for some generator  $b$  in  $B$ .

**Key Generation:** Generate bilinear group  $B$  of order  $N = PQ$ . public key and private key are generated by the bilinear mapping group, which is  $pk$  and  $sk$ .

$pk = (B, N, b, bp)$  and  $sk = (p)$  here  $pk$  is the public key and  $sk$  is the secret key.

**Encryption:** Enc  $(pk, x)$  here  $pk$  and  $x$  is a public key .

$V < L * n$  and  $F < b^x (bp)^v \in B$ . Here  $V$  is a random variable, and it belongs to  $L * n$  .

Here the random variables  $v_1, v_2, v_3, v_4, v_5 \in L * n$  are generated and variable  $v_i$  is used for encrypting  $i$ th partition of PHR.

$$F_p = L^{v_1} \dots PHR_p \quad (3)$$

Where  $F_{p_i}$  is the semi encrypted file that contains the private information partition as encrypted text.

$PHR_{p_i}$  is private information on personal health records.

$$F_m = L^{v_2} \dots PHR_m \quad (4)$$

$F_{m_r}$  is the semi encrypted file that contains the medical record partition as encrypted text in addition to the  $F_{p_i}$  that was encrypted in the previous step.  $PHR_{m_r}$  is medical record of personal health record.

$$F_{m_i} = L^{v_3} \dots PHR_{m_i} \quad (5)$$

Fme is the semi encrypted file that contains the medical examine partition as encrypted text in addition to the Fpi, Fmr that was encrypted in the previous step. PHRme is medical examine of personal health record.

$$F_p = L^{V_5} \cdot PHR_p \tag{6}$$

Fip

is the semi encrypted file that contains the Insurance Policy partition as encrypted text in addition to the Fpi, Fmr, Fme that was encrypted in the previous step. PHRip is insurance policy of personal health record.

$$F = L^{V_5} \cdot PHR_s \tag{7}$$

F is the completed encrypted file that contains all the partitions in the encrypted form. PHRsi is sensitive information on personal health records.

The above-stated encryptions the client also calculates the following parameters.

$$V_{pi\_p} = b^{V_1 X_p} \tag{8}$$

$$V_{me\_p} = b^{V_2 X_p} \tag{9}$$

$$V_{mr\_p} = b^{V_3 X_p} \tag{10}$$

$$V_{ip\_p} = b^{V_4 X_p} \tag{11}$$

$$V_{si\_p} = b^{V_5 X_p} \tag{12}$$

Here Xp is the private key of the patient and Vis the parameter which is used to produce the re-encryption key for the partition indicates in the subscript of each V and P is the user. The parameters Vpi\_p, Vme\_p, Vmr\_p, Vip\_p, Vsi\_p are transmitted to the re-encryption key along with the file identification for which their parameters are generated.

**Decryption:** Calculates the re-encryption keys (Vk) and V and transmits it to the user I.

$$F_p = [b^x]^p \cdot [b^y]^p = [bq]^x$$

The re-encryption keys and V are calculated below.

$$Vk_{p \rightarrow I} = b^{\frac{x_I}{x_p}} \tag{13}$$

Here xI and xp are the private keys of I and P.

V is the parameter corresponding to the user I are calculated according to the following equations.

$$\begin{aligned} V_{pi\_I} &= e(Vk_{p \rightarrow I}, V_{pi\_p}) \\ &= e(b^{\frac{x_I}{x_p}}, b^{V_1 X_p}) \\ &= e(b, b)^{V_1 X_i} \\ \text{Therefore } L &= e(b, b) \\ V_{pi\_I} &= L^{V_1 X_i} \end{aligned} \tag{14}$$

Where Vpi\_I is the parameter used to decrypt the partition Private Information and it is applicable for the user I. Similarly V parameters for other partitions corresponding to the user I are calculated.

$$\begin{aligned} V_{me\_I} &= e(Vk_{p \rightarrow I}, V_{me\_p}) \\ &= e(b^{\frac{x_I}{x_p}}, b^{V_2 X_p}) \\ &= e(b, b)^{V_2 X_i} \\ \text{Therefore } L &= e(b, b) \\ V_{me\_I} &= L^{V_2 X_i} \end{aligned}$$

$$\begin{aligned} V_{mr\_I} &= e(Vk_{p \rightarrow I}, V_{mr\_p}) \\ &= e(b^{\frac{x_I}{x_p}}, b^{V_3 X_p}) \\ &= e(b, b)^{V_3 X_i} \\ \text{Therefore } L &= e(b, b) \end{aligned}$$

$$V_{mr\_I} = L^{V_3 X_i}$$

$$\begin{aligned} V_{ip\_I} &= e(Vk_{p \rightarrow I}, V_{ip\_p}) \\ &= e(b^{\frac{x_I}{x_p}}, b^{V_4 X_p}) \\ &= e(b, b)^{V_4 X_i} \end{aligned}$$

$$\text{Therefore } L = e(b, b)$$

$$V_{ip\_I} = L^{V_4 X_i}$$

$$\begin{aligned} V_{si\_I} &= e(Vk_{p \rightarrow I}, V_{si\_p}) \\ &= e(b^{\frac{x_I}{x_p}}, b^{V_5 X_p}) \\ &= e(b, b)^{V_5 X_i} \end{aligned}$$

$$\text{Therefore } L = e(b, b)$$

$$V_{si\_I} = L^{V_5 X_i}$$

The above given parameters are provided to the user I that decrypts each of the partitions based on the following equations.

$$V_{pi\_I} = L^{v_1 x_i}$$

$$L^{v_1} = V_{pi\_I}^{\frac{1}{x}}$$

$$F_{pi} = L^{v_1} \cdot PHR_{pi}$$

$$PHR_{pi} = \frac{F_{pi}}{V_{pi\_I}^{\frac{1}{x}}}$$

$$V_{me\_I} = L^{v_2 x_i}$$

$$L^{v_2} = V_{me\_I}^{\frac{1}{x}}$$

$$F_{me} = L^{v_2} \cdot PHR_{me}$$

$$PHR_{me} = \frac{F_{me}}{V_{me\_I}^{\frac{1}{x}}}$$

$$V_{mr\_I} = L^{v_3 x_i}$$

$$L^{v_3} = V_{mr\_I}^{\frac{1}{x}}$$

$$F_{mr} = L^{v_3} \cdot PHR_{mr}$$

$$PHR_{mr} = \frac{F_{mr}}{V_{mr\_I}^{\frac{1}{x}}}$$

$$V_{ip\_I} = L^{v_4 x_i}$$

$$L^{v_4} = V_{ip\_I}^{\frac{1}{x}}$$

$$F_{ip} = L^{v_4} \cdot PHR_{ip}$$

$$PHR_{ip} = \frac{F_{ip}}{V_{ip\_I}^{\frac{1}{x}}}$$

$$V_{si\_I} = L^{v_5 x_i}$$

$$L^{v_5} = V_{si\_I}^{\frac{1}{x}}$$

$$F_{si} = L^{v_5} \cdot PHR_{si}$$

$$PHR_{si} = \frac{F_{si}}{V_{si\_I}^{\frac{1}{x}}}$$

### Conclusion

In this paper, proposed a novel framework is proposed for secure sharing of personal health records in cloud computing. Partially trustworthy cloud servers are considered and discussed to fully realize the patient-centric concept, and patients shall have complete control of their own privacy through encrypting their PHR files to allow fine-grained access. The framework addresses the unique challenges brought by multiple PHR owners and users, which significantly reduces the complexity of key management while enhancing the privacy guarantees compared with previous works. RSA is utilized to encrypt the PHR data so that patients can allow access not only by personal users but also by various users from public domains with different professional roles, qualifications, and affiliations.

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# Knowledge, Coverage and Usage Patterns of Health Insurance in Rural South India

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## Abstract

**Introduction:** Out-of-pocket payments by individual households are the main source of health care financing in India. Contrary to most other consumption expenses, medical expenditure is largely unpredictable both in timing and quantity. Households, especially in low income countries, cope either by divesting their savings, borrowing, mortgaging or selling assets or by forgoing treatment.

**Aim:** To study the knowledge, coverage and usage patterns of health insurance in a rural area of south India.

**Method:** A community based cross sectional study was done in a village in south India. Data was collected by questionnaire method among the heads of the selected households and analysed.

**Results:** This study found that 30.4% households were enrolled in a health insurance scheme. Among the eligible households only 14.5% were aware about government funded health insurance schemes. Highest enrolment was in Sampoorna Suraksha Scheme 33 (47.1%), followed by ESI 21 (30%). Among the enrolled households 118 (51.4%) had utilised it in the past one year.

**Conclusion:** Presently people are getting aware of health insurance, through acquaintances, health insurance agents, mass media etc., but this awareness has not yet resulted in satisfactory levels of enrolment/utilisation. As the results have shown, only 30.4% of households are being covered by some form of health insurance scheme, a large chunk of the population is still financing health care expenditure without health insurance coverage. Moreover it was observed that a large proportion of the eligible households were unaware about Government funded Health insurance schemes.

**Keywords:** Health Insurance, Out of pocket expenditure, Enrolment, Utilisation.

## Introduction

Improvement in health status is vital for the enhancement of human capabilities. Of all the risks

facing poor households, health risks pose the greatest threat to their lives and livelihoods. A health shock adds health expenditures to the burden of the poor. Even a minor health shock can cause a major impact on poor person's ability to work and curtail their earning capacity. Moreover, given the strong link between health and income at low income levels a health shock usually affects the poor the most<sup>1</sup>.

Non-availability of necessary finances is a major obstacle in the health care attainments of people in many developing countries, including India. There is a growing awareness that access to healthcare cannot be free-of-

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charge, due to the low level of government spending on health, nor funded mainly out-of-pocket by care-seekers, due to the regressive effect of this financing mode<sup>2</sup>.

Health Insurance (HI) has emerged as part of the reform drive in many countries, both as a way of augmenting financial resources available for care, and as a means of better linking health demand to the provision of services<sup>3</sup>.

Health insurance in a narrow sense would be ‘an individual or group purchasing health care coverage in advance by paying a fee called premium.’ In its broader sense, it would be any arrangement that helps to defer, delay, reduce or altogether avoid payment for health care incurred by individuals and households<sup>4</sup>.

In this backdrop, the present study is an attempt to understand the

1. Awareness of Health insurance schemes available, particularly government funded among the people.
2. To know the enrolment pattern among the households.

3. To find the utilisation rates & patterns of utilisation.
4. To find the out-of pocket spending on healthcare among the households.

### Material and Method

A cross-sectional study was conducted in Munnur village of Karnataka state in South India. A sample size of 226 was estimated using a prevalence of 17%<sup>5</sup>. A total of 230 households were selected for the study using the probability proportional to size sampling technique. After obtaining an informed consent, the head of the households were interviewed using a pre-tested, structured questionnaire for the collection of data. The first part of the questionnaire contained questions on socio-demographic data like age, sex, religion, occupation, education status, ration card, monthly household income and household size and the second part about awareness, enrolment & utilisation of health insurance schemes and out-of pocket expenditure on healthcare for the entire household. The data collected was analysed using SPSS version 20 software.

### Findings:

**Table 1: Socio-demographic distribution of study population (n=230)**

Socio-Demographicvariables	Variables	Frequency	Percentage (%)
Gender	Male	181	78.7
	Female	49	21.3
Age group (Years)	25-40	62	27.0
	41 – 64	139	60.4
	65 and above	29	12.6
Religion	Hindu	122	53.0
	Muslim	73	31.7
	Christian	35	15.2
Education	Illiterate	35	15.2
	Primary	116	50.4
	Secondary	69	30.0
	Graduate	9	3.9
	Professional	1	0.4
Socio-economic status	APL	78	33.9
	BPL	152	66.1

Table 1 shows that majority of the study subjects were males (79 %), 60% belonged to the age group of 41-64 years, 53% were Hindus, 85% were literate and 66% belonged to BPL families.

Table 2 shows that a majority of the study participants (80%) were aware about health insurance schemes, only (15.7%) were aware about government funded health insurance schemes for the poor, and only (30.4%) had



enrolled in a health insurance scheme, also a majority (73.9%) of them said that health insurance coverage will reduce out of pocket expenditure, and (48.3%) had an OOPE on healthcare of more than Rs. 5000 during the last one year

Table 3 shows that (47.1%) had enrolled in Sampoorna Suraksha scheme, (31.4%) had utilised HI in the past one year, and (42.4%) had used it for surgical causes.

**Table 2: Awareness, enrolment status, opinion & OOPE about health insurance among study population (n=230)**

	Responses	Number	Percentage (%)
Awareness status	Aware	184	80.0
	Not aware	46	20.0
Awareness of Government funded Health Insurance schemes	Aware	36	15.7
	Not aware	194	84.3
Enrolment status in a health insurance scheme	Enrolled	70	30.4
	Not enrolled	160	69.6
Opinion about reduction in OOPE by using health insurance	Helpful	170	73.9
	Not helpful	11	4.8
	Don't Know	49	21.3
Out of pocket expenditure on healthcare in the past one year	Less than 1,000	36	15.7
	1,001 – 5,000	83	36.1
	5,001 – 10,000	59	25.7
	10,001 – 25,000	37	16.1
	25,001 – 50,000	15	6.5

**Table 3: Health insurance enrolment pattern, utilisation rates and type of service availed by the households in the past one year (n=70)**

	Responses	Number	Percentage (%)
Enrolment pattern in health insurance schemes	Sampoorna Suraksha	33	47.1
	ESI	21	30.0
	RSBY	6	8.6
	Voluntary or Private for profit	9	12.9
	National Insurance Company	1	1.4
Utilisation rate of health insurance during the past one year	Once	22	31.4
	Twice	12	17.1
	Thrice	2	2.9
	Not used	34	48.6
Type of service health insurance was used for	Surgical	22	42.4
	Obstetric	5	9.6
	Medical	25	48.0

## Discussion

This community based observational study assessed the knowledge, coverage and usage patterns of health insurance among the rural population in Karnataka, India. In this study majority of the participants were males (79%), 60% belonged to the age group of 41-64

years, 53% were Hindus, 85% were literate and 66% belonged to BPL families.

In this study 80% of the subjects were aware about health insurance schemes. These results are almost similar to a study conducted by Bawa S K et al.<sup>6</sup> (2011), in which 91.3% of respondents were aware about HI.

In this study the first source of information about HI was friends/family among 111 (60.3%) respondents, followed by insurance agent 28 (15.2%), print media 25 (13.6%), electronic media 16 (8.7%) and others 4 (2.2%). These results differ to a study by Bawa S K et al.<sup>6</sup> (2011), in which TV (26.5%), newspaper (21.2%), insurance agent (17.8%), friends (10.5%) and family (6.9%), were the major sources of information. This shows that there are various sources of creating awareness about HI.

During the study it was found that majority of the respondents 194 (84.3%) were unaware of Government funded Health insurance schemes for the poor, while 36 (15.7%) were aware about it.

In this study, majority of the eligible households 130 (85.5%) were unaware of Government funded HI schemes. These results differ to a study by Rajasekhar D et al.<sup>7</sup> (2012), in which the awareness levels for RSBY was 86.5%, Yeshasvini 100% and Vajpayee Arogyashree Scheme 13.9% in the sample households in Karnataka. When asked, majority of the respondents mentioned that Gram Panchayat officials had not communicated about Govt. funded HI schemes to them. The reason for such a low level of awareness in this study may be due to lack of awareness campaigns undertaken by Insurance company and village level government officials in the study area.

In this study, majority of the respondents 170 (73.9%) said that HI helps in reducing OOPE on healthcare. This shows that a large portion of the people knew about the intended benefit of HI schemes.

The study found that 70 (30.4%) households had enrolled in a Health insurance scheme. These results differ with a study by Prinja S<sup>8</sup> (2012), who reported that the proportion of India's population under insurance cover was about 15%.

Thus the enrolment rate in this study is more than most of the studies reviewed; the reason for this could be better penetration of micro health insurance scheme like Sampoorna Suraksha Scheme (SSP) in the study area.

In this study, enrolment was highest in Sampoorna Suraksha Scheme 33 (47.1%), followed by ESIS 21 (30%), voluntary or private for profit 9 (12.9%), RSBY 6 (8.6%) and National Insurance Company 1 (1.4%). SSP was responsible for almost half of the enrolment rate, this may be because a large portion of the women in the study area were members of SKDRDP promoted

self-help groups, which has been active in this area since many years, due to which they had enrolled their families in this scheme<sup>9</sup>.

During the study, it was found that among the 70 enrolled households, Health insurance was utilised by 36 (51.4%) in the past one year. Among them 22 (31.4%) used it once, 12 (17.1%) used it twice and 2 (2.9%) used it thrice. These results differ with the study by Rajasekhar et al.<sup>7</sup> (2012), in which 0.4% of enrolled households had utilised their HI scheme. The reason for this may be because the study by Rajasekhar et al. was done 6 months after commencement of the scheme. Devadasan N et al.<sup>10</sup> (2010) reported that 10% insured individuals, had utilised HI scheme in a period of 12 months. The higher utilisation rate in this study may be due to the proximity of the study area to two Medical college hospitals.

It was also found that the services for which the HI were utilised in the past year by the households enrolled were medical services 25 (48%), followed by surgical 22 (42.4%) and obstetric services 5 (9.6%). Interestingly there was no usage of HI for trauma care.

This study revealed that the OOPE on healthcare among all the households in the past one year was – 83 (36.1%) spent in the range of Rs.1,001 – 5,000, followed by 59 (25.7%) in Rs.5,001 – 10,000, 37 (16.1%) in Rs.10,001 – 25,000, 36 (15.7%) less than Rs.1,000 and 15 (6.5%) Rs.25,001 – 50,000.

Majority of the enrolled households 68 (97.1%) were satisfied with their HI scheme. These results are almost similar to the survey carried out by Research Institute<sup>11</sup> in Kerala, in which more than 90 % of beneficiaries of RSBY were satisfied with the scheme. Grover and Palacios<sup>12</sup> (2011) found that among the beneficiaries of RSBY in Delhi 85% were satisfied with the scheme. A survey by Nabard Consultancy Services<sup>11</sup> among beneficiaries of Yeshasvini scheme found that 90% were satisfied with the scheme. This shows that almost all the people who had HI coverage were happy with its benefits.

## Conclusion

Health Insurance is not a new concept. Presently people are mainly getting aware of it, through friends and family, Health insurance agents, print media, electronic media etc., but this awareness has not yet resulted in satisfactory levels of enrolment/utilisation of HI. As

the results have shown, only 30.4% of households are being covered by some form of health insurance scheme, a large chunk of the population is still financing health care expenditure without health insurance coverage. Moreover it was observed that a large proportion of the eligible households were unaware about Government funded Health insurance schemes. It was found that almost all the households covered by Health insurance schemes were satisfied with the services provided and were willing to continue with the scheme they have opted for. More intensified efforts should be made to educate the public about government funded health insurance schemes among the beneficiaries which will help in reducing the OOPE on healthcare in India.

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# Role of Intrinsic Motivation in Eating Habits and Physical Activity in Adults with Primary Hypertension

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## Abstract

Eating habits and physical activities are identified as the major, modifiable risk factors of hypertension. However, management of these risk factors is reportedly mediated by the motivation levels of the individual. This study aims to examine the role of intrinsic motivation in eating habits and physical activity in adults with primary hypertension. The study includes 140 adults with primary hypertension recruited from community based private hospitals through purposive sampling method. They were divided into two equal groups based on the level of intrinsic motivation (high intrinsic motivation = 70 and low intrinsic motivation = 70). Patients were asked to fill questionnaire that included questions related to their motivation eating habits, food choice and physical activity. Results of study indicated that there is a significant difference between high intrinsic and low intrinsic motivation groups in their food choice and eating habits. And there was no significant difference found between high intrinsic motivation group and low intrinsic motivation group with regard to physical activity. This study suggests that motivation alone is not a valid indicator of physical activity. Hence the interventions need to focus beyond motivational analysis when targeting physical activities among those with primary hypertension.

**Keywords:** *Intrinsic motivation, Eating habits, Physical activity, Primary hypertension, Adults.*

## Introduction

Hypertension is the leading non communicable disease and is estimated to be the cause of mortality in nearly 10 per cent of all deaths in India [1].

Prevention, early diagnosis, and control of hypertension can be done with the help of targeting the modifiable risk factor [2].

The risk factors for hypertension are varied. Risk factors are distinguishable into modifiable, and unmodifiable. Unmodifiable risk factors are inbuilt and cannot be altered such as age, ethnicity and family history etc, and modifiable risk factors include changes in various lifestyle habits, such as, physical activity, alcohol consumption, smoking and high salt intake. Psychosocial stresses such as work stress seem to affect hypertension [3].

Dietary habits (e.g. salt intake, fruit and vegetable intake) are the most important modifiable risk factors for hypertension. The Scientific Advisory Committee on Nutrition [4] suggests an association between high salt intake and elevated blood pressure. Similarly unhealthy diets along with physical inactivity are two of the main risk factors of many chronic diseases. An unhealthy diet is an independent risk factor of chronic disease in itself. Up to 2.7 million lives could be saved annually with sufficient fruit and vegetable consumption. Low fruit and vegetable intake is among the top 10 selected risk factors for global mortality. Worldwide, low intake of fruits and vegetables is estimated to cause about 19% of gastrointestinal cancer, about 31% of ischaemic heart disease and 11% of stroke are occurring due to less consumption of fruits and vegetables [5]

Physical activity is one of the ways to prevent the blood pressure. It is the bodily movement produced

by skeletal muscle that requires energy expenditure. Physical inactivity has an indirect association with the development of hypertension through its association with risk factors such as obesity, insulin resistance, and hyper insulinemia [6]. Physical activity may be as or even more important than pharmacotherapy for reducing the risk of mortality in adults with hypertension [7].

There are several models which explains about why people do or do not engage in various health enhancing activities. Some theories focus on the cognitive antecedents of motivation such as knowledge, attitudes and beliefs. For example, the health belief model suggests that people are motivated to change their health behaviours by specific beliefs about their susceptibility to a particular disease and about its likely severity. The Theory of Reasoned Action suggests that beliefs about the outcomes of the behaviour and the value they attach to these outcomes and at subjective norms are important motivating factors [8].

Motivation may be internally or externally driven. Many psychological theories identify motivation as an important behavioural determinant. "Motivation is an inner drive to behave or act in a certain manner, the inner conditions such as wishes, desires, goals, activate the person to move in a particular direction"<sup>[9]</sup>. Intrinsic motivation is entailed whenever people behave for the satisfaction inherent in the behavior itself, even when there are no attractive external agents such as rewards<sup>[10]</sup>. The association between intrinsic motivation and physical activity was investigated by different researchers. Perceptions of personal responsibility were associated with more intrinsic motivation toward physical education and a higher stage of physical activity<sup>[11]</sup>.

Diet and nutrition are major determinants of population health. At the individual level the determining eating behaviors are taste preferences, nutrition knowledge, attitudes and intentions [12]. Unsatisfactory hypertensive control was related to food intake and eating habits which includes high salt diet, coffee consumption and inadequate milk intake [13]. Still there is a little literature regarding why people don't engage in health promoting behaviors and do not have control over their risk behaviour and literature also suggests that intrinsic motivation as an important behavioural determinant but there is little literature in this regard in the Indian setting, so present study aimed at assessing the role of intrinsic motivation in eating habits and physical activity

## Method

**Plan and Design:** The design of the study is descriptive design with the independent variable being intrinsic motivation and dependent variables eating habits and physical activity.

**Participants:** The sample was drawn from the adults with primary hypertension population aged between 30 to 70 years (M=49.2, SD=9.28), from various hospitals of Hyderabad, Andhra Pradesh. The sample consisted of 140 (high intrinsic motivation group = 70 and low intrinsic motivation group =70). Purposive sampling technique with snowball method was used to select the participants. The inclusion criteria for the sample were that the age group is between 30-70 years, with a medical diagnosis of primary hyper tension and/or on antihypertensive medication and able to give informed consent. The exclusion criteria for the sample were age below 30 years and above 70 years, patients diagnosed with secondary hypertension, and patients with psychiatric disorder.

**Tools:** Global Motivation Scale, Food Choice questionnaire, Leisure Time Physical Activity Questionnaire.

**Procedure:** In order to select the sample, the hospitals in Hyderabad were approached and a detailed explanation about the study was given to the hospital authority. An informed consent was received from the hospital authority and patients were selected by asking the patients about their diagnosis and from case sheets. After that informed consent was taken from the patient and given detailed information about the study, objectives, its scope, ensured them the confidentiality regarding the information which they are going to share. After the instructions were given, the participants were handed over the questionnaires and were asked to fill in the response. First, the Intrinsic Motivation Subscale of Global Motivation Scale was used to identify the level of motivation. Then the other two tools were administered.

**Statistical Analysis:** The obtained data from the sample was analyzed with the help of Statistical Package for Social Sciences for Windows Version 20.0 (SPSS 20.0). Descriptive statistics, t-test, Mann– Whitney U test were applied as per their basic assumptions. t-test was performed to study the group differences where there were two independent groups

## Results

Table 1 shows the distribution of demographic details of the two study groups, where there were 70 participants in each group. In the groups of high motivation and low motivation, percentage of both the males and females were found to be equal (male 64.28% and female 35.71%). In the group with high intrinsic motivation there is more number of participants with primary education and secondary education (42.5% and 37.71%) as compare to the group with low intrinsic motivation. In the group with high intrinsic motivation there were more participants who were self-employed (40%) as compare to the group with low intrinsic motivation.

Table 2 shows, distribution eating and dietary habits of two study groups. Though it was found that majority of the both groups did not report taking regular meals outside home, a higher percentage (27.14%) of people from low motivation group took meals outside as compare high motivation group. Further, the low motivation group had higher percentage (32.85%) of people who reported weight gain in the last one year as compare to high intrinsic motivation group. And both groups tried various dietary restrictions such as low salt diet, low fat diet and low spicy diet.

Table 3 shows the results of t test done to find out the group differences on food choice and eating habits. Significant differences were noted on health dimension between high motivation and low motivation groups ( $t_{138}=4.92$ ,  $p < .01$ ). The high motivation group ( $M=16.43$ ;  $SD=2.52$ ) was found to have the higher mean score compared to low motivation group ( $M=14.26$ ;  $SD=2.69$ ). In the dimension of convenience significant differences were found between high motivation and low motivation groups ( $t_{138}=2.33$ ,  $p<.05$ ). The high motivation group ( $M=14.40$ ;  $SD=2.68$ ) was found to have the higher mean score as compared to the low motivation group ( $M=13.33$ ;  $SD=2.73$ ). In the dimension of natural significant differences were found between high motivation and low motivation groups ( $t_{138}=2.20$ ,  $p<.05$ ). The high motivation group ( $M=7.14$ ;  $SD=2.04$ ) was found to have the higher mean score as compared

to the low motivation group ( $M=6.41$ ;  $SD=1.85$ ). In the dimension of price significant differences were found between high motivation and low motivation groups ( $t_{138}=2.24$ ,  $p<.05$ ). The high motivation group ( $M=8.87$ ;  $SD=2.32$ ) was found to have the higher mean score as compared to the low motivation group ( $M=7.90$ ;  $SD=2.78$ ). In the dimension of weight control significant differences were found between high motivation and low motivation groups ( $t_{138}=2.47$ ,  $p<.05$ ). The high motivation group ( $M=7.83$ ;  $SD=3.06$ ) was found to have the higher mean score as compared to the low motivation group ( $M=6.77$ ;  $SD=1.84$ ) and no significant difference was found between the groups on mood, sensory appeal familiarity and ethical concern dimensions. It indicates that the high motivation group had consistently higher scores in the domains of health, convenience, natural content, and price and weight control.

Table 4, to test the group differences Mann-Whitney U Test was conducted because the variance between the groups was larger as indicated by the Mean and SD values of the physical activities of the two groups (high motivation group  $M=6.28$  and  $SD=19.64$  and low motivation group  $M=2.14$   $SD=8.86$ ). Table 5 shows the mean ranks of the two groups for the number of days involved in physical activity in three months. The group difference was not significant ( $Z=-1.20$ ). It implies that both the groups did not differ significantly on physical activity.

Table 5 shows reasons for not following regular physical activity. Both the groups reported work related constraints, family responsibilities and lack of time as reasons in that order for not indulging in physical activity. In high motivation group, 11.42% reported no time as a reason or not indulging in physical activity as compare to 2.85% of low motivation group. Sixty percent of high motivation group and 52.85% of low motivation group cited work related constraints as a reason for not indulging in physical activity. Further, 28.57% of the high motivation group and 44.28% of the low motivation group reported family responsibilities as a reason for not following regular regimen of physical activity.

**Table 1: Demographic details of the two study groups.**

Socio-demographic variables		High-motivation Group n (%)	Low-motivation Group n (%)
Gender	Male	45 (64.28)	45 (64.28%)
	Female	25 (35.71)	25 (35.71%)
Education	No education	9 (12.8%)	19 (27.1%)
	Primary education	30 (42.85%)	28 (40%)
	Secondary education	25 (35.71%)	20 (28.57%)
	Intermediate and above	6 (8.57%)	3 (4.28%)
Occupation	Government	4 (5.71%)	2 (2.85%)
	Private	9 (12.8%)	19 (27%)
	Self employed	28 (40%)	25 (35.71%)
	Causal labor	13 (18.57%)	9 (12.85)
	House wife	15 (21.42%)	4 (5.71%)
	Others	1 (1.42%)	1 (1.42%)

**Table 2: Group differences on eating and dietary habits**

Eating Habits		High motivation group n (%)	Low motivation group n (%)
Do you take meals out side	Yes	10 (14.2%)	26 (27.14)
	No	60 (85.71)	44 (62.85)
Has weight changed in the last year	No	42 (60%)	33 (47.14%)
	Yes, I gained in kgs	12 (17.15%)	23 (32.85%)
	Yes, I lost in kgs	16 (22.85%)	14 (20.00%)
Kinds of diets tried to manage hypertension	Low salt diet	40 (57%)	39 (55.71%)
	Low fat diet	29 (41.4%)	28 (40%)
	Low spicy diet	1 (1.42%)	3 (4.28%)

**Table 3: Group difference in factors determining the food choice and eating habits of the study groups**

Dimensions	High-motivation Group		Low-motivation Group		t-test (df=138)
	M	SD	M	SD	
Health	16.43	2.52	14.26	2.69	4.92**
Mood	14.63	3.21	13.69	3.52	1.65
Convenience	14.40	2.68	13.33	2.73	2.33*
Sensory appeal	7.06	2.09	6.69	1.81	1.12
Natural content	7.14	2.04	6.41	1.85	2.20*
Price	8.87	2.32	7.90	2.78	2.24*
Weight control	7.83	3.06	6.77	1.84	2.47*
Familiarity	7.37	1.80	7.14	1.76	.75
Ethical concern	6.54	2.51	6.31	2.26	1.60

\*p &lt; .05, \*\*p &lt; .01

**Table 4: Showing the difference in physical activity in two groups**

Groups	N			Mann –Whitney		P
		Mean rank	Sum of ranks	U	Z	
High motive	70	68.36	4785.00	2300.00	-1.20	.230
Low motive	70	72.64	5085.00			

**Table 5: Reasons for not doing physical activity**

Reasons	High-motivation Group n (%)	Low-motivation Group n (%)
No time	8 (11.42%)	2 (2.85%)
Work related constraints	42 (60%)	37 (52.85%)
Family responsibilities	20 (28.57%)	31 (44.28%)

**Discussion**

Hypertension is the most prevalent risk factor for cardiovascular disease in elderly people. But the age of onset is gradually decreasing across the globe. However, improved dietary habits and other lifestyle factors, such as physical activity, can reduce its prevalence. Physical activity and intrinsic motivation are complimentary to each other in managing hypertension; together they mediate one’s personal responsibility in expecting good health. Strong beliefs that physical activity can manage hypertension; and one’s own confidence to continue physical activities without relapse could further enhance motivation to control hypertension. Motivation to change unhealthy eating habits, taste preferences, nutrition knowledge, attitudes and intentions has an impact on hypertension status. Therefore this study is aimed at understanding how food and eating habits and physical activity vary with intrinsic motivation in regard to hypertension.

**Role of intrinsic motivation in eating habits:**

This study establishes the significant difference between high intrinsic and low intrinsic motivation groups in their food choice and eating habits. Nine dimensions were covered to see the difference in eating habits and food choice between high intrinsic and low intrinsic motivation groups. They are health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, ethical concern. The significant differences were found in five of the following dimensions: health, natural content, price, weight control and convenience.

In the dimension of health, there is a significant difference between high intrinsic and low intrinsic motivation groups. This indicates that people with high intrinsic motivation are concerned more about their health. This finding is supported by a few studies which suggest that health-related expectations could mediate the food intake and eating habits [14]. This finding strengthens the earlier findings that people with high intrinsic motivation choose the food which contains

vitamins, minerals, proteins, nutrients which keeps them healthy in order to control the disease avoidance and maintain a better physical well-being [15].

Significant difference was found in this dimension between high motivation and low motivation groups in the domain of natural content, which reflects concerns with the use of additives and the selection of natural ingredients. People with high motivation choose the food which contains natural ingredients and no additives as compare to low motivation people. Combing this trend with the above, we may infer that people with high intrinsic motivation seek out food that is healthy and has optimum natural content and has minimal or no additives. This finding corroborates with the earlier studies that people who are knowledgeable about their health and are motivated to maintain health usually search for specific food components and positive health message included in label claims [16].

Price is an obvious influence on food choice. The cost of food is an important element in selection among people with low income compared with those that are better. In this dimension there is a significant difference between high motivation group and low motivation. People with high motivation group prefer food which is not expensive and they manage the budget and purchase the food which helps them maintain better health. Perceived worth of food i.e., getting the most out of their money or the value for money is an important factor for those who are health conscious[15].

In the dimension of weight control there was a significant difference between high intrinsic and low intrinsic motivation groups this could be because people with high intrinsic motivation practicing caloric restriction favor natural foods such as raw vegetables over prepared dishes and low fat diet which helps them to control weight and keeps them healthy as compared to low motivation groups. Significant difference between high intrinsically motivated people and low intrinsic motivated people could be explained by the consumption



of low fat foods for weight control by former group [17]. Controlling weight might be considered not only as “physical image model of healthiness” by avoiding overweight, but a consequence of greater knowledge of the impact of weight control in reducing the incidence of certain illnesses [18].

The mood dimension covers the constructs like general alertness and mood, as well as to relaxation and stress control. In this dimension, no significant difference was found between high motivation group and low motivation group. This may imply that both groups are similar when choosing the food which alleviates their mood and make them to feel good. Or, mood may not be an important variable in determining the eating behaviours and food choices.

The convenience dimension includes concepts like, purchasing and preparing food. Significant difference was found in this dimension between high motivation and low motivation groups. It means that high motivation group prefers food that is easy to prepare and cook. Convenience takes precedence over health, then education and information about healthy food that is also readily available and easy to prepare might be of greater value than messages emphasizing health alone. Time as a commodity to be spent or saved, weighing the value of convenience in terms of time in negotiation with other values such as ease of access or preparation [16]. Therefore, there is a need to make healthy foods conveniently accessible.

In the sensory appeal dimension, which refers smell, taste and appearance of food, no significant difference was found between high motivation and low motivation groups. This finding is supported by an earlier study which indicates found that health motives were negatively correlated with convenience; while health and sensory appeal (i.e. pleasure) were unrelated [19]. It means that sensory appeal of food does not vary with the motivation of the groups when food choices are made.

In the dimension of familiarity and there is no significant difference is seen between high motivation and low motivation groups. It reflects how important it is for the person to eat their accustomed food and diet, rather than being adventurous in food choices. From the results it can be inferred that both the groups were not concerned about the familiarity of the food.

The above findings indicate that people with high intrinsic motivation seek foods that are healthy, high on

natural content; that gives value for money, and regulates health and weight. Therefore, efforts may be focused on educating about the foods that facilitate health, bodily wellbeing and minimize specific risks. At a larger level there is a need for clear labeling of food informing the buyer about the natural content, additives, price tags, possible risks so that they make informed choices in selecting food items and modifying food habits.

Health and weight control dimension falls more internal to the individual level or within the purview of the individual. So individual efficiency could be enhanced by evaluating the variables knowledge of diseases, health related motivation, health related self-efficacy and disputing health related myths and health related negative beliefs in the context of food choices and eating behaviors and hypertension.

#### **Role of intrinsic motivation in physical activity:**

There was no significant difference between high intrinsic motivation group and low motivation group with regard to physical activity which may indicate that sedentary behavior, lack of self-efficacy for physical activity, and lack of perceived health in adults with hypertension is still a common phenomenon [20]. Reasons given by study groups for not doing physical activity were work related constraints, family responsibility and lack of time, in that order. These findings are supported by several other studies that lack of enjoyment associated with physical activity, lack of self-determination to engage in physical activity and lack of perceived effectiveness in physical activity might explain the physical inactivity in the both the groups [21]. Physical inactivity by the both groups could be related to intentional level, lack of perceived competence in them, lack of intention and perceived success by engaging in physical activity [22]. Some studies also explain that lack of stronger beliefs towards physical activity; and perceiving physical activity as functionally inconsequential in managing disease may result in poor physical activity levels [23]. Lack of perceived personal responsibility in managing diseases could also explain the physical inactivity in both the groups [24]. Lack of significant association between intrinsic motivation and engaging in physical may imply several reasons: one, motivation alone is not sufficient; two, physical activity is not a need as compared to food and hence not many shall perceive it as something important that needs to be modified. Realizing the importance and benefits of physical activity, it is important to understand the factors other than motivation. Though it is not within the scope

of this study, it is apt to note that studies indicate gender, income, previous experience, self-efficacy are some of the important factors that influence physical activity.

### Conclusion

On a concluding note, the present study examined the role of intrinsic motivation in eating habits and physical activity among adults with primary hypertension. findings revealed that, In the context of hypertension, those with high intrinsic motivation shape their eating habits and food choices based predominantly on health parameters, convenience, and natural content, value for money and weight control. Factors such as mood, familiarity, sensory appeal and ethical concern may not be mediated by intrinsic motivation in the context of hypertension. Even studies reported that motivation as an important behavioural determinant in the present study findings revealed Motivation, particularly, intrinsic motivation, may not help us understand the physical activities of hypertensive. Therefore, we need to understand that motivation based psychological strategies may help guiding the eating habits and food choices but not the physical activities. These findings may be considered while preparing comprehensive psychological interventions for the hypertensive.

**Limitations and future directions:** This study has its own limitations. The primary one is the sampling technique- purposive sampling, which will limit generalizations. Illness related factors such as onset, duration, knowledge of illness were not considered. Future studies may consider these limitations. Nevertheless, the present findings may be utilized in designing intervention strategies to improve healthy eating habits and physical activity.

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# The Combination of Transcranial Direct Current Stimulation (tDCS) and TENS - Its Effectiveness on Pain and Functional Outcomes in Knee OA Patients: A Pilot Study

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## Abstract

The goal of the study is to investigate the effectiveness of combination of Transcranial direct current stimulation (tDCS) and TENS on pain and functional outcomes in patients with knee osteoarthritis. Study Design: 4-arm parallel group, participant blinded; sham (placebo) controlled randomized trial. Sampling: Simple random Sampling. Sample: 40 patients based on the inclusion and exclusion criteria were recruited and randomized into following four groups: Active tDCS/active TENS (group 1), Sham tDCS/active TENS (group 2), Active tDCS/sham TENS (group 3), Sham tDCS/sham TENS (group 4). Procedure: tDCS 2 mA on M1-SO montage and High frequency TENS at 100 Hz for 20 min for 5 consecutive days followed by supervised exercise sessions for next 5 weeks. Outcome variables: Pain, Six minute walk test and self-reported questionnaire KOOS. Result: Significant pain reduction and functional improvement in Active tDCS/Sham TENS group. Conclusion: tDCS effective in reduction of pain and improving the functions and quality of life. However use of tDCS in isolation or in combination with TENS should be further investigated.

Trial Registration: CTRI/2018/02/012027.

**Keywords:** *Transcranial direct current stimulation, TENS, Osteoarthritis, Knee.*

## Introduction

Osteoarthritis (OA) of knee joint is a standout amongst the various reasons for musculoskeletal pain and disability. As persistent pain is common in OA, this causes maladaptive neuroplastic changes in the brain and at the spinal cord<sup>1,2</sup>. A recent study displaying the MRI findings has shown that there is bilateral decrease in volume in the somatosensory, insular, and motor cortices along with many structural and functional changes in the primary motor cortex (M1) area in patients with knee OA. Therefore, interventions that have potential to reorganize the cortex may result in reduction of pain and improvement in function<sup>3</sup>.

Transcranial direct current stimulation (tDCS) a non-invasive neuro-modulatory technique is researched extensively to treat pain in various chronic pain conditions<sup>4</sup>. Various studies have already proved the effectiveness of TENS in reducing pain in the cases of knee OA<sup>5,6</sup>. Therefore tDCS along with the TENS can

be used in treating the OA knee and the effects of the combination can be explored further.

Priming the brain to reach an optimal state of excitability is already experimented in a study using tDCS in combination with the TENS in chronic low back pain patients<sup>7</sup>. Application of low amplitude currents induces changes in the neuronal membrane potential<sup>8,9</sup> and releases endogenous opioids in the mid anterior cingulate cortex and periaqueductal grey matter<sup>10</sup>, and the high-frequency TENS manages the pain by segmental inhibition in the pain gate<sup>11</sup> and descending pain suppression via  $\mu$ -opioid mechanisms<sup>12,13</sup>. Thus, the cortical effects produced by tDCS and spinal and peripheral effects are obtained by TENS may produce superior decrease in pain. Therefore, this study aims at i) whether the combination of tDCS and TENS will reduce pain to greater extent, improve function and overall quality of life (QoL) in patients of knee OA ii) to provide data for sample size estimation for a fully powered trial.

## Method

**Design, Participants and method:** The present study is 4-arm parallel group, participant blinded; sham (placebo) controlled randomized trial.

The trial registration, study design and the procedure are published in the protocol study for the trial<sup>14</sup>.

**Data Analysis:** Data distribution was tested for normality (Shapiro Wilk test). The analysis was performed according to principle of intention-to-treat. Missing data were not replaced. ANOVA was done to find the between group differences from baseline to post intervention scores of each outcome. Post hoc comparisons were done. Repeated measure ANOVA was used to compare within group differences from baseline to post intervention scores of each outcome.

## Result

**Pain (VAS):** Group 2 (Active tDCS/Sham TENS) has 1.20 less pain than group 3 (Sham tDCS/Active TENS) at the baseline MD= -1.20 95% CI (-2.14, .252). At week 1 group 1 has 1.40, Group 2 has 1.23 and group 3 has 1.08 less pain than group 4 with aMD= -1.40 95% CI (-2.47, -.328), MD -1.23 (-2.30, -.158), -1.08 (-2.152, -.008) respectively. At week 2 group 1 has 1.51 group 2 has 1.57 and group 3 has 1.52 less pain as compared to group 4 with a MD= -1.51 (-2.50, -.515), -1.57 (-2.56, -.575), -1.52 (-2.51, -.525) respectively. At week 6 group 1 has 1.42, group 2 had 1.52 and group 3 had 1.45 less pain as compared to group 4 with a MD= -1.42 (-2.44, -.399), -1.52 (-2.54, -.499), -1.45 (-2.47, -.429) respectively.

**Functional Improvement:** The functional improvement measured through six minute walk test showed no significant improvement in any of the four groups at any time points.

**Quality of life:** KOOS subgroup variables of symptom showed group 2 has 12.7 higher score than group 4 at week 1 MD= 12.70 95% CI (3.03, 22.37). At week 2 group 1 has 10.2 more scores than group 4 with a MD= 10.20 95% CI (.69, 19.71) and 13.4 higher score than group 4 at week 6 with a MD= 13.40 (1.03, 25.77). At week 2 group 2 has 14.70 more scores than group 4 with a MD= 14.70 (5.19, 24.21) and 17 more scores than group 4 at week 6 with a MD= 17.00 95% CI (4.63, 29.37). In the KOOS pain variable only Group 2 has significant improvement and has 12.5 more scores than group 4 at week 1 MD=12.50 95% CI (.47, 24.53),

13.6 higher scores at week 2 and 6 with a MD=13.60 (1.46,25.74) and MD= 13.60 95% CI (1.44, 25.76) respectively. KOOS function scores showed significant improvement in group 2 and has 10.7, 10.5 and 11.4 higher scores as compared to group 4 at week 1,2 and 6 with a MD= 10.70 95% CI (1.02, 20.38), MD= 10.50 95% CI (1.76, 19.24) and MD= 11.40 (.31, 22.49) respectively. Group 1 also showed significantly higher scores by 11.7 as compared to group 4 at week 6 with a MD= .61, 22.79). KOOS sports function variable showed significant improvement only in group 4 as compared to group 1 at the baseline values with a MD= 17.90 95% CI (40.12, 31.68) and no improvement thereafter at any time points in any of the groups. There was no significant improvement in KOOS quality of life variable in any of the groups.

## Discussion

The result showed that the participants in the Group 1 (Active tDCS/Active TENS) had maximum reduction in pain at the week 1 as compared to group 2 and 3. However, the reduction in VAS score was slightly higher as compared to the group 1 (Active tDCS/Active TENS) and group 3 (Sham tDCS/Active TENS) at week 2 and 6 showing the consistent effect (short and long term) of the interventions. The functional improvement was not significant in any of the groups. The reduction in pain can be attributed to the use of M1-SO montage that might have induced the analgesic effects by modulating M1 thalamic inhibitory connections involved in pain processing pathways in these patients. Previous studies have also reported the reduction of pain by application of M1-SO montage by modulating the activities in areas involved in pain processing and by facilitating descending pain inhibitory mechanisms<sup>15,16</sup>. The effectiveness of M1-SO montage stimulation paradigm in reduction of pain has been described in various studies. Fregni et al 2006 showed significant reduction in pain with anodal stimulation over C3 position in female patients with fibromyalgia<sup>17</sup>. Mori et al 2010 reported significant improvement in pain with the same montage in adults with multiple sclerosis<sup>18</sup>. It was conceptualised previously that the OA is a regional pain condition in which the symptoms are produced because of the pathology in the periphery, but the studies have shown that the intensity of pain does not co-relate with the severity of structural damage or the presence of inflammation<sup>19,20</sup> suggesting the involvement of central pain processing in OA patients. Various studies have also demonstrated alteration in the central pain processing

in patients of OA<sup>21</sup>. A study reports that the reliable cortical and subcortical neurophysiological response to tDCS with this montage<sup>22,23</sup> and demonstrates increase in regional cerebral blood flow response to mechanical pain stimulation in multiple areas of brain like cingulate, insula, thalamus, amygdala and putamen<sup>24,25</sup> supporting the finding of altered pain processing system in patients of OA. In the KOOS subscales of symptom both the group 1 and 2 both showed improvement, but the improvement was greater in group 2. In the KOOS subscale of pain and function only the group 2 (Active tDCS/Sham TENS) have shown significant improvement. The use of tDCS in combination with TENS or in isolation must be explored further in order to elaborate the effectiveness of the tDCS to be used as an independent tool to modulate the pain or to be used as a priming intervention that accentuates the effect of subsequent interventions for managing the symptoms of knee osteoarthritis.

### Conclusion

The use of tDCS in combination with TENS or in isolation must be explored further in order to elaborate the effectiveness of the tDCS to be used as an independent tool to modulate the pain or to be used as a priming intervention that accentuates the effect of subsequent interventions for managing the symptoms of knee osteoarthritis.

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# A Study on Epidemiology and Its Models

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## Abstract

Epidemiology, the study of disease transmission is the review and analysis of the patterns, causes, and impacts of health and disease conditions in characterized population. In this paper we have presented a deep study about Epidemiology and its models since it is the foundation of human health. From this study it is clearly observed that in the literature there is no sufficient papers or works available related to epidemiology and very few papers have been published comparing to other research areas and out of that no paper presents an accurate model for calculating the disease transmission specifically about basic reproduction rate, and final size of the epidemic. Hence it is good to promote more number of researches in the future related to Epidemiology.

**Keywords:** *Epidemiology, disease transmission, susceptible, Infectious, Recovered.*

## Introduction

Epidemiology, the study of disease transmission is the review and analysis of the patterns, causes, and impacts of health and disease conditions in characterized populaces. It is the foundation of public health, and shapes approach choices and confirmation based practice by distinguishing hazard elements for disease and focuses for preventive healthcare. Disease transmission specialists help with study design, collection, and statistical analysis of information, correct elucidation and scattering of results (counting peer audit and infrequent methodical survey). The study of disease transmission has created procedure utilized as a part of clinical research, public health examinations, and to a lesser degree, fundamental research in the natural sciences<sup>1</sup>. Significant zones of epidemiological review incorporate disease etiology, transmission, flare-up examination, disease observation, measurable the study of disease transmission and screening, biomonitoring, and correlations of treatment impacts, for example, in clinical trials.

Disease transmission specialists depend on other logical orders like science to better comprehend disease forms, measurements to make productive utilization

of the information and make suitable determinations, sociologies to better comprehend proximate and distal causes, and designing for presentation evaluation. The foundation and spread of irresistible diseases is a mind boggling marvel with many cooperating components, e.g., the earth in which the pathogen and hosts are arranged, the population (s) it is presented to, and the intra-and between elements of the populace it is presented to. The part of the scientific study of disease transmission is to show the foundation and spread of pathogens. A transcendent technique for doing as such, is to utilize the thought of abstracting the populace into compartments under specific suspicions, which speak to their health status as for the pathogen in the framework.

**The SIR Model:** The SIR model marks these three compartments S = number susceptible, I = number infectious, and R = number recovered (resistant). This is a decent and straightforward model for some infectious ailments including measles, mumps and rubella. The letters likewise speak to the number of individuals in every compartment at a specific time. To demonstrate that the numbers may differ after some time (regardless of the possibility that the aggregate populace estimate stays steady), we make the exact numbers a component



of t (time): S (t), I (t) and R (t). For a particular ailment in a particular populace, these capacities might be worked out keeping in mind the end goal to foresee conceivable episodes and bring them under control. The SIR model is dynamic in three senses. As suggested by the variable function of t, the model is alterable in that the numbers in every compartment may change after some time. The significance of this dynamic perspective is most clear in an endemic illness with a short infectious period, for example, measles in the UK preceding the presentation of a vaccine in 1968. Such maladies have a tendency to happen in cycles of episodes because of the variety in number of susceptibles (S (t)) after some time. Amid a pandemic, the quantity of susceptible people falls quickly as a greater amount of them are tainted and in this manner enter the infectious and evacuated compartments. The illness can't break out again until the quantity of susceptibles has developed back thus of posterity being naturally introduced to the susceptible compartment.

Every individual from the populace normally advances from susceptible to infectious to evacuate. This can appear as a stream chart in which the crates speak to the distinctive compartments and the bolts the move between compartments.

**Transmission Rates:** For the full details of the model, the bolts ought to be marked with the move rates between compartments. Amongst S and I, the move rate is  $\beta I$ , where  $\beta$  is the contact rate, which considers the likelihood of getting the malady in a contact between a susceptible and an infectious subject.

Amongst I and R, the move rate is  $\nu$  (just the rate of recuperation or demise). On the off chance that the span of the contamination is signified D, then  $\nu = 1/D$ , since an individual encounters one recuperation in D units of time. It is expected that the changelessness of each single subject in the pandemic states is an irregular variable with exponential circulation. More mind boggling and reasonable dispersions, (for example, Erlang appropriation) can be similarly utilized with couple of changes. Quality Check

All submitted paper should be cutting edge, result oriented, original paper and under the scope of the journal that should belong to the engineering and technology area. In the paper title, there should not be word 'Overview/brief/Introduction, Review, Case study/Study, Survey, Approach, Comparative, Analysis,

Comparative Investigation, Investigation'.

**Bio-Mathematical Deterministic Treatment of the SIR Model:**

**The SIR Model without Vital Dynamics:** The elements of an epidemic, for instance this season's cold virus, are frequently much quicker than the progression of birth and death, consequently, birth and death are regularly discarded in straightforward compartmental models. The SIR framework without purported indispensable flow (birth and death, now and then called demography) depicted above can be communicated by the accompanying arrangement of normal differential equations<sup>2</sup>.

$$\frac{dS}{dt} = \frac{\beta IS}{N} \quad (1)$$

$$\frac{dI}{dt} = \frac{\beta IS}{N} - \nu I \quad (2)$$

$$\frac{dR}{dt} = \nu I \quad (3)$$

This model was surprisingly proposed by O. Kermack and Anderson Gray McKendrick as an extraordinary instance of what we now call Kermack-McKendrick hypothesis, and took after work McKendrick had finished with Ronald Ross. This framework is non-direct, and does not concede a non specific explanatory arrangement. All things considered, noteworthy outcomes can be determined analytically. Firstly take note of that from the equation the below mentioned equation has been derived.

$$\frac{dS}{dt} + \frac{dI}{dt} + \frac{dR}{dt} = 0 \quad (4)$$

$$S(t) + I(t) + R(t) = N = Constant \quad (5)$$

It is noted that the above equation is communicating in numerical terms the consistency of populace. Take note of that the above relationship suggests that one need just review the condition for two of the three factors. Secondly, we note that the dynamics of the infectious class depends on the following ratio:

$$R_0 = \frac{\beta}{\nu} \quad (6)$$

The purported basic reproduction number (additionally called basic reproduction proportion).

This proportion is inferred as the normal number of new diseases (these new contaminations are here and there called optional diseases) from a solitary disease in a populace where all subjects are susceptible. This thought can most likely be all the more promptly checked whether we say that the run of the mill time between contacts is, and the average time until recovery is From here it takes after that, by and large, the number of contacts by an infected individual with others before the infected has recovered is: . From here it takes after that, all things considered, the number of contacts by an infected individual with others before the infected has recovered is  $T_i/T_c$ .

By partitioning the principal differential condition by the third, isolating the factors and incorporating we get

$$S(t) = S(0)e^{-Ro(R(t)-R(0))/N} \quad (7)$$

where  $S(0)$  and  $R(0)$  are the initial numbers of respectively, susceptible and removed subjects. Thus, in the limit  $t \rightarrow +\infty$ , the amount of recovered persons follows the transcendental equation

$$R_\infty = N - S(0)e^{-Ro(R_\infty - R(0))/N} \quad (8)$$

The above condition demonstrates that toward the end of an epidemic, unless  $S(0)=0$ , not all people of the populace have recovered, so some must stay susceptible. This implies the finish of an epidemic is brought about by the decrease in the number of infected people instead of a flat out absence of susceptible subjects. The part of the basic reproduction number is critical. Truth be told, after reworking the condition for irresistible people as takes after:

$$\frac{dI}{dt} = (RoS/N - 1)\gamma I \quad (9)$$

It derives that if, then that is, there will be a legitimate epidemic episode with an expansion of the number of the irresistible which can achieve an impressive part of the populace. On the opposite, if, then that is, autonomously from the underlying size of the susceptible populace the sickness can never bring about an appropriate epidemic flare-up. As an outcome, plainly the basic reproduction number is critical.

**The Force of Infection:** Note that in the above model the function models the move rate from the compartment of susceptible people to the compartment

of irresistible people, so it is known as the compel of disease. In any case, for huge classes of transmittable sicknesses it is more practical to consider compel of contamination that does not rely on upon unquestionably the number of irresistible subjects, however on their part regarding the aggregate steady populace  $N$ .

$$F = \beta \frac{I}{N} \quad (10)$$

**The Sir Model with Vital Dynamics and Constant Population:** Considering a populace described by a death rate  $\mu$  and birth rate  $\tilde{\Lambda}$ , where a transmittable disease is spreading the model with mass-activity transmission is:

$$\frac{dS}{dt} = \tilde{\Lambda} - \mu S - \beta IS \quad (11)$$

$$\frac{dI}{dt} = \beta IS - (\gamma + \mu)I \quad (12)$$

$$\frac{dR}{dt} = \gamma I - \mu R \quad (13)$$

**Recent Advances In Computational Epidemiology:** General wellbeing epidemiology plans to comprehend the spatio-temporal spread of diseases and to create strategies to control such spread. The danger of pandemic flare-ups over various landmasses and the related monetary and social expenses is a key societal concern, and keeps on requesting critical assets for modeling, detection, and control efforts. Computational epidemiology has ended up progressively multidisciplinary (getting procedures from epidemiology, atomic science, connected arithmetic, hypothetical software engineering, machine learning, and elite figuring) and has prompted to novel computational techniques for understanding and controlling spatio-temporal malady spread. Here, we highlight some current advances, concentrating particularly on modeling, information mining, and inferential and arranging questions. We concentrate on irresistible diseases, basically including people.

**Modeling Epidemics:** An Interaction Based Approach

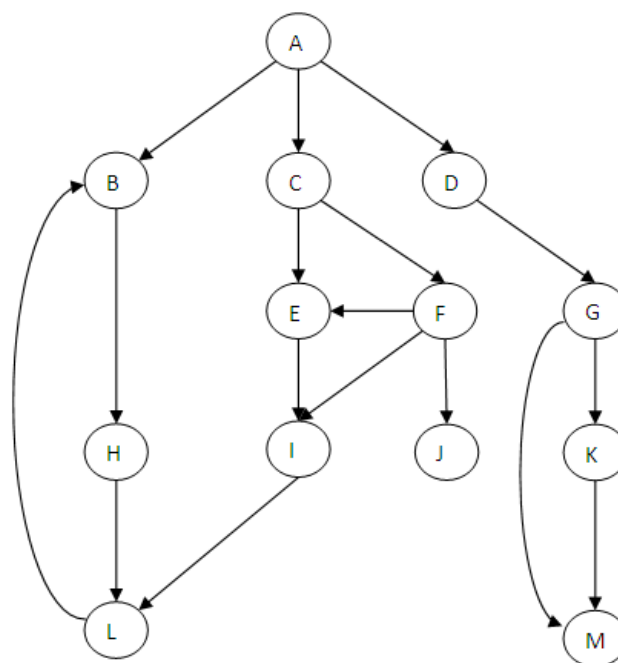
Customarily mathematical epidemiology has concentrated on rate-based differential equation models. In this approach, one parcels the populace into subgroups in light of different criteria (e.g., demographic qualities and disease states), and uses differential equation models to depict the disease elements over these gatherings.

Models, portray disease progression by a parameter,  $R_0$ , the essential multiplication number.  $R_0$  is characterized as the quantity of optional infections created by a solitary infective individual into an entirely defenseless populace. It figures out if an epidemic can happen by any means; if  $R_0 < 1$ , the epidemic will cease to exist, while if  $R_0 > 1$ , then we will have an epidemic. This approach has been tremendously effective in illuminating general wellbeing strategy. All things considered, a potential shortcoming is its powerlessness to catch the many-sided quality of human cooperations and practices. Compelling arranging and reaction in case of epidemics is not about just forecast, but rather reckoning and adjustment.

The normal work process of a general wellbeing expert includes the measure-extend break down mediate cycle. Differing information is gathered by means of overviews, online networking, sensors and approach archives, which are then broken down to yield relevant situational representations. Dynamic models as PC recreations are then used to interject and in addition extrapolate from the information. Reenactments are additionally used to assess different imagine a scenario in which situations (counterfactual trials. This information is utilized by an approach expert to settle on particular strategy choices, possibly prompting to changes in epidemic flow. The measure-extend break down mediate cycle propels an 'association based approach' for creating informatics stages. Here we plan to precisely display the social communications that shape the premise of disease transmission. The approach utilizes endogenous representations of people together with express collaborations between these operators to produce and catch the disease spread over the social cooperation organize.

**Synthetic Information Environments:** A Synthetic Information Environment (SIE) comprises of four parts: 1) a factual model of the population of intrigue, which we allude to as a synthetic population, 2) a movement based model of the social contact organize, 3) models of disease progression, and 4) models for representing and evaluating interventions, open strategies and individual behavioral adaptations. Initial, a synthetic population is produced by coordinating evaluation information with other demographic and geographic information to make a population of individual specialists. Synthetic populations are statistically indistinguishable to the information sources that are utilized to develop them yet protect individual security and look after secrecy. Second, we create a definite minute-by-minute calendar

for every individual in the synthetic population, utilizing time-utilize overviews consolidated with machine learning strategies (e.g. Truck). A period fluctuating, spatially unequivocal individual area system can now be built utilizing the synthetic information. The combination of such systems is a continuous research subject in computational social science and is infrequently alluded to as generative social science<sup>7</sup>. As of late, specialists have investigated different techniques to integrate littler social contact systems utilizing smart phones, RFID labels and other computerized gadgets consolidated with social media; illustrations incorporate blend of social contact systems for among secondary school understudies when going to schools and undergrads.



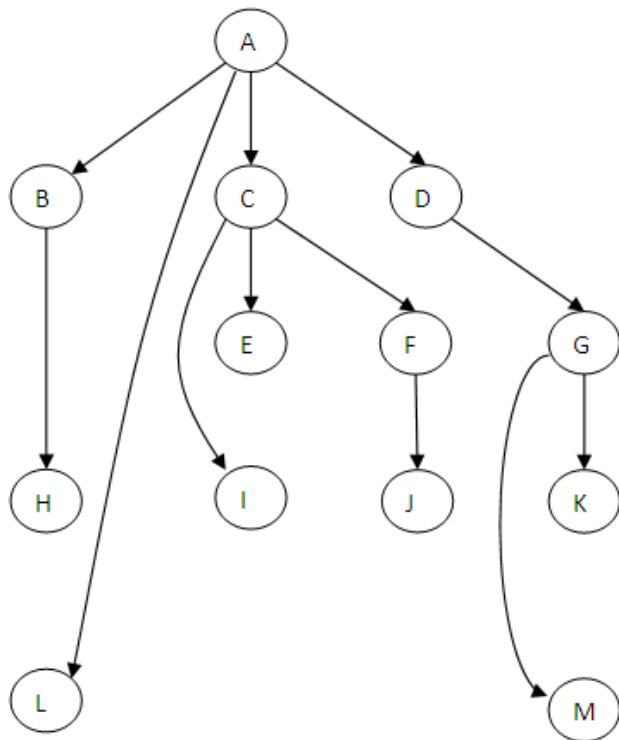
**Fig. 1: An example graph**

**Big Data driving Real-time Epidemiology:** Real-time epidemiology, a quickly creating zone inside general wellbeing epidemiology looks to bolster arrangement producers in close ongoing as the epidemic is unfurling<sup>4</sup>. A characteristic utilization of ongoing epidemiology is in disease observation, i.e., the issue of checking the space-time progression of disease. Customary instruments for observation incorporate sentinel facilities and serological testing<sup>5</sup>.

As of late, social media information<sup>6</sup> has been utilized to acquire disease episodes and progression, a phenomenal case of how computational advances are changing general wellbeing epidemiology. Maybe the most commended case of social media reconnaissance

is Google FluTrends (<http://www.google.org/flutrends/>) that utilizes internet searcher questions as a pointer of wellbeing looking for conduct, and in this manner a marker of disease (flu) action among a population. Not long after Google FluTrends was presented, procedures for nowcasting flu rates utilizing Twitter got to be distinctly conspicuous<sup>7</sup>.

Analysts have given careful consideration to substance modeling of tweets. For example, Lamb et al<sup>6</sup> have created strategies to separate tweets that report genuine flu infections from others that display simple mindfulness/worry about the flu.



**Fig. 2: Dominator Tree**

We have formalized the possibility of social network sensors utilizing the idea of graph dominators<sup>8</sup>. In a given graph, a hub  $x$  is said to overwhelm a hub  $y$  if all ways from an assigned begin hub to  $y$  must experience  $x$ . For our situation, the begin hub shows the wellspring of the contamination or disease. In Fig. 1, which depicts a social contact network with hubs as individuals, all ways from hub  $A$  (the assigned begin hub) to  $H$  must go through  $B$ ; in this way  $B$  rules  $H$ . Take note of that a man can be ruled by numerous other individuals.

To disentangle such transitive circumstances, we say that hub  $x$  is the novel quick dominator of  $y$  if  $x$  commands  $y$  and there does not exist a hub  $z$  to such an

extent that  $x$  rules  $z$  and  $z$  overwhelms  $y$ . This empowers us to reveal a basic tree of dominator connections, as appeared in Fig. 2, with a much littler number of edges than the first graph.

**Conclusion**

In this paper we did a detailed study about Epidemiology, the study of disease transmission is the review and analysis of the patterns, causes, and impacts of health and disease conditions in characterized population. Also, this paper elaborated the Epidemiology models. From this study it is clearly explained that in the literature there is no sufficient works carried out in the past and there is no accurate model for calculating the disease transmission specifically about basic reproduction rate, and final size of the epidemic. Hence it is important to stress that more research has to be carried out in the future related to Epidemiology.

**Ethical Clearance:** Nil (Not Required)

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Ideal Self-Concept Factors influencing on Emotional Intelligence among School Teachers and Nurses

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## Abstract

The present research is an empirical effort made to study how the ideal self-concept influences on the Emotional Intelligence. The sample-size is 350 (comprised of 200 Teachers and 150 Nurses). The stratified random sampling method is adopted. The age ranges from 22 to 56 (Mean Age= 31.87). The research is executed with non-clinical samples. The tools adopted are: (1) Emotional Intelligence scale<sup>4</sup> and (2) Self-concept ration scale<sup>13</sup>. The participants are contacted individually by the researcher and data is obtained with the help of the above mentioned tools. The descriptive statistics and correlation are used for the statistical analyses. Results indicated that all dimensions of the emotional intelligence are positively and significantly correlated with the dimensions of the ideal self-concept at 0.01 percent level of significance. The physical self-concept is significantly correlated at 0.05 percent level of significance with the value orientation. This finding supports the understanding and the development of effective strategies for strengthening the self-concept of client in psychotherapy.

**Keywords:** *Ideal Self-Concept, Emotional Intelligence, non-clinical samples.*

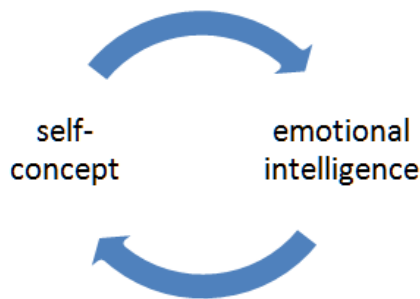
## Introduction

Self-concept is defined as the overall image or awareness of one's own self, including the beliefs and values. It is considered as contextualized dynamic cognitive structure<sup>3</sup> that adapts and regulates the behavior. The self-concept is viewed as a multifaceted phenomenon of images, schemas, conceptions and prototypes<sup>15</sup>. The core characteristic of self-concept is that it perpetuates and remains stable over time<sup>17</sup> and seen as a product of interpersonal interactions<sup>18</sup> where the overall self-concept is in a state of flux being more readily influenced by the current experience, social roles taken and the people with whom one associates. It is a process in which there are three stages: Self-identity, self-evaluation and self-ideal<sup>1</sup> that are based on the positive or negative attitudes. It is explicitly articulated in the words we frequently engage in talking about ourselves or while performing silent monologues. The person with negative self-concept considers themselves as failures, and they have pessimistic approaches, complain and not generally open to criticism. On the other hand the

person with positive self-concept are confident, believe in themselves, handle different situations, overcome challenges, respect themselves and others, and have realistic assessment about themselves.

Emotional intelligence refers to the ability or competency to deal effectively with emotions. It is a set of abilities to identify, understand, use and regulate the emotions for promoting greater emotional and personal growth<sup>11</sup>. It embodies the inter-personal and intra-personal intelligence<sup>8</sup> as proposed by Gardner (1993). The inter-personal intelligence denotes the ability to understand other people, their moods, desires and motivations<sup>2</sup> which enable a person to work effectively with others with empathy and understanding. On the other hand, intra-personal intelligence denotes the ability to understand one's own emotions, moods, goals, etc. which is important for personal success and happiness. Thence the emotional intelligence means handling of one's own emotions and managing it in such a way that it is channeled towards one's own personal growth by impacting other people in the social environment.

**Emotional intelligence and self-concept:** Research done outside of India portrays that the emotional intelligence is essential for building the self-concept<sup>6</sup> and for the mental health<sup>7</sup>. The low self-concept (inferiority complex) would lead to low emotional intelligence which in turn brings forth the anxiety and depression<sup>5</sup>. It implies that the emotional intelligence significantly and positively influence the self-concept<sup>10 15 17</sup>. In other words, the high self-concept facilitates a greater ability for regulating one's own emotions as well as those of others. The acceptance and regulation of one's self and emotion bring novelty in relations<sup>10</sup>. By analyzing the earlier studies, we conclude that the self-concept and the emotional intelligence influence each other reciprocally. If the emotional intelligence is low then the self-concept would be also low, and if the self-concept is high then the emotional intelligence would be also high.



The figure-1 shows the relationship between the emotional intelligence and self-concept

**Significant of the Research:** Review of literature reveals that there has no study on ideal self-concept of adult population in an Indian context in particular to the service sector respondents like teachers and nurses. This fills the research gap. This research would help the readers to understand the interpersonal issues better. Consequently this study will assist in counseling and psychotherapy towards strengthening the 'self'.

#### Objectives:

1. To identify the levels of Ideal self-concept among the respondents.
2. To identify the levels of Emotional Intelligence of the respondents.
3. To find out the relationship between the responses of the respondents towards the Ideal self-concept and Emotional Intelligence.

Hypothesis: The research hypothesis is a tentative solution to a research problem<sup>9</sup>. Based on the above

stated descriptions about the self-concept and the emotional intelligence, the following hypothesis is being framed:

Ho: There is no significant relationship between the factors of ideal self-concept and the emotional intelligence.

Ha: There is significant relationship between the factors of ideal self-concept and the emotional intelligence.

#### Method

Descriptive survey method was adopted. 350 samples were selected following the stratified random sampling from Cuddalore district- Tamil Nadu, consisting of 153 males and 197 females in which 200 teachers were working in private, aided and government institutions, and 150 nurses were working in private and government healthcare centers. The age was ranging from 22 to 56 (Mean Age= 31.87). The participants were contacted individually by the researcher and data was obtained with the help of the selected tools. Before the data collection was made, oral permission was obtained from the correspondent and principles of the concerning schools and healthcare centers.

#### Instruments Used:

**Emotional Intelligence Scale (EIS):** The Emotional Intelligence scale is developed and standardized by Hyde, A., Pethe, S., & Dhar, U. (2002) for Indian Milieu. It contains 34 items with five-point rating scales as 5-strongly agree, 4- Agree, 3-uncertain, 2-disagree, and 1-strongly disagree. The scale measures the ten dimensions of Emotional Intelligence namely, self-awareness, empathy, self-motivation, emotional stability, managing relations, integrity, self-development, value orientation, commitment and altruistic behavior. It has split-half reliability value of 0.88 and validity with 0.93. This scale is used only for individual assessment, research and survey purposes. It does not require the services of highly trained test administrator. Based on this stated reasons, the EIS-scale was selected and used for this research purpose.

**Self-Concept Rating Scale:** The self-concept rating scale is developed and standardized by Saraswat, R.K. (2011) in an Indian context. It contains 57 personality traits based on dimensions like physical, power, ability, social and psychological characteristics. The responses

are to be received on a three points rating scale (low, average and high) for each trait and under each self-concept (real, ideal and social). It is to be administered for adult population. Test-retest reliability was found to be 0.83. Based on these stated reasons, the scale was selected and used for this research purpose.

**Analysis Strategy:** The statistical program IBM SPSS 21 was used for the data analysis. The descriptive statistics were adopted. For determining the relationships between the research variables of this study, Karl Pearson’s moment correlation (‘r’) was used towards determining the significance, direction and strength of the relationship between the variables.

**Results and Discussion**

The research goal was to find out the relationship between the Ideal self-concept and the emotional intelligence of the teachers and the nurses. The collected data was coded with IBM SPSS 21 version. The tables were obtained through descriptive analysis and correlations.

The table-1 shows the frequency and its corresponding percentages of the responses under low, average and high levels towards the five dimensions of the Ideal self-concept

Dimensions of ideal self-concept	Low		Average		High	
	Frequency	%	Frequency	%	Frequency	%
Power self-concept	2	0.57	189	54	159	45.42
Social self-concept	1	0.28	152	43.42	197	56.28
Ability self- concept	3	0.85	175	50	172	49.14
Physical self-concept	-	-	144	41.14	186	53.14
Psychological self-concept	1	0.28	195	55.71	153	43.71

Source: Primary data

Table-1 shows the frequency and its corresponding percentages of the responses under low, average and high levels towards the five dimensions of the Ideal self-concept. It identifies the levels of Ideal self-concept among the respondents. It is found that 171 (48.85) individuals have scored average and 174 (49.53) individuals of high on the dimensions of the ideal self-

concept. Highest frequency of 197 (56.28) goes with the Social self-concept among all the five dimensions.

The table-2 shows the frequency and its corresponding percentages of the responses under low, average and high levels towards the 10 dimensions of the Emotional Intelligence

Dimensions of Emotional Intelligence	Low		Average		High	
	Frequency	%	Frequency	%	Frequency	%
Self-awareness	25	7.14	171	48.85	154	44
Empathy	22	6.28	212	60.57	116	33.14
Self-motivation	16	4.57	182	52	152	43.42
Emotional stability	30	8.57	207	59.14	113	38
Managing relations	21	6	201	57.42	128	36.57
Integrity	29	8.28	199	56.85	122	34.85
Value orientation	53	15.14	188	53.71	109	31.14
Commitment	40	11.42	171	48.85	139	39.71
Altruistic behavior	31	8.85	200	57.14	119	34
Self-development	31	8.85	189	54	130	37.14

Source: Primary data



It is vivid from the table-2 that the dimensions of Emotional Intelligence are measured with low, average and high with their percentage. It identifies the levels of Emotional Intelligence of the respondents. It is found that overall 30 (8.51) individuals have scored low, 192 (54.85) individuals have scored average and 128

(36.62) individuals have scored high on the dimensions of emotional intelligence.

The table-3 shows the correlation between the dimensions of emotional intelligence and ideal self-concept

Dimensions of emotional intelligence	Dimensions of ideal self-concept				
	Power self-concept	Social self-concept	Ability self-concept	Physical self-concept	Psychological self-concept
Self-awareness	.266**	.231**	.278**	.267**	.269**
Empathy	.252**	.204**	.243**	.273**	.231**
Self-motivation	.255**	.248**	.283**	.280**	.285**
Emotional stability	.235**	.192**	.241**	.230**	.234**
Managing relations	.280**	.170**	.250**	.218**	.202**
Integrity	.272**	.230**	.277**	.293**	.295**
Value orientation	.142**	.165**	.173**	.127*	.174**
Commitment	.188**	.180**	.210**	.192**	.223**
Altruistic behavior	.228**	.262**	.262**	.228**	.262**
Self-development	.184**	.181**	.174**	.165**	.146**

Source: Primary data \*\*. Correlation is significant at the 0.01 level (2-tailed), \*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows the results of Karl Pearson’s moment correlation (‘r’) which is used to elicit the relationship between the dimensions of the emotional intelligence and the ideal self-concept. It is found that the dimensions of the emotional intelligence are positively and significantly correlated with the dimensions of the ideal self-concept at the 0.01 level. But the physical self-concept alone is significant and correlated at the 0.05 level with the value orientation. Even though the responses are more in the average and high levels in both the responses through the two scales, the correlation results show the relationship as positive and significant. But the Correlational values ranges from 0.127 – 0.295. This indicates the low correlation. Even then the correlation seems to be significant and positive.

### Discussion

The primary intension of the research is to find out the relationship between the dimensions of the ideal self-concept and the emotional intelligence. The ideal self-concept is the persons’ perceptions of aspirations and beliefs that one ought to be. These aspirations and beliefs may be within the reach of the person, or it may be so unrealistic that it can never be reached in real life<sup>14</sup>. According to Carl Rogers (1951) -founder of

the humanistic approach- states that everyone strives to reach an “Ideal self”. It implies that the person is striving to become by fulfilling the expectation of others which do not match their experiences. When the person is forced to fulfill the conditions and expectations of others, the person leaves behind one’s organismic beliefs and values, and forms the conditional positive self-regard. As the result, the person develops the ideal-self: being afraid to accept one’s own experiences as valid, looking for winning approval from other<sup>12</sup> and being moved or controlled by the external factors or forces. From table-1 it is clear that the 174 (49.53) individuals have the high ideal self-concept. This indicates that the individual’s aspirations are unrealistic which would never be reached in real life where the person would look for winning the approval from others.

This higher score on the ideal self-concept reflects the higher score on the dimensions of the emotional intelligence. From the table-1 and table- 2, it is vivid that 174 (49.53) individuals have the high ideal self-concept, correspondingly 128 (36.62) individuals have score high on the dimensions of emotional intelligence. This indicates that there is a positive relationship between the ideal self-concept and the dimensions of emotional

intelligence where increasing in one dimensions would induce to increase in another dimensions. This also confirms the theoretical aspects of cognitive therapy as envisaged by Aaron Temkin Beck (1994) where the thinking influences the emotions of the persons.

Further analyzing the relationship between the dimensions of the emotional intelligence with the dimensions of ideal self-concept with the help of Karl Pearson's moment correlation ('r'), it is clear from the table-3 that all dimensions of the emotional intelligence are positively and significantly correlated with the dimensions of the ideal self-concept at the 0.01 level, while the physical self-concept from the ideal self-concept dimensions alone is significantly correlated at the 0.05 level with the value orientation of emotional intelligence. Thus the present research confirms with the earlier findings<sup>15 10 17</sup> and accepts the research hypothesis that there is significant relationship between the factors of ideal self-concept and the emotional intelligence.

**Implication and Limitation:** There research is done in an Indian context. This would help us to understand the relationship between the dimensions of Ideal self-concept and Emotional Intelligence, and how the thinking (self-concept) would influence the emotions of the persons. The finding would be helpful for developing strategies effectively in psychotherapy where the person's self-concept would be strengthened in order to encounter the emotions that come in intra and inter-personal relationships. On the other hand the limitations as such, the sampling area covered in the present research is from non-clinical populations. Though the data were collected following the stratified random sampling, covering teachers and healthcare professionals working in private, and government institutions and centers, but the data was collected at the convenience of the researcher as well. Regarding the target population, young and middle adults were only included. The data analyzed for this study were originally meant for research purpose rather than clinical analysis or making diagnosis.

**Conflict of Interest:** The conflict of interest is nil.

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**Ethical Clearance:** Ethical Clearance is taken from Center for Academic Research (CARE) Annamalai University, Psychology wing.

## Conclusion

From above the empirical study we conclude that the dimensions of the ideal self-concept and emotional intelligence are positively related. Based on the cognitive therapy, we also affirm if the self-concept (cognition) about oneself and other is positive, then the emotions related to oneself and other would also be positive, moving in the positive direction. On the other hand, if the self-concept (cognition) about oneself and other is negative, then the emotions related to oneself and the other would also be negative. Strengthening the self (intra-personal) facilitates the inter-personal relationship, through enhancing the emotional intelligence.

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# A Study to Assess Prevalence of Cysts and Tumours in the Oral Cavity: A Retrospective Study

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## Abstract

**Background:** Geographic differences are seen in prevalence and pattern of orofacial cysts and tumors. The purpose of this study was to determine the prevalence of cysts and tumors in the oral cavity.

**Material and Method:** The present study was conducted to assess the prevalence of Odontogenic cysts and tumors diagnosed histopathologically in 260 patients over the period of 6 months. Data regarding age, gender, location, size, histopathological evaluation and treatment done were gathered from the clinical records. Data was analyzed using the SPSS - 20 (Chicago, IL-USA). The level of significance was set at  $P < 0.05$ .

**Results:** In the present study 53.46% were male and 46.53% were females. The gender distribution showed a slight male predilection in Odontogenic Cysts, while the Odontogenic Tumors showed female predilection. Dentigerous cysts were most commonly occurring cysts than the other odontogenic cysts and shows male predilection. Ameloblastoma was most commonly occurring tumor than the other odontogenic tumors and shows female predilection.

**Conclusion:** Our study concluded that odontogenic cysts were more prevalent than odontogenic tumors and the gender distribution in odontogenic cysts showed a slight male predilection, while the Odontogenic Tumors showed female predilection.

**Keywords:** Dentigerous cysts, odontogenic cysts, Ameloblastoma, odontogenic tumors.

## Introduction

The oral cavity is a unique, peculiar environment and one of the most dynamic regions in the body.<sup>1</sup> A cyst is defined as a pathologic cavity containing fluid, semifluid or gaseous contents that are not created by the accumulation of pus; frequently but not always, is lined by epithelium. Odontogenic cyst (OC) is categorized into two groups on the basis of their origin:

developmental and inflammatory. OCs are unique as they only affect the oral and maxillofacial region which are characterized by resorption of bone and they develop from the components of the odontogenic epithelium or its residuals which remain trapped within the gingival tissue or bone.<sup>2</sup> The knowledge of prevalence of odontogenic cysts and tumors is limited, which may be due to inadequate documentation in our hospitals and health care centres. A very limited prevalence studies of odontogenic cysts and tumors have been carried out in India and information is limited.<sup>3,4</sup> The purpose of this study was to determine the prevalence of cysts and tumors in the oral cavity.

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**Material and Method:** The present study was conducted to assess the prevalence of Odontogenic cysts and tumors which were diagnosed histopathologically

in 260 patients over the period of 6 months. Before the commencement of the study ethical approval was taken from the Ethical committee of the institution. Data regarding age, gender, location, size, histopathological assessment and treatment done were collected from the clinical records. Classification of the diagnosis was based on the International Statistical Classification of Diseases and Related Health Problems (ICD-10) published by World Health Organization. Data was analyzed using the SPSS - 22 (Chicago, IL-USA).

The level of significance was set at  $P < 0.05$ . Results: In the present study 53.46% were male and 46.53% were females. The gender distribution showed a slight male predilection in Odontogenic Cysts, while the Odontogenic Tumors showed female predilection. Dentigerous cysts were most commonly occurring cysts than the other odontogenic cysts and shows male predilection. Ameloblastoma was most commonly occurring tumor than the other odontogenic tumors and shows female predilection.

**Table 1: Distribution of Odontogenic Cysts according to gender**

Type of Odontogenic cysts	Male (%)	Female (%)	Total (%)
Dentigerous cysts	36 (23.07%)	33 (21.153)	69 (44.23%)
Radicular cysts	26 (16.66%)	21 (13.46%)	47 (30.12%)
Odontogenic kerotocysts	24 (15.38%)	11 (7.05%)	35 (22.43%)
Glandular cysts	5 (3.20%)	0 (0%)	5 (3.20%)
Total	91 (58.33%)	65 (41.66%)	156 (100%)

**Table 2: Distribution of Odontogenictumors according to gender**

Type of odontogenic tumors	Male (%)	Female (%)	Total (%)
Ameloblastoma	29 (27.88%)	41 (39.42%)	70 (67.30%)
Odontoma	5 (4.80%)	3 (2.88%)	8 (7.609)
Adenomatoid odontogenic tumor	4 (3.84%)	3 (2.88%)	7 (6.73%)
Ameloblastic fibroma	3 (2.88%)	2 (1.92%)	5 (4.80%)
Calcifying epithelial odontogenic tumor	2 (1.92%)	3 (2.88%)	5 (4.80%)
Odontogenic myxoma	0 (0%)	4 (3.84%)	4 (3.84%)
Peripheral odontogenic fibroma	5 (4.80%)	0 (0%)	5 (4.80%)
Total	48 (46.15%)	56 (53.84%)	104 (%)

## Discussion

Odontogenic tumors are lesions which are formed from epithelial and/or mesenchymal rudiments that are part of the tooth-producing tissues or its remnants. The lesions shows range from hamartomatous tissue proliferation to malignant neoplasms, with metastatic potential.<sup>5,6</sup> In humans, odontogenic tumors are reasonably rare, consists of about 1% of all tumors in the jaw.<sup>7</sup>

Santos et al., however, showed a peak occurrence in the second decade of life, this difference in age incidence may be due to being related to the major prevalence of odontomas in such an age range, in their study.<sup>8</sup>

Meningaud et al. found that cysts may be asymptomatic for a long period of time, which in turn, may lead to severe bone destruction. The most common site for radicular cysts in their study was the mandible.<sup>9</sup>

Prockt AP conducted a study and confirmed that Odontogenic Cysts occurred more commonly in males.<sup>10</sup>

Odontogenic Tumors occurred most commonly in females which was confirmed by the studies done by Fernandes,<sup>11</sup> Ochsenius et al.<sup>12</sup>.

## Conclusion

Our study concluded that odontogenic cysts were more prevalent than odontogenic tumors and the gender

distribution in odontogenic cysts showed a slight male predilection, while the Odontogenic Tumors showed female predilection.

**Conflicts of Interest:** The authors declare that there is no conflict of interest regarding the publication of this paper.

**Source of Funding:** Self

**Ethical Clearance:** Ethical Clearance has been taken from Institutional Ethical Committee.

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# Neural Network Based Implementation of Corner Detection for Biomedical Application in Computer Vision

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## Abstract

The identification of the corner is one of the important features of the visual processing system. When the image is extracted and used to modify the image, image may be enhanced according to the application, such as corner detection, edge detection, sharpness, etc. Different devices, such as real-time video surveillance, medical imaging, facial recognition, include object detection, including detection in a corner. We are proposing a Corner Detection Method with Neural Network in order to provide improvement over existing corner detector method. The theoretical rigor benefits are there in conventional differential filter-based algorithms but excessive post-processing is required. The proposed new network technique is used in the realization of corner detection tasks, it takes advantage of the extraction of momentum, can process an input picture of any size without preparation.

**Keywords:** *Neural Network, Corner Detection, Convolution, Biomedical imaging.*

## Introduction

Corners contain high information points which are one of the important features in the pictures<sup>[1]</sup>. The two dimensions are closely positioned. Much work has been conducted on this subject until now, but each methodology is different and findings are slightly different. These method results have difficulties in detecting the correct detection in the corner.

Typical corner detection method are of two kinds: (i) Second grade variation (ii) Convolution based estimation.

The pixel value on the image is measured in the middle method between two above mentioned method. The presence of corner is deduced if the value of the pixel exceeds the value of the user Threshold. This value is not specified by a fixed model. The image is captured and processed in different environments. Typical technology is not invariant where coins are detected, where noise, particularly for the second derivative method, is also important. Here we compute labels of Bayesian subsequent probabilities, which is one of a

corner detection problem in recognition of statistical patterns. Training based methodology is important and here we use a neural feed network trained by traditional error propagation. This approach is useful because it is easy to apply to hardware like Raspberry Pi in real time. Due to inadequate preparation, disappointing results have been shown in the past in real time. There have been many attempts in this regard. We have trained our models with large data with gray corner detection models to achieve good results. This makes for a good broad. It was hard to learn mapping here. Pre-treatment steps have removed known corner problems and thus reduced the difficulty of the classification problem. Instead of training a single network, we have used training sets and trained modules.

The output of each individual module is used to create a second training package that is used for training a further network. This approach contrasts the findings with traditional method. The results are good in the analysis.

**ANN Corner Detection Algorithm:** The design of the model Neural Networks by David Hubel and Torsten

Wiesel was scientifically inspired by the architecture and function of the vision system of mammals<sup>[8]</sup>. The introduction of data should be used for the artificial expansion of the data set by means of label-preserving transformations<sup>[7]</sup>. The artificial profound thinking can be recognized as part of a correlation with human intelligence on the basis of its model. Algorithms and marked training data are necessary in order to simulate the broad neuronal spectra of the neocortex in an artificial “neural network” computing infrastructure. Several types of brain functions are known, in particular the primary visual cortex (PVC). Good fellow et al.<sup>[2],[9]</sup> outlined three PVC characteristics in order to model a network: i) It is organized as a spatial map since the structure of PVC is in 2D. Networks capture this property by having features defined with regard to 2D maps. ii) PVC contains several simple cells that are characterized in a broad, spatially distributed receptive field by a linear image feature. The network detector units are designed to copy such properties from simple cells. iii) These cells respond to characteristics and include various complex cells. Complex cells cannot change the position of their characteristics or remain unchanged, regardless of changes in measuring conditions other than simple cells. The pooling of networks is motivated.

**Operation:** The term Convolution is used when a new feature is generated from two variables. The new function demonstrates how much the original features relate to the accuracy of the graphs. According to the convolution principle, the Fourier transformation is a point-specific consequence of the Fourier transformation. The unification of two functions of one domain (for instance, the time domain) is regarded as a point-specific distribution within another domain (for example the frequency domain).

$$g(x) = f(x) \otimes h(x) = \int_{-\infty}^{\infty} f(s)h(x-s)ds \quad (1)$$

When two functions are f(x) and g(x), s is a buzzing parameter for integration (takes values 0 or 1). The convolution between two functions is shown as follows in two dimensions:

$$g(x,y) = f(x,y) \otimes h(x,y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(s,t)h(x-s,y-t)dsdt \quad (2)$$

An asterisk\* is used for the operation of convolution. The convolution operation (1) is, for example, based on a signal time domain, X(t) and frequency region, w(a) for one-Dimensional use.

$$s(t) = (x * w)(t) \quad (3)$$

When x is an input, w is a kernel; s(t) is an output called a map or kernel feature. In computer applications, time series data are binary and the time index t can only take integer values. As the discrete convolution, this can be defined:

$$s(t) = (x * w)(t) = \sum_{-\infty}^{\infty} x(a)w(t-a) \quad (4)$$

Typically, the input is a multidimensional information set, which is a multidimensional array of items suited to the training algorithm. These multifaceted displays are referred to as tensors. If two-dimensional space, like image I as a source, exists, kernel K must be used twice. The integration is two-dimensional.

$$S(i,j) = (I * K)(i,j) = \sum_m \sum_n I(m,n)K(i-m,j-n) \quad (5)$$

If we assume, on the assumption that the convolution is commutative, that scope for valid values m is less variable than n, we can write (5) exactly as following:

$$S(i,j) = (K * I)(i,j) = \sum_m \sum_n I(i-m,j-n)K(m,n) \quad (6)$$

In m, the input index is raised, but the index is reduced to the kernel, so we have moved the kernel to the input. If the kernel is not inverted, we use the feature called the cross-correlation.

$$S(i,j) = (K * I)(i,j) = \sum_m \sum_n I(i+m,j+n)K(m,n) \quad (7)$$

The algorithm is used to learn the appropriate kernel value in an appropriate location in machine learning<sup>[2]</sup>. In the machine learning the combination of other functions is not used on its own but at the same time. This works on the basis of the concepts of the neural network.

**Neural Networks:** In the Neural network, there is an AB matrix generated by a two-matrix n x m, with n being one of the matrix parameters and m interacting with each input device and the output device<sup>[2]</sup>. The neural network uses a parameter of AB. The topology here is focused on the receptive domain, weight shared and spatial or temporal sampling<sup>[10]</sup>. Each layer is of small kernels that extracts high-level characteristics and different layer types. The final layer is supplied for fully connected layers. The neural nets have less connections and easier to train if they are constrained in number to learn<sup>[5]</sup>. This neural network uses data-driven filtering to draw input descriptive features<sup>[3]</sup>. The template design comprises an input layer, alternating layer, pool or sub-sampling layer



as well as a non-linear layer. The layers of spatial and configurable invariance are combined with sub-sampling layers to reduce computational time. The input layer is a set of information that is multidimensional in which data are sent into the network<sup>[3]</sup>. Picture pixels or conversion of image data, patterns, time series, or video signal can include input data. The principal building blocks of the network are groundbreaking layers. The primary purpose of this layer is to draw from the input different characteristics such as corners, rims, contrast, sharpness, etc. Krig<sup>[12]</sup> defines a variety of learnable kernels that are used to measure the kernel map with local characteristics and each kernel.

Important elements like boundaries, angles, textures and lines are removed in the first layer. The next convolution layer develops higher levels but the higher levels are derived from the last convolution layer<sup>[13]</sup>. The kernel size means that the filter is around the map, while the filter slides are the stage. It determines how the filter fits the feature map. That is why the filter rotates every cycle around the various layers of the map of the system by sliding one unit<sup>[2]</sup>. For the neural network too, it is important to introduce padding which enables information to be extended to include elements V, i, j and k, in instance. For example, the zero input padding is used when managing the Output size and kernel width W separately. The detector step is used to detect each linear activation through a non-linear activation feature. In other words, linear activation leads to neural networks being non-linear and allows for the learning of complex models<sup>[11]</sup>. There are many non-linear capabilities. The standard model of the f neuron output is with the function of its inputx of  $f(x) = \tanh(x)$ ,  $\text{sigmoid}(x)$  or  $\text{rectified linear unit}$ <sup>[11]</sup>. It is quicker than rehearsingfor most days. Many authors use the sigmoid (·) function in its simplicity<sup>[6]</sup>. Network encoding and computational complexity decrease previous map resolution<sup>[14]</sup>. The pooling layer is immune to the previously observed small change in usability. Pooling maintains the focus of the network on important trends.

The sampled version of the input map comes from a bundle that reduces the dimensionality of the next layers of function maps<sup>[3],[4]</sup>. The pooling splits the inputs into areas of R x R to create one output from each zone. If an input with a length W x W is inserted in the pooling layer, the output value P is achieved<sup>[15]</sup>:

$$P = \left\lfloor \frac{W}{R} \right\rfloor \tag{8}$$

Maximum pooling, median rectangle and testing pooling are included in the pooling. The full pooling operation is planned for the rectangular quarter's maximum output. Max outputs for each kernel the maximum number and reduces the function's map width. The average sum of the four factors is selected for the highest amounts. Max pooling accounts for invariance. For the average pooling, the average of four values is chosen. The median values are rounded off by a fraction to the next integer. A combination of several input maps may be combined in each output graph. Ordinarily<sup>[16]</sup> we can compose:

$$x_j^L = f\left(\sum_{i \in M_j} x_j^{L-1} * k_j^L + b_j^L\right) \tag{9}$$

- where L: the convolution layer;
- L-1: The surface of the down sample;
- $x^{L-1}$ : Convolution layer input characteristics;
- $k_{ij}^L$ : Convolution layer kernel maps.;
- $b^L$ : Convolution additive bias;
- $M_j$ : Represents a selection of input maps;
- i: Input;
- j: Output.

Neural network extraction usually consists of a number of comparable phases and three cascading layers: convergence level, activation layer, and pooling.

N x N x D dimensions are converted into p kernel numbers with the kernel scale k x k x D. The 3D convolution approach used in neural networks is shown in Figure 1. A kernel with the input map generates a chart of the output variable, which p immediately produces p maps. Both kernels switch from the top-right corner of the feature diagram to the top-right part of the section. Then the kernel transfers an element to the left and turns on the right side. This process happens when the kernel is down to the ground. For operations, a component of an output function k x k x D is required. The above criteria suggest that the filter is normally slit over the induction and calculated by a non-linear activation function, accompanied by a filter which incorporates non-linearity into the template<sup>[11]</sup>. Generally, the new function map is created. A convergence surface is, for example, the input character graph, kernel and the convolution performance. In each feature map, each unit has the same weights (filters).

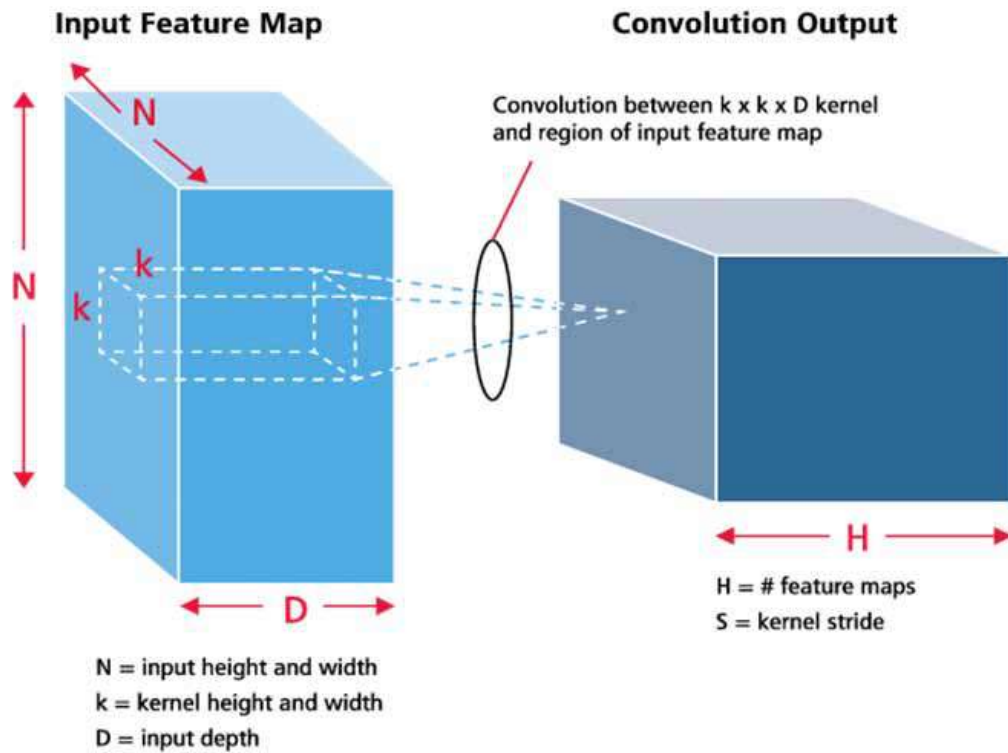


Figure 1. The convolution process

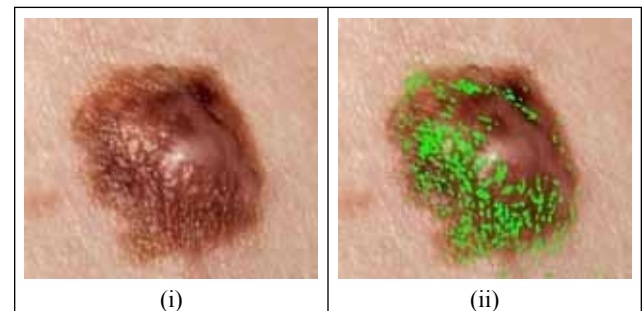
The benefits of share weights are a small number of parameters and the capacity to identify this function irrespective of its location in the inputs<sup>[15]</sup>. The result for the next step shall be converted using max pooling or average pooling. The layers are fully connected. This is the last phase of a standard multi-layered topology network. The last few layers will be fully connected with any activation in the previous layer<sup>[4]</sup>. Features to train a different classifier from these layers can be extracted. Diverse loss functions can be used to demonstrate how network learning penalizes the difference between expected labels and true ones, e.g. softmax, sigmoid cross-entropy or euclidean loss.

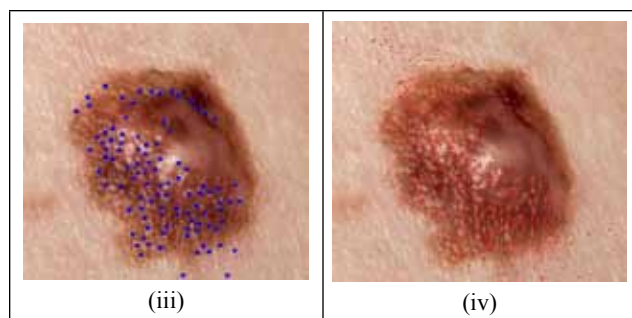
### Results and Discussions

The latest array of imaging techniques, such as MR, computed tomography (CT), POT (PET), OCT (Optical Consistency Tomography), and ultrasound provide a better understanding of the human body's various anatomical and functional systems. Although such imaging technology has improved significantly over the years with the goal of achieving improved signal-to-noise (SNR) resolution and decrease in the rate of purchase, due to operational, financial and

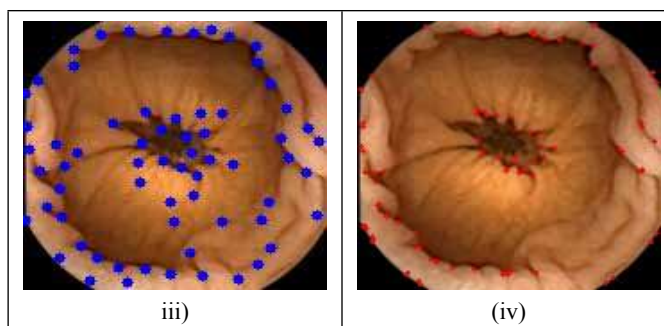
physical constraints there remain numerous fundamental compromises between these three aspects. The data collected can thus belargely unusable due to factors like noise, technological elements, poor resolution and contrast. Further, the complexity of data from biomedical imaging makes interpreting and analyzing the acquired data meaningfully and efficiently often difficult for researchers and clinicians. Researchers in the VIP group are developing exciting and new ways to better visualize, diagnose and understand various conditions affecting the human body in the field of biomedicine imagery to support clinicians, radiologists, pathologists and clinical investigators.

#### a. Skin Cancer Detection:



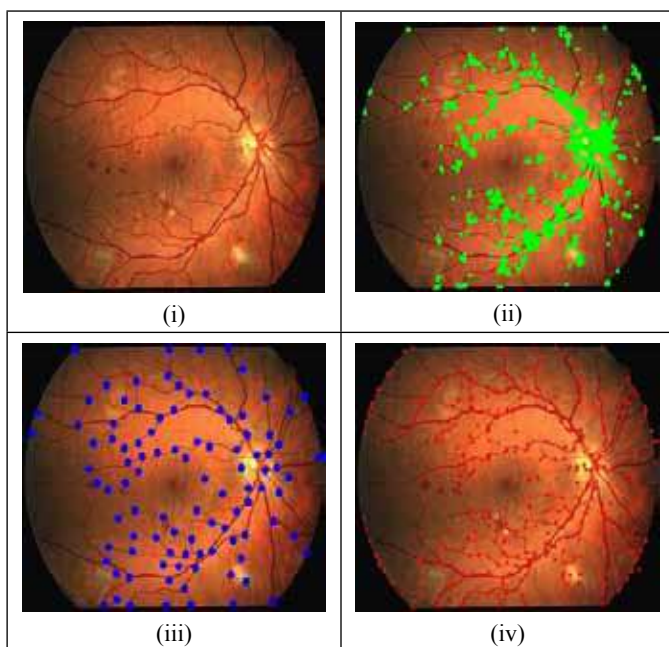


**Figure 2: Skin Cancer Detection (i) Input image (ii) Harris Corner Detection (iii) Good Features Corner Detection (iv) ANN Corner Detection**



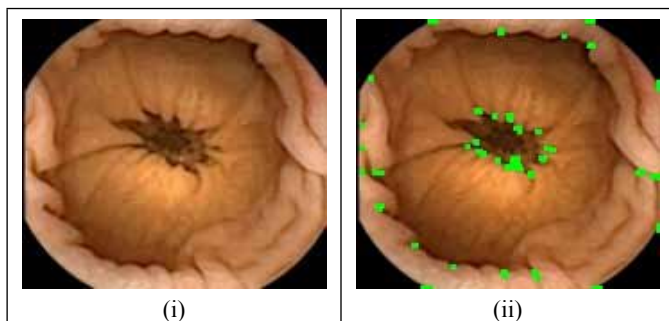
**Figure 4: Capsule Endoscopy (i) Input image (ii) Harris Corner Detection (iii) Good Features Corner Detection (iv) ANN Corner Detection**

**b. Diabetic Retinopathy:**

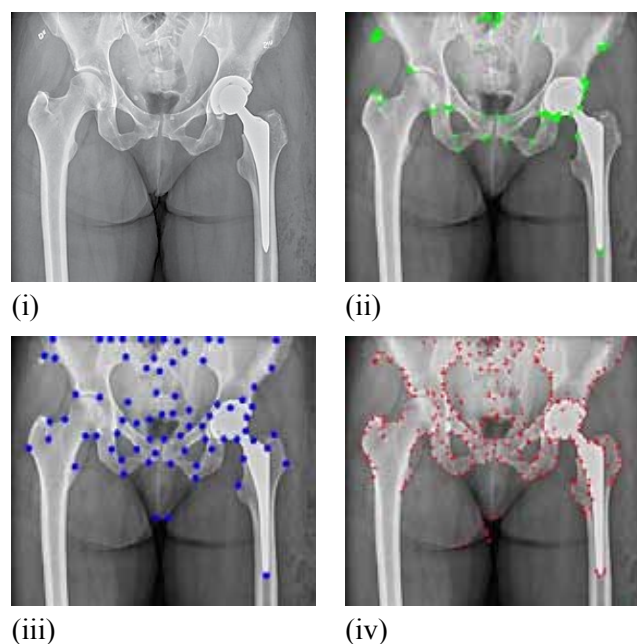


**Figure 3. Diabetic Retinopathy (i) Input image (ii) Harris Corner Detection (iii) Good Features Corner Detection (iv) ANN Corner Detection**

**c. Capsule Endoscopy:**



**d. Hip Replacement:**



**Figure 5. Hip Replacement (i) Input image (ii) Harris Corner Detection (iii) Good Features Corner Detection (iv) ANN Corner Detection**

In Figure 2, 3, 4 and 5, for the input image (i), the respective corner detections such as Harris Corner Detection, Good Features Corner Detection and ANN Corner Detection are depicted as (ii), (iii) and (iv) respectively. We can observe the improvement in total number of corners detected through machine learning based ANN Corner Detection.

**Conclusion**

We have implemented the neural network to mark corner functions in this paper. This network trains information from the grey-level corner design. For partitioning components, the bootstrapped technique is

used. Network tests are higher than those of other corner detectors. The purpose of this research was to explain the basic theoretical principles and neural networks for applicability. The reduction in parameter numbers contributes to less noise during the exercise. It is because the number of parameters depends on the width of the kernel. The number of parameters in the model is directly proportional to the kernel width. Eventually, it can be considered that for the extraction of features like corner detection by neural networks the proposed algorithm should be adapted.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** The database used and implemented in this paper is taken from internet source available for research and does not contain any patient name and identity.

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# Effectiveness of Ultrasound Therapy on Oral Submucosal Fibrosis

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## Abstract

**Aim:** The aim is to find the effectiveness of ultrasound therapy on oral submucosal fibrosis.

**Objective:** To evaluate the efficacy of ultrasound therapy to increase level of mouth opening in oral submucosal fibrosis.

**Procedure:** The study procedure was explained to all the participants with an information sheet and a written informed consent was obtained. Assessment was done and 40 individuals with osmf were selected based on the inclusion and exclusion criteria following which participants were randomly allocated into groups, Group A and Group B. Group A individuals were treated jaw opening exercises. Group B individuals were treated with ultrasound and jaw opening exercises. Both the group participants were assessed for level of mouth opening using scale and divider. After two weeks of intervention, post period assessment same as of pretest was performed to ensure any differences.

**Outcome Measures:** Level of mouth opening.

**Result:** Statistical Analysis made with quantitative data revealed statistical significance between pre and post test values.

**Conclusion:** From the result it has been concluded that ultrasound therapy is effective in increasing the level of mouth opening in osmf individuals

**Keywords:** Oral submucosal fibrosis, mouth opening, ultrasound therapy, Physiotherapy.

## Introduction

Oral Submucous fibrosis is a chronic disease of insidious onset featuring the deposition of fibrous tissue in the juxta epithelial layer of mucous membrane

involving the pharynx, palate, fauces, cheek and lips, pharynx and oesophagus<sup>(1)</sup>. Although occasionally preceded and/or associated with vesicle formation, is always associated with juxtaepithelial inflammatory reaction followed by fibro elastic changes in lamina propria with epithelial atrophy leading to stiffness of oral cavity leading to trismus and inability to eat<sup>(2)</sup>. Oral sub mucous fibrosis has now become an Indian epidemic with an estimated 2.5 million people being affected with this disease. The rate varies from 0.2-2.3% in males and 1.2-4.57% in females in Indian communities. Oral sub mucous fibrosis also has a significant mortality rate because it can transform into Oral cancer, particularly squamous cell carcinoma, at a rate of 7.6%<sup>1</sup>. It is a

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pre-malignant condition with 15 % of all cases converted to malignancy<sup>(3)</sup>. Oral Submucous Fibrosis (OSF) is a lesion found among people who chew betel nut (Areca catechu) with or without tobacco and other ingredients. Gutka is the predominant form of areca nut (with or without tobacco) consumption in most parts of India, Gutka (also called gutkha,) is a powdery or granular preparation of areca nut, betel nut, tobacco, lime and savory flavorings. It is a popular product in India and available under several dozen names<sup>(4)</sup>. Presently, the etiology of OSMF is mainly attributed to the use of areca nut and quid chewing habit. Areca nuts contain alkaloids, of which arecoline seems to be a primary etiology factor<sup>(5)</sup>. Areca nut is available in processed and unprocessed forms. The processed areca nut products are available in a variety of commercial forms with and without tobacco such as plain arecanut (without tobacco) and Gutkha (with tobacco). Areca nut is taken as it is or wrapped in a betel leaf along with slaked lime and several condiments according to taste referred to as betel quid. Most important risk factor is chewing betel quid and this has been supported by epidemiological, case control, animal tissue culture studies as well. Also, it has been a part of religious, social, and cultural rituals. There is no definitive treatment for OSMF<sup>(6)</sup>. A common presenting symptom is a burning when eating hot and spicy food and a progressive decrease in the mouth opening, associated with difficulty in eating, changed gustatory sensation, dryness of mouth and nasal voice.

Oral submucous fibrosis is divided into four stages clinically graded OSMF into: Stage I: Faucial bands only., Stage II: Faucial bands and buccal bands., Stage III: Facial, buccal and labial bands and functionally graded OSF into, stage A : Mouth opening  $\geq 20$  mm, Stage B : Mouth opening 10-19 mm, Stage C : Mouth opening  $\leq 10$ mm The oral mucosa loses its resiliency and becomes blanched and stiffing its advanced stage. Other features of the disease include pigmentation and recurrent ulceration of oral mucosa, restricted movement of the soft palate, dryness of the mouth, burning sensation, decreased mouth opening, and tongue protrusion<sup>(7)</sup>.

The management of OSMF is mainly followed by two major strategies—medical and surgical; however, the question of improving the elasticity of oral mucosa and thus increasing the mouth opening is prevailing. Considering the above facts, apart from medical and surgical management, physiotherapy is offering the third dimension to the management of OSMF. Basic physiotherapy techniques, viz., active jaw movements

and stretching have been tried postsurgically as a supportive therapy. Apart from this, ultrasound (US) is conventionally being used for fibrous and scar tissues, however, it has not been extensively used for oral mucosa. Ultrasound is defined as a form of acoustic vibration with frequencies so high that it can't be perceived by human ear. Thus frequencies less than 17000 Hz are usually sound and those above are defined as ultrasound. Ultrasound used for therapeutic purpose has a frequency of about 0.8-1 MHz and an intensity of 0.5-3 w/cm<sup>2</sup><sup>(8)</sup>.

Ultrasonic treatment: ultrasonic waves produce tissue heating at a deeper level than moist heat; this increase in local tissue temperature leads to increase in blood flow and removal of metabolic byproducts responsible for pain and may help decrease adhesions. The physiotherapy is third dimension of treatment in oral sub mucous fibrosis, which include disrupting collagen cross-linkage.

Stretching exercises: Physical therapy using muscle-stretching exercises for the mouth may be helpful in preventing further limitation of mouth movements. This is often combined with medical and surgical therapy. Muscle stretching exercises for the mouth may be helpful to prevent further limitation of mouth movements. This includes forceful mouth opening with the help of sticks, ballooning of mouth, hot water gargling. This is thought to put pressure on fibrous bands. Forceful mouth opening have been tried with mouth gag & acrylic surgical screw. Hence, this study is designed to evaluate the adjuvant effects of therapeutic ultrasound and physiotherapy in OSMF patients<sup>(9)</sup>.

## Methodology

Study design: experimental study. Study setting: saveetha medical college and hospital, saveetha institute of medical and technical sciences, thandalam, chennai. Sampling method: convenient sampling technique sample size: 40 individuals. Inclusion criteria: gender: both males and females, age group: 20 -50 years, eligibility: less than 30-35 mm and subjects: mouth opening level less than 30 mm using pan or other substance for more than 6 months. Exclusion criteria: mouth opening level more than 30-35mm, using pan or other substance for less than 6 months, any fracture in the oral cavity, surgeries done in oral cavity and established cancer cases

**Procedure:** Following the Institutional Scientific Review Board approval the study was initiated with participants chosen from Saveetha Medical College and

Hospital, Saveetha Institute of Medical and Technical Sciences, Thandalam.

The study was approved by institutional human ethical committee and ethical clearance was obtained from Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Thandalam. The study procedure was explained to all the participants with an information sheet and a informed consent was obtained. Assessment was done and 40 individuals with oral submucous fibrosis were selected based on the inclusion and exclusion criteria following which participants were randomly allocated into groups, Group A and Group B. Group A individuals were treated with ultrasound and jaw opening exercises. Group B individuals were treated with jaw opening exercises. Both the group participants were assessed for the level of mouth opening using scale and divider. After Preliminary Evaluation, the participants in Group A and group B were made to proceed into a 2-week treatment program. After two weeks of intervention, post period assessment same as of pretest was performed to ensure any differences.

#### Group A:

Group A individuals were treated with jaw opening exercises.

The participants were asked to perform the following exercises

- Wide mouth opening and maintaining it for five seconds- 10 repetitions
- Lateral deviation of mandible to right and left side -10 repetitions
- Protrusion of mandible-10 repetitions
- Gradual mouth stretching by placing the left thumb over the lower incisor and right index finger over the lower incisor and maintain it for 5 seconds-10 repetition

These exercises are done two times a day for five days per week for two week

#### Group B:

Group B individuals were treated with ultrasound and jaw opening exercises

The participants were made to lie down in supine position comfortably.

Ultrasound is applied to the affected side cheek .The parameters of ultrasound therapy are

It is followed by jaw opening exercises

- Wide mouth opening and maintaining it for five seconds- 10 repetitions
- Lateral deviation of mandible to right and left side -10 repetitions
- Protrusion of mandible-10 repetitions
- Gradual mouth stretching by placing the left thumb over the lower incisor and right index finger over the lower incisor and maintain it for 5 seconds-10 repetition

These exercises are done two times a day for five days per week for two weeks

#### Outcome Measures:



Figure 1: Level of mouth opening measurement



Figure 2: Level of mouth opening

**Statistical Analysis:** The collected data was tabulated and analyzed using descriptive and inferential statistics. To all parameters mean and standard deviation (SD) was calculated. Paired t-test was used to analyze significant changes between pre-test

and post-test measurements. Unpaired t-test was used to determine significant difference between the groups. A p-value less than 0.0001 were considered as statistically significant.

**Table: 1 Comparison of pre test and post test values of Group A**

Outcome Measure	Pre Test		Post Test		t-Value	p-Value
	Mean	S.D	Mean	S.D		
Level of Mouth Opening	24.70	1.92	25.55	1.73	6.4743	<0.0001

**Table:2 Comparison of pre test and post test values of Group B**

Outcome Measure	Pre Test		Post Test		t-Value	p-Value
	Mean	S.D	Mean	S.D		
Level of Mouth Opening	24.50	1.85	30.20	1.64	17.9777	<0.0001

**Table:3 Comparison of post test values between group A and group B**

Outcome Measure	Group A		Group B		t-Value	p-Value
	Mean	S.D	Mean	S.D		
Level of mouth opening	25.55	1.73	30.20	1.64	8.7163	<0.0001

**Results**

From statistical analysis made with quantitative data revealed statistically significant between pre and post test value the post test mean value of group a (jaw opening exercises) is 25.55 and group b (ultrasound and jaw opening exercise) is 30.20. Pre test and post test values of group a (jaw opening exercises). The paired t value shows that there is extremely statistically significant change at  $p < 0.0001$  and t value 6.4743 (Table 1). Pre test and post test values of group b (ultrasound and jaw opening exercises). The paired t value shows that there is extremely statistically significant change at  $p < 0.0001$  and t value 17.9777 (Table 2). Post test values of group a and b. the paired t value shows that there is extremely statistically significant change at  $p < 0.0001$  and t value 8.7163 (Table 3).

**Discussion**

OSMF is a commonly occurring and widely spread premalignant condition increasingly affecting the youth. The occurrence of OSMF in gutkha chewers is far more faster and more severe as compared in other forms of

areca nut products chewers. The easy availability and promotions of these areca nut products specially gutkha and pan masala outside the schools colleges and social places has impacted younger population in India which has led to the increased occurrence of OSMF. Causation of OSMF is multifactorial but in present study pan masala was the commonest product used

According to this study our dual therapy of local ultrasound and jaw opening exercise has led to significant improvement in mouth opening when compared to the group treated with only jaw opening exercises.

The purpose of this study was to determine the effectiveness of ultrasound in osmf patients. This improvement could be explained on the basis of effect of pulsed ultrasound due to mechanical effect which causes loosening of adherent fibrous tissue probably due to the separation of collagen fibres from each other and softening leading to pliability jaw opening exercises include opening of the mouth, gradual stretch to the mouth .

The two treatment modalities definitely show a



significant improvement in the patient's condition with no reported side effects, hence should be included in the treatment protocol for patients with OSMF before a more invasive surgical intervention is sought<sup>(10,11)</sup>. Reduction in pain and improvement in maximal mouth opening was appreciably significant in both the groups. The results indicated that ultrasound when given along with exercise resulted in significantly better subjective and objective outcome. Therapeutic ultrasound when used as an adjuvant shows a significant improvement in the patient's condition with no reported side effects, hence, should be incorporated in the treatment protocol for patients with OSMF<sup>(12)</sup>. There was significant improvement in mouth opening in both the groups, that is, exercise alone and the ultrasound along with exercise in patients with OSMF. However ultrasound in combination with exercise gives more improvement in mouth opening compared to exercise alone<sup>(13,14)</sup>.

### Conclusion

Ultrasound therapy followed by jaw opening exercises can be alternate mode of treatment for OSMF to improve mouth opening level. The subjects treated with ultrasound followed by jaw opening exercises were more satisfied with the outcome than the subjects treated with jaw opening exercises only. Patients with OSMF suffer a lot because of pain and limited mouth opening level several techniques such as cortisone injections are used. Study is required in physiotherapy method since it is a non invasive method which will be fruitful to the patients.

**Ethical Clearance:** IHEC approval was obtained before subject enrolment from SIMATS, Chennai.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Clinicomicrobiological Profile of Gram Negative Bacterial Infections in Adult ICU's of a Tertiary Care Centre

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## Abstract

**Objectives:** To identify the common Gram negative bacteria associated with health care associated infections, To study the antibiogram and to identify the presence of genes responsible for Carbapenem resistance in Gram negative bacterial pathogens

**Method:** Prospective study was carried out for 2 years. The pathogens from cases of clinically suspected infection in ICU were identified by the standard biochemical reactions. Antibiotic sensitivity testing was done by the Modified Kirby-Bauer disk diffusion method. Multiplex PCR was done to detect the carbapenem resistant genes in Gram negative bacilli :bla<sub>NDM-1</sub>, bla<sub>VIM</sub>, bla<sub>IMP</sub>, bla<sub>OXA-48</sub> and bla<sub>KPC</sub> genes

**Results:** Study included 175 clinically significant Gram negative bacterial isolates. 42% of the isolates were from ET aspirate, followed by sputum, pus and blood. Klebsiella spp. and Acinetobacter spp. were the common pathogens. 18% of the pathogens showed Carbapenem resistance. The statistically significant risk factors were Invasive procedure, ventilation, catheterization, prior antibiotic use, chronic liver, lung diseases and diabetes. NDM 1 was the common gene identified.

**Conclusion:** Antibiotic resistance is on rise in our setup mandating continuous monitoring of the trend.

**Keywords:** Antibiotic resistance, Gram negative bacilli, Infections, NDM-1.

## Introduction

Gram-negative bacteria cause infections including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis in healthcare settings. Gram-negative infections include those caused by Klebsiella spp., Acinetobacter spp., Pseudomonas aeruginosa, and E. coli.<sup>1</sup>

The prevalence of infections in ICU is reported as 51.4%. The proportion of Drug resistant bacilli

is increasing including carbapenemase-producing Klebsiella pneumoniae (KPC), Acinetobacter spp. and Pseudomonas aeruginosa.<sup>2,3</sup> Compared with infections caused by susceptible strains of the same organism, infections caused by several antibiotic-resistant bacteria have been associated with worse outcomes, including longer hospitalization, higher mortality rates, and greater healthcare expenditure.<sup>4</sup>

The reported risk factors for Gram negative bacterial infections include diabetes mellitus, chronic respiratory conditions, and nosocomial factors such as empiric use of fluoroquinolones, immunosuppression and the use of invasive devices.<sup>5</sup>

The previous studies have reported 2-3 % in ICU. Pneumonia was the most frequently detected infection (62.07%), followed by urinary tract infections and central venous catheter associated bloodstream infections.

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Gram-negative Enterobacteriaceae were most frequently isolated pathogens, while *P. aeruginosa* was the single most frequent causative organism in ICU infections.<sup>6</sup>

For empirical treatment, the in vitro susceptibility pattern for a CRE in the hospital will be worthwhile.<sup>9, 10</sup> There recent reports coming from India and the neighboring countries (including Pakistan and Bangladesh) show that the distribution of NDM β lactamases among clinical and environmental isolates of Gram-negative bacteria is widespread in these areas.<sup>11-16</sup>

**Aim and Objectives:**

1. To identify the common Gram negative bacteria associated with health care associated infections
2. To study the antibiogram of Gram negative bacilli associated with health care associated infections
3. To identify the presence of genes responsible for Carbapenem resistance in Gram negative bacterial pathogens
4. To identify the risk factors, treatment and outcome in these cases

**Material and Method**

**Study Design:** Prospective study.

**Study Subjects:** Patients of the age 18 years and above developing infections with Gram negative bacilli after 48 hrs of admission into hospital.

**Exclusion Criteria:** Patients presenting with infections at the time of admission and patients below 18 years of age.

**Study Duration:** 2 years

**Sample Size:** With 95% confidence level and 80% power, with reference to [14], the sample size came to be 175 based on the following calculations:

The collected data was entered into MS Excel and analysis was done using SPSS Version 15. For categorical variables, statistical test chi square was done, and only those with p value less than or equal to 0.05 was considered statistically significant.

Samples from cases of clinically suspected infection

in ICU are plated on chocolate agar and blood agar and MacConkey agar and incubated at 37°C overnight and bacterial growth was identified by the standard biochemical reactions. Antibiotic sensitivity testing was done by Modified Kirby-Bauer disk diffusion method. The results were analysed and interpreted in accordance with Clinical Laboratory Standards Institute (CLSI) recommendations.

The genes for Carbapenem resistance were detected by PCR. Multiplex PCR was done to detect the carbapenem resistant genes in Gram negative bacilli: bla<sub>NDM-1</sub>, bla<sub>VIM</sub>, bla<sub>IMP</sub>, bla<sub>OXA-48</sub> and bla<sub>KPC</sub> genes using the protocol previously published.<sup>21</sup> The empirical antibiotic given, any changes/de-escalation done after receiving the report, duration of antibiotic treatment was noted from the case sheets .

**Results**

The study included 175 clinically significant Gram negative bacterial isolates .The distribution of clinical samples and Gram negative pathogens are given in Tables 1 and 2 respectively. The Antibiotic resistance pattern of Gram negative bacterial pathogens is shown in Table 3 .ESBL producers 72/175 (41.14%). Cefaperasone sulbactam and Piperacillin Tazobactam: the resistance rates were 29% .The statistically significant risk factors were Invasive procedures, mechanical ventilation, catheterization, prior antibiotic use, chronic liver, kidney and lung diseases and diabetes. (p value : Chi square test <0.001 very highly significant as shown in Table 4 The characterization of Carbapenem resistant genes in Gram negative bacteria shown in Table 5. Agarose gel picture of the PCR for the detection of carbapenemase genes is shown in Figure 1 .

**Table 1: Distribution of Gram negative pathogens in clinical specimen**

Samples	Number
ET aspirate	74
Urine	46
Sputum	31
Pus	15
Blood	9
Total	175

**Table 2: Specimen wise distribution of Gram negative bacterial pathogens**

Isolate	Number	ET Tip	Urine	Sputum	Pus	Blood
Klebsiella spp.	62	18	19	21	0	4
Acinetobacter spp.	44	35	4	5	0	0
Pseudomonas spp.	41	19	7	3	12	0
Escherichia coli	28	2	16	2	3	5
Total	175	74	46	31	15	9

**Table 3:Antibiotic resistance pattern of Gram negative bacterial pathogens**

Antibiotic	Resistance Rates
Aminoglycosides	69/175 (39.4%)
Fluoroquinolones	70/175 (40%)
3 <sup>rd</sup> generation cephalosporins	77/175 (44%)
Piperacillin tazobactam	50/175 (29%)
Carbapenems	32/175 (18%)

**Table 4: Characterization of Carbapenem resistant genes in Gram negative bacteria**

Isolate	Carbapenem Resistant Gene
Klebsiella spp. (12)	NDM-1: 5, OXA-48: 2, VIM :1
Acinetobacter spp. (10)	VIM : 2
Escherichia coli (6)	NDM-1:2, OXA-48 :1
Pseudomonas spp. (4)	IMP:1, VIM:1

Figure 1 PCR for detection of bla<sub>NDM-1</sub> and bla<sub>KPC</sub> genes

Agarose gel picture of amplified products showing bla<sub>NDM-1</sub> gene

Lane 1: DNA ladder (100 bp)

Lane 2: Sample 1- Negative for bla<sub>NDM-1</sub> and bla<sub>KPC</sub> gene

Lane 3: Sample 2 – Positive for bla<sub>NDM-1</sub> gene

Lane 4: Sample 3 – Positive for bla<sub>NDM-1</sub> gene

Lane 5: Positive control for bla<sub>KPC</sub> gene

Lane 6: Positive control for bla<sub>NDM-1</sub> gene

In our study, 89 of the 175 patients (50.85%) with Gram negative bacterial infections in ICU expired . The

immediate cause of death in these patients were Sepsis with MODS, malignancy, cellulitis, renal failure. The empiric antibiotic treatment given was Cefotaxime, Ceftriaxone, Meropenem, Amikacin, Cefepime sulbactam and Piperacillin tazobactam .

In 35% of the cases in ICU, the empiric antibiotic Piperacillin tazobactam and Meropenem was deescalated to Cefotaxime .In 32% of the cases, the antibiotics Cefotaxime, Piperacillin tazobactam and Amikacin were escalated to Meropenem based on the antibiotic sensitivity report .In 18% of the cases, the empiric treatment was Piperacillin tazobactam or Meropenem,it was escalated to Colistin or Colistin with Tigecycline .

## Discussion

The Gram negative bacterial infections (51%) reported include pneumonia, UTI, surgical site infections. We studied 175 cases in the ICU with Gram negative bacterial infections . The

commonest bacterial pathogens reported in our ICU were Klebsiella spp. .Acinetobacter spp., Pseudomonas spp., Escherichia coli.<sup>18</sup> The major infections found in ICU were due to Acinetobacter baumannii, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus and Streptococcus pyogenes.

The infection rate was maximum in the urinary tract (44.4%) followed by wound infections (29.4%), pneumonia (10.7%) and bronchitis (7.4%)...The maximum isolation of Klebsiella spp., Acinetobacter spp, were from respiratory samples, Pseudomonas spp. from pus and Escherichia coli were isolated majorly from urine .The prevalence of nosocomial infections in ICU has been 11-60%. On the contrary some studies have reported UTI accounting for the 30% of nosocomial infections.<sup>19,20</sup>

The antibiotic resistance rates detected in our set up were aminoglycosides (39%), fluoroquinolones (40%), third generation cephalosporins (44%), Piperacillin tazobactam (29%) Carbapenems (18%). ampicillin and co-trimoxazole 75% and 59%, respectively. E. coli resistance to third-generation cephalosporins increased from 70% to 83%, and fluoroquinolone resistance increased from 78% to 85%. The rate of Carbapenem resistance in E coli is 13%. Klebsiella pneumoniae had a resistance of 80% to third-generation cephalosporins, 73% to fluoroquinolone, 52% to Carbapenem in tertiary-care hospital in New Delhi .<sup>21</sup>

In Acinetobacter isolates from ICU the resistance rates reported were 31% to Ciprofloxacin, 60% to Ceftazidime, 62% to Ceftriaxone, 64% to Amikacin, 75% to Piperacillin.<sup>22</sup> The previous studies on the ICU isolates of Pseudomonas aeruginosa have reported the following resistance rates: Ceftazidime : 58%, Gentamicin: 73%, Amikacin: 68%, Ciprofloxacin : 71%, Piperacillin tazobactam : 45%, Cefaperasone sulbactam: 64%, Imipenem : 67%.<sup>23</sup>

The common carbapenem resistant genes detected in our setup were bla<sub>NDM-1</sub> (26%), bla<sub>VIM</sub> (19%) and bla<sub>OXA-48</sub> (17%) We did not detect bla<sub>KPC</sub> and bla<sub>IMP</sub> was detected in 1 isolate of Pseudomonas aeruginosa.. The carbapenem resistant genes were detected in 54% of the isolates . The remaining mechanisms could be contributed by porin loss and/or chromosomal ampC hyper production bla<sub>NDM</sub> was the the most common MBL identified, agreeing to the previous reports. The occurrence of bla<sub>NDM</sub> ranged from 5% to 24% in various studies from India. <sup>24</sup> The ICU mortality rate was 50% in our setup. Some studies have reported mortality rates as high as 67% in ICU . Elderly male patients with sepsis accounted for 80% of the expired cases <sup>25</sup>. In the previous published studies de-escalation was done in 52% of the cases. The empiric antibiotic Piperacillin tazobactam was deescalated to Ceftriaxone. In our study antibiotic de-escalation was done in 36% of the cases.<sup>26</sup>

### Conclusion

In our study the maximum isolation of Gram negative bacilli as pathogens were from respiratory samples (ET aspirate, sputum) followed by urine and pus .Pneumonia was the commonest infection reported followed by Urinary tract infection and catheter related blood stream infections.

Antibiotic resistance is on rise in our setup mandating continuous monitoring of the trend . The antibiotic resistance rates detected in our set up were aminoglycosides (39%), fluoroquinolones (40%), third generation cephalosporins (44%), Piperacillin tazobactam (29%) Carbapenems (18%).

The common carbapenem resistant genes detected in our setup were bla<sub>NDM-1</sub> (26%),bla<sub>VIM</sub> (19%) and bla<sub>OXA-48</sub> (17%) .

**Ethical Clearance:** Obtained from the Institutional Ethics Committee

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# Comparitive Evaluation of pH and Calcium Ion Release in Newer Calcium Silicate Based Root Canal Sealers

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## Abstract

**Introduction:** The aim of root canal treatment is to provide three-dimensional obturation of the root canal system to prevent the entry of bacteria and fluid. Recent Calcium Silicate Sealers (CSS) have been claimed to be excellent sealers with alkaline pH, low solubility and providing good sealing owing to their setting expansion. To date, there are not enough publications that prove their physiochemical behavior.

**Aim:** The aim of this study is to evaluate and compare both pH and calcium ion release in newer calcium silicate-based root canal sealers.

**Material and Method:** We compared 3 commonly used calcium silicate sealers which were categorised as Group 1 (n = 5) control group, Group 2 (n = 10) sealapex, Group 3 (n = 10) mineral trioxide aggregate (MTA) fillapex, and Group 4 (n = 10) White MTA. The polyethylene tubes were prepared and materials were filled according to the groups made. The tubes were packed and flask was closed and stored at a constant temperature of 37°C during all the evaluation period at different intervals of 24 h, 7 days and 1 month. pH and calcium ion released was measured using pH meter and atomic absorption spectrophotometer, respectively.

**Results:** At 24 h, White MTA showed the highest pH and highest calcium (Ca<sup>++</sup>) release. MTA fillapex maintained an alkaline ph even after 1 month of the study. MTA Fillapex showed the highest Ca<sup>++</sup> release even after 30 days that gradually increased aswell.

**Conclusion:** MTA Fillapex proves to show better alkalinizing ability and Ca<sup>++</sup> release of as compared to White MTA and (Sealapex) with increase in time intervals can be explained by greater solubility of MTA Fillapex with time as compared to the other two materials.

**Keywords:** Calcium silicate, filapex, MTA, sealapex.

## Introduction

The aim of root canal treatment is to provide three-dimensional obturation of the root canal system to

prevent the entry of bacteria and fluid.<sup>1,2</sup> To provide hermetic sealing, core materials such as gutta-percha (GP) and root canal sealers are essential.<sup>3,4</sup> The introduction of sealers with therapeutic properties applied in endodontics conceivably created prospective of a higher success rate of root canal treatment.

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Properties like pH changes and released elements of root canal sealers have an impact on their clinical, biological and antibacterial behaviors. The alkaline pH is closely related to the increased hydroxyl and calcium ion (Ca<sup>2+</sup>) release after root canal obturation, which

inhibits growth of residual microbes, and this enhances healing of periapical pathosis.<sup>5,6</sup>

The use of calcium hydroxide clinically in the root canal was first reported by Rohner in 1940. Hence, the focus of research in sealers shifted toward calcium ( $\text{Ca}^{++}$ ) based sealers due to their antimicrobial activity owing to their  $\text{Ca}^{++}$  releasing potential. These sealers have been popularly used because of their potential for providing a high alkaline environment.

In 1993, at Loma Linda University, Dr. Torabinejad invented MTA. MTA is a complex blend of hydrophilic tricalcium silicate, tricalcium oxide, and tricalcium aluminate with added oxides (bismuth oxide).<sup>8</sup> Various studies have shown MTA to be biocompatible with the ability to stimulate mineralization and have the property of deposition of apatite-like crystals in dentin due to which its use was encouraged as a sealer. However, it has revealed specific drawbacks of extended setting time and challenging handling properties.<sup>10</sup> So as to recover some MTA drawbacks, numerous new calcium silicate-based materials have been invented.<sup>11</sup>

Latest among these sealers is MTA Fillapex. Which is basically MTA incorporated with salicylate resin, natural resin, bismuth, and silica. Their good handling property makes them easier to be used in the canal as a sealer. However, there is limited research regarding the physiochemical and biological properties of MTA Fillapex.<sup>12</sup>

Recent Calcium Silicate Sealers (CSS) have been claimed to be excellent sealers with alkaline pH, low solubility and providing good sealing owing to their setting expansion. To date, there are not enough publications that prove their physiochemical behavior. Hence, it is necessary to evaluate pH and  $\text{Ca}^{++}$  release of these materials to analyze their alkalization ability and induction of mineralization.

Therefore, this study was designed to evaluate pH and calcium ion release of a new calcium silicate-based sealer-MTA Fillapex and compare it with White MTA and the conventional calcium hydroxide-based sealer-sealapex.

## Material and Method

The root canal sealers tested in this study were Sealapex, MTA Fillapex and White MTA. N° polyethylene tubes were cut into 35 tubes of equal sizes; with each tube measuring 10 mm length  $\times$  1.0 mm diameter using bard parker blade and digital Vernier caliper. The tubes were pre-weighed and were prewashed with 5% nitric acid to prevent interference with phosphate ions and alkaline metals. The polyethylene mounted tubes were divided as: Group 1 ( $n = 5$ )-control group-empty tubes, Group 2 ( $n = 10$ )-tubes filled with Sealapex, Group 3 ( $n = 10$ )-tubes filled with MTA Fillapex and Group 4 ( $n = 10$ )-tubes filled with White MTA.

Fresh mixed sealers were prepared according to manufacturer instructions. The mixed MTA was carried into the polyethylene tube with the help of lentulo spiral. After complete filling of the tubes, the materials were condensed with the hand pluggers to avoid any voids in the inserted sealer. Subsequently, the samples were radiographed and those containing voids were discarded.

Subsequently, the samples were placed in polypropylene flasks, containing 10 ml of deionized water. The deionized water was verified for the total absence of calcium ions and the presence of neutral pH (6.8). The flask was closed with the lid, and the samples were stored in an incubator at a constant temperature of 37°C during all the evaluation period. At 24 h, 7 days and 1 month, the deionized water was measured for pH by a pH meter and released calcium ions were measured by atomic absorption spectrophotometer. Following each evaluation, the water was discarded, and the samples were immersed in fresh deionized water of similar amounts (10 ml).

**Statistical analysis:** According to the normality test, the data was statistically analyzed by the One-Way ANOVA and Post-Hoc Tukey HSD tests using SPSS software (Version 21.0; SPSS, Inc, Chicago, IL) at significance level of 5%, to compare the tested materials.

## Results

In the present study all the materials were evaluated for both pH and calcium release at three time intervals namely: after 24 hrs, after 7 days/ 1 week and lastly at 30 days or 1 month.

**Table 1: Comparitive pH Values of Study Materials at 24 Hours,7 Days and 30 Days.**

Study Groups	Mean pH Values 24 hrs	Mean pH Values 7 Days	Mean pH Values 30 Days
Group 1 (N=5)	6.87±0.14	6.90±0.02	6.88±0.05
Group 2 (N=10)	8.32±0.10	8.45±0.14	8.34±0.12
Group 3 (N=10)	8.29±0.05	8.68±0.08	8.74±0.10
Group 4 (N=10)	8.42±0.12	8.52±0.20	8.58±0.08

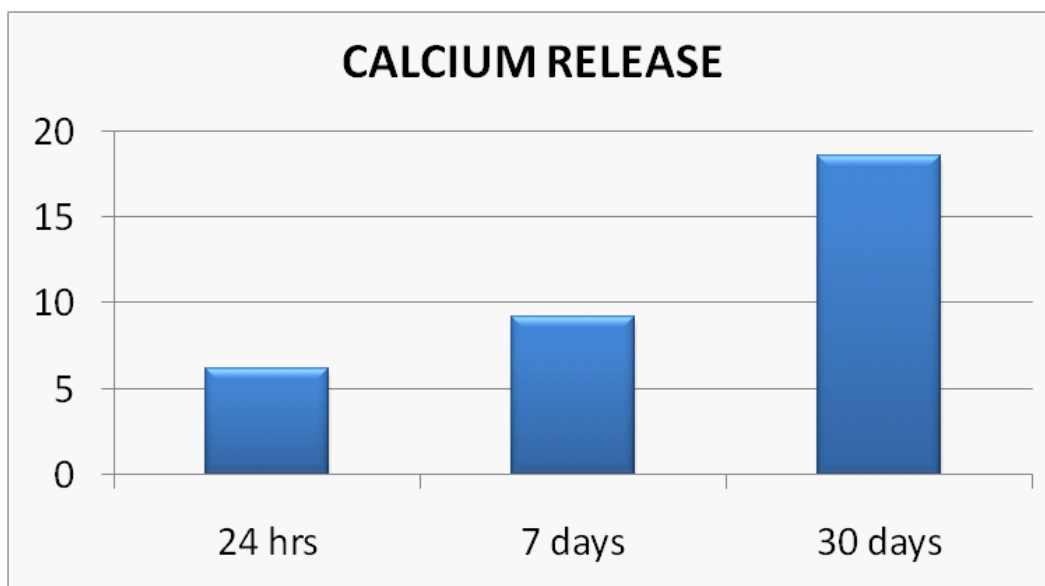
The results of mean pH values of all the study groups are compared in table 1. Our results showed that highest mean pH values observed at 24 h was shown by White MTA (group 4) with 8.42±0.12, Sealapex (group 2) with 8.32±0.10 and MTA fillapex (group 3) with 8.29±0.05. The highest mean pH values observed at 7 days and at 30 days was of MTA fillapex with 8.68±0.08 and 8.74±0.10 respectively. There was no statistically significant difference between pH of White MTA and sealapex. The difference in values of MTA Fillapex was significantly higher than other two groups ( $P < 00001$ ).

Further table 2 demonstrated mean values of calcium release by all study materials. It was observed

that The highest calcium ion release at 24 h was shown by White MTA (group 4) with 15.20±0.42 followed by group 2 i.e Sealapex with 9.04±0.08 and lastly least values were obtained from MTA Fillapex (group 3) with 6.21±0.10. Control group showed negligible Ca<sup>++</sup> release at all time periods (0.03). All the experimental materials showed Ca<sup>++</sup> release at all time periods. At 7 days, MTA Fillapex showed the highest Ca<sup>++</sup> release with 9.24±0.20, whereas, Sealapex showed significantly lowest calcium ion release with 8.02±0.12. At 30 days, the calcium ion release by MTA Fillapex was again the highest with 18.56±2.40. The difference the values of MTA Fillapex when compared with other groups was found to statistically highly significant ( $P < 00001$ ).

**Table 2: Comparitive Mean Calcium Values of Study Materials at 24 Hours, 7 Days and 30 Days.**

Study Groups	Mean Values 24 hrs	Mean Values 7 Days	Mean Values 30 Days
Group 1 (N=5)	0.04±0.02	0.04±0.02	0.04±0.02
Group 2 (N=10)	9.04±0.08	8.02±0.12	6.89±0.28
Group 3 (N=10)	6.21±0.10	9.24±0.20	18.56±2.40
Group 4 (N=10)	15.20±0.42	8.32±0.42	9.86±2.10



**Graph 1: Comparitive Mean Calcium Values of MTA Fillapex at 24 Hours, 7 Days and 30 Days.**

When pH and calcium ion release at different time intervals was compared, it was found that Sealapex showed an almost constant pH and gradual decrease in calcium ion release with increasing time intervals. MTA Fillapex in our study showed an increase in the pH and a significantly higher calcium ion release with an increase in the period.

## Discussion

The present study compared the change in pH and calcium release in three commonly used materials as Sealapex, MTA Fillapex and White MTA at three different time intervals.

With regard to the pH our study reported MTA fillapex to maintain an alkaline pH even after 1 month of the study. But there are controversies among studies when literature was reviewed. Some studies supported our finding as strongly alkalinity (pH range 10-12) that continued for four weeks after setting<sup>13-15</sup>.

In yet another study, the initial pH of MTA-Fillapex was low in alkaline (pH = 9.3) that gradually declined over time to be 7.76 after 7 days.<sup>16</sup> It was believed that a strong alkaline pH may encourage a prolonged setting time which enhances a long-lasting antibacterial effect and eliminates the residual microbes that survive on the dentinal wall.<sup>17</sup> On contrary the pH value in the current study was found to be less than reported by Torabinejad *et al.* and Cutajar *et al.*<sup>18</sup>

Different pH values are observed with different formulations of MTA which can be explained on basis that calcium hydroxide present in MTA and MTA based sealers dissociates into  $\text{Ca}^{++}$  and  $\text{OH}^-$  ions, thus increasing the pH of the solution and because of this variation in the concentration of calcium hydroxide there is variation in pH as well. Furthermore, although both White MTA and MTA Fillapex are MTA based sealers, but the size of the polymer chain formed after setting may vary which may explain the difference in the result.

Further in our study, MTA Fillapex showed higher  $\text{Ca}^{++}$  release which can be explained by the higher solubility of MTA Fillapex as was seen in the study by Borges *et al.* where the solubility of MTA Fillapex (14.85%) was more than Sealapex (5.65%).<sup>19</sup> In a study by Nassari MRG *et al.*, Fillapex presented a solubility of 16.6% at 2 days and 15.03% at 7 days, whereas Sealapex exhibited solubility of 13.42% at 2 days and 9.97% at 7 days.<sup>20</sup> A decrease in solubility should manifest as a decrease in  $\text{Ca}^{++}$  release and a decrease in pH.

The calcium ion release and, in consequence, the increase in pH values is closely related to setting time and solubility<sup>21</sup>. According to Parirock and Torabinejad<sup>22</sup>, the presence of calcium may favor an alkaline pH, which leads to a biochemical effect that accelerates the healing process.

In 2013, Silva *et al.* suggested that due to high alkalinity of MTA Fillapex,<sup>16</sup> it had a strong capacity to release hydroxyl ions, thereby causing a high  $\text{Ca}^{2+}$  ion release. The alkaline media could activate the alkaline phosphatase, neutralize the acid, inactivate the osteoclasts, prevent the further bone destruction and allow tissue repair with concomitant apatite formation. The extreme alkalinity, however, can induce severe tissue cytotoxicity overtime. The significant difference in  $\text{Ca}^{2+}$  released from the four brands of CSS confirmed its different alkaline pH values.<sup>16</sup>

## Conclusion

MTA Fillapex proves to show better alkalinizing ability and  $\text{Ca}^{++}$  release of as compared to White MTA and (Sealapex) with increase in time intervals can be explained by greater solubility of MTA Fillapex with time as compared to the other two materials. However, further studies are needed to establish better and confirmed findings with a methodology which would probably better simulate the clinical situations.

**Conflicts of Interest:** The authors declare that there is no conflict of interest regarding the publication of this paper.

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**Ethical Clearance:** Ethical clearance has been taken from Institutional Ethical Committee

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# Tobacco Prevalence and Usage Pattern in the Urban Slum of Visakhapatnam

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## Abstract

Tobacco use is one of the biggest public health threats the world has ever faced and leads not only to human loss, but also heavy social and economic costs. Hence study was initiated with objectives to determine prevalence of tobacco usage and patterns among urban slum population and to study socio-demographic characteristics among study population. It was an observational, descriptive cross-sectional study conducted in the urban field practice area of GITAM Institute of Medical Sciences & Research, Visakhapatnam for a period of 3 months. The study population included were adults aged above 18 years who were residing in that area since 1 year and willing to participate in the study. The sample size was 350. A simple random sampling procedure was followed. Present questionnaire adopted from GATS survey Questionnaire. Data entered in MS excel sheet. Analysis done by using SPSS soft ware. Out of 350 study population 216 (61.7%) were males and 134 (38.3%) were females. In this study prevalence of current users of smoking daily was 34.9% and less than daily users was 7.1%. The most common type of smoking product used was cigarettes (30.9%). There was 15.1% of former smoking of users was observed. The prevalence of current daily users of smokeless form of tobacco was found to be 13.7% and product used for smokeless form was chewing tobacco (8.8%). There was 12.5% of study population exposed to second hand smoke. Most common reason for initiation of tobacco use was fun (16%). Prevention of tobacco use in people appears to be the single opportunity for preventing non-communicable disease in the world today. India needs to adopt a more holistic and coercive approach to fight the problem of tobacco by adopting media awareness, behavior change communication interventional activities and establishing tobacco de-addiction and counselling centres for slum dwellers.

**Keywords:** Smoking, Tobacco usage, Tobacco patterns, Urban slum, Visakhapatnam.

## Introduction

Tobacco use is one of the biggest public health threats the world has ever faced and leads not only to human loss, but also heavy social and economic costs. It is claiming the lives of nearly 5.4 million people a

year worldwide.<sup>[1]</sup> Burden in South East Asia region is one of the highest among WHO regions.<sup>[1]</sup> Tobacco is one of the major causes of death and disease in India, accounting for nearly 0.9 million deaths and 12 million people fall ill due to tobacco every year.<sup>[2]</sup> Nearly 275 million adults (15 years and above) in India (35% of all adults) are users of tobacco, according to the Global Adult Tobacco Survey India, 2009-10.<sup>[3]</sup> Tobacco use is a major risk factor for many chronic diseases including lung diseases, cardiovascular diseases and stroke. Among other diseases, tobacco use increases risk for lung and oral cavity cancers.<sup>[4]</sup> Tobacco use accounts for one in six deaths due to non-communicable diseases (NCDs). In India tobacco consumption pushes approximately 150 million people in poverty.<sup>[4]</sup>

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**Objectives:**

- To determine prevalence of tobacco usage and patterns among urban slum population.
- To study socio-demographic characteristics among study population.

**Methodology**

**Study Design:** An observational, descriptive cross-sectional study.

**Study Setting:** Urban field practice area of GITAM Institute of Medical Sciences & Research, Visakhapatnam.

**Study Population:** Adults aged above 18 years who were residing in that area since 1 year.

**Inclusion Criteria:**

1. Age >18 years
2. Both gender (male and female).
3. Those who were willing to participate in the study.

**Exclusion Criteria:**

- a. Age <18 years
- b. Those Who were not willing to participate in the study.

**Study Period:** 3 months (Feb 2019 to April 2019)

**Sample Size:** Considering the prevalence of tobacco use as 35% among adults in a previous study [5] with a relative precision of 5% the minimum required sample size for assessing the prevalence of tobacco use

among adults was calculated to be 350 by using formula  $(1.96)^2pq/L^2$ .

**Sampling Technique:** A simple random sampling procedure was adopted to select 350 families from the house list of the area. Then from every house one person was randomly selected who matched the inclusion and exclusion criteria of the study. After obtaining consent data was collected by interviewing the randomly selected participants by house to house survey.

**Study Tools:** Present questionnaire adopted from GATS survey Questionnaire. Modified questionnaire includes information on their socio-demographic status, tobacco usage and patterns, reasons for their initiation and/or addiction to tobacco and on their knowledge about ill effects of tobacco use.

**Ethical Considerations:** Ethical clearance was obtained from Institutional Ethical committee, GITAM Institute of Medical sciences & Research, Visakhapatnam before starting of the study. Informed consent was taken from all the study participants.

**Statistical Analysis:** Data entered in MS excel sheet. Analysis done by using SPSS software. Qualitative data was represented as percentages and proportions. Chi square test applied for finding out statistical significance. P value <0.05 is considered as statistically significant.

**Results**

A total of 350 study participants were studied, out of which 216 (61.7%) were males and 134 (38.3%) were females.

**Table 1 : Distribution of study population according to socio demographic characteristics**

Variable	Grouping	Male n (%)	Female n (%)	P value
Marital status	Married	151 (69.9%)	94 (70.15%)	0.002
	Unmarried	65 (30.1%)	40 (2.85%)	
	Total	216 (100%)	134 (100%)	
Religion	Hindu	183 (85)	116 (86.56)	0.25
	Christian	21 (10)	11 (8.20)	
	Muslim	12 (5)	7 (5.22)	
	Total	216 (100%)	134 (100%)	

Variable	Grouping	Male n (%)	Female n (%)	P value
Education	Illiterate	97 (45)	54 (40)	0.08
	Primary	43 (20)	26 (20)	
	Secondary	32 (15)	34 (25)	
	High school & above	44 (20)	20 (15)	
	Total	216 (100%)	134 (100%)	
Type of family	Nuclear	183 (85)	116 (86.56)	0.25
	Joint	21 (10)	11 (8.20)	
	Three generation family	12 (5)	7 (5.22)	
	Total	216 (100%)	134 (100%)	
Socioeconomic status	Upper class	0	0	6.64
	Upper middle	44 (20)	20 (15)	
	Lower middle	43 (20)	26 (20)	
	Upper lower	32 (15)	34 (25)	
	Lower class	97 (45)	54 (40)	
	Total	216 (100%)	134 (100%)	

In this study most of the study participants were married (male-69.9% & female-70.15%), and majority belong to Hindu by religion (male-85% & female-86.5%). Most of them were illiterates by education. Majority were from nuclear family and most of them belonged to lower socioeconomic class.

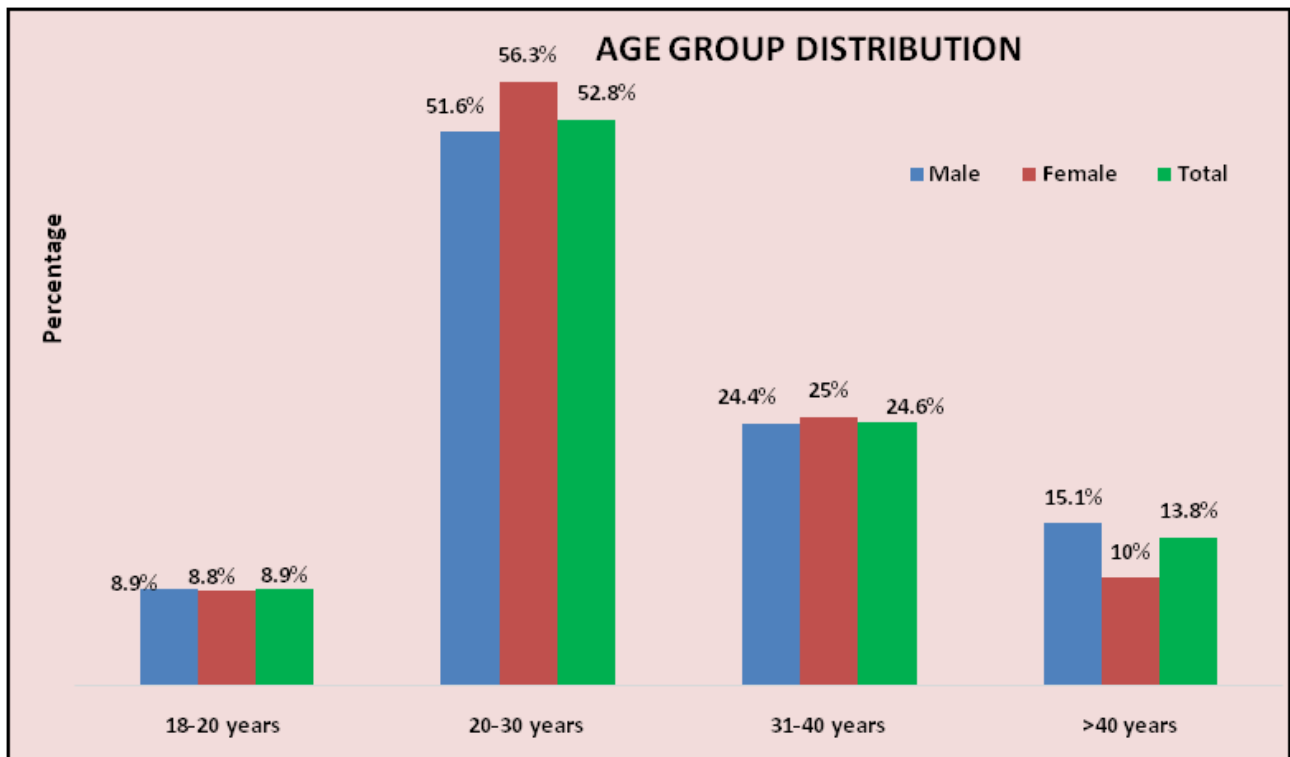


Fig. 1: Distribution of study participants based on age group

In the present study more than half of the study population in both gender group belonged to 20-30 years age group.



**Table 2: Prevalence of Tobacco among study population**

Variable	Frequency	Percentage
<b>Current smoking</b>		
Daily users	122	34.9
Less than daily users	25	7.1
Not at all	203	58
Former users for smoking	53	15.1
<b>Type of smoking product used</b>		
Cigarette	108	30.9
Hand rolled cigarette	26	7.4
Chutta	4	1.1
Others	9	2.5
<b>Current Smokeless tobacco users</b>		
Daily	48	13.7
Less than daily	28	8.0
<b>Type of smokeless form</b>		
Tobacco chewing	31	8.8
Gutka	20	5.7
Khaini	17	4.9
Others	4	1.1
Former smokeless	19	5.4
Second hand smoke	44	12.5

In this study prevalence current users of smoking daily was 34.9% and less than daily users was 7.1%. the most common type of smoking product used was cigarettes (30.9%). There was 15.1% of former smoking of users was observed. The prevalence of current daily users of smokeless form of tobacco was found to be 13.7% and product used for smokeless form was chewing tobacco (8.8%). There was 12.5% of study population exposed to second hand smoke.

**Table 3: Reasons for initiation of smoking among study participants**

Reasons for initiation	Frequency	Percentage
Fun	56	16
To pass time	37	10.6
Curiosity	8	2.3
To remove burden	12	3.4
Peer pressure	27	7.7
Stress	9	2.6
Movies/ads	10	2.9
Parenteral habits	8	2.3
Occasions	28	8
Multiple responses	37	10.6

Most common reason for initiation of tobacco use was fun (16%) followed by for time pass (10.6%) and also multiple responses.

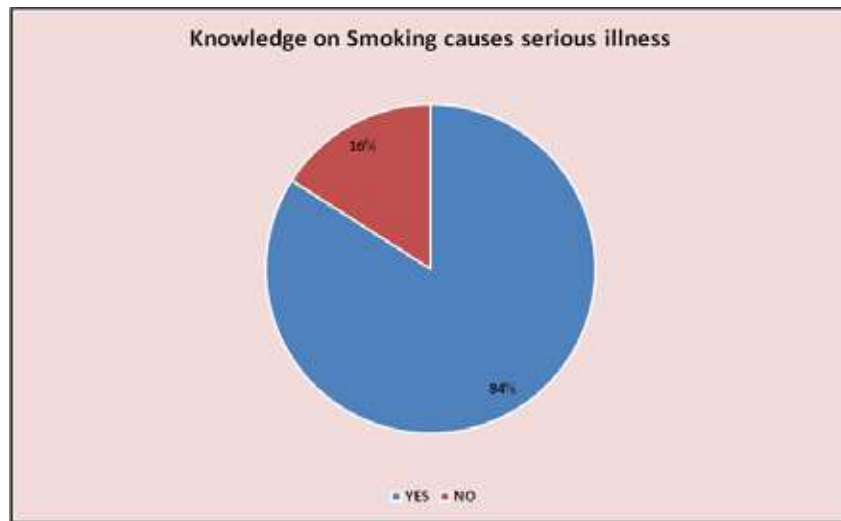


Fig 2: Knowledge on smoking causes serious illness

Majority (84%) of the study population had knowledge that smoking causes serious illness.

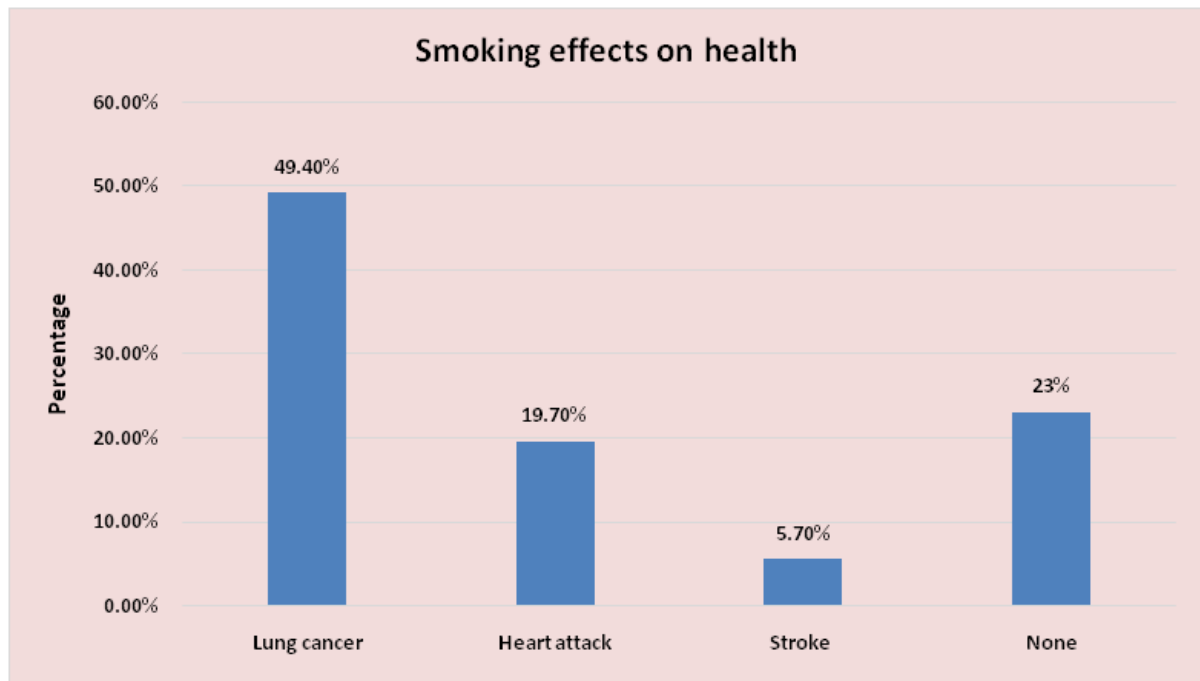


Fig 3: knowledge regarding effects of smoking on health

Knowledge regarding smoking effects on health, 49% had knowledge that smoking causes lung cancer followed by heart attack (19.7%) and stroke (5.7%).

### Discussion:

In this study prevalence of current users of smoking daily was found to be 34.9% and less than daily users was 7.1%. Similar results were observed by study conducted by GATS<sup>[3]</sup> in 2009-10 showed that the prevalence of

tobacco use among Indians was 34.6%. Higher level of prevalence was observed in a study done by Hussain CA et al., <sup>[5]</sup> found that 88.4% participants have ever used tobacco products where as 28.9% were daily users, 4.1% were less than daily users and 51.6% were occasional users. In study conducted by Das R et al,<sup>[6]</sup> showed that

the prevalence of tobacco use among urban residents was 61.76%.

In the present study most common reason for initiation of tobacco use was fun (16%). These findings were compared with other studies. Study done by Hussain CA et al.,<sup>[5]</sup> found that 31.19% of study participants had smoking offered in occasions. In study conducted by Das R et al,<sup>[6]</sup> showed that most common reason for initiation of tobacco use was “group habit” and the reason for maintenance of its use was “sense of wellbeing”.

### Conclusions & Recommendations

A total of 350 study participants were studied, out of which 216 (61.7%) were males and 134 (38.3%) were females. In the present study more than half of the study population in both gender belong to 20-30 years age group. In this study prevalence current users of smoking daily was 34.9% and less than daily users was 7.1%. The most common type of smoking product used was cigarettes (30.9%). There was 15.1% of former smoking of users was observed. The prevalence of current daily users of smokeless form of tobacco was found to be 13.7% and product used for smokeless form was chewing tobacco (8.8%). There was 12.5% of study population exposed to second hand smoke. Most common reason for initiation of tobacco use was fun (16%) followed by for time pass (10.6%) and also multiple responses. Majority (84%) of the study population had knowledge that smoking causes serious illness. Knowledge regarding smoking effects on health, 49% had knowledge that smoking causes lung cancer followed by heart attack (19.7%) and stroke (5.7%).

Prevention of tobacco use in people appears to be the single opportunity for preventing non-communicable disease in the world today. India needs to adopt a more holistic and coercive approach to fight the problem of tobacco by adopting media awareness, behavior change

communication interventional activities and establishing tobacco de-addiction and counselling centres for slum dwellers. Not only the government, but all responsible citizens will need to support the fight against this global epidemic. Non governmental organ is at ions should also help governmet for creating awareness among people on ill effects of smoking on health.

**Ethical Clearance:** Taken from Institutional Ethical committee, GITAM Institute of Medical sciences & Research, Visakhapatnam.

**Source of Funding:** Self

**Conflicts of Interest:** Nil

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# Psychological Health in Respect of Self Esteem among Rural, Urban and Semi Urban College Students of Different Genders of East Midnapore District: A Cross Sectional Study

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## Abstract

Self esteem is the expression of the existence of psychological health. Self esteem is needed as it is one of the most important human rights. Self esteem is greatly affects the quality of life as well as the productivity of the people that is why the self esteem is greatly impacted on the student's performance as they are the future of our country. This study has conducted to assess the existing level of self esteem among east Midnapore college students of technical and allied stream; also it is concentrated on whether self esteem is significantly related with gender of the students and area the students are residing. Total 159 students are included in the study after doing convenient sampling method. A questionnaire has formed which follows Rosenberg Self Esteem scale system. T test and ANOVA has conducted by SPSS 21 software and it shows neither gender nor area are significantly related with the level of self esteem among students of technical and allied stream because in every cases the p value is greater than .05.

**Keyword:** *Psychological health, Selfesteem, rural, semi urban, urban, mental health, human right, technical and allied.*

## Introduction

Self esteem has a positive relation with the psychological health. It is shown by many researchers, that self esteem is negatively related with the depression (Orth, 2008)<sup>15</sup> anxiety (Dumont, 1999)<sup>7</sup>, it has positive relation with the self efficacy (Bandura, 1977)<sup>3</sup> Self esteem is self learned, experience and it stays throughout life (Sari et al., 2018)<sup>17</sup>. It is the self evaluation of the individual either positively or negatively (Baumeister, 1998)<sup>4</sup>. The self esteem is one of the most popular topics among many psychologists around the world (Baumeister, 1993)<sup>5</sup>. The self esteem is affected when someone's social expectations are not matched with their

actual performance also social and cultural factors affect the self esteem (Tashakkori, 1993)<sup>20</sup>. Many researchers found high self esteem is helpful to improve academic excellence, accept failure, know their capabilities, ready to take challenges and many more (Baumeister, 1998)<sup>4</sup>. The level of self esteem is also associated with the higher education (Arshad et al., 2015)<sup>2</sup>. Adolescent is important because adolescent aged boys and girls are going through series of diversified environments, challenges and in that way their carrier are developed, in this regard level of self esteem is deciding factor. So analyzing the existing level of self esteem among the boys of girls of adolescent age is important (Sirin, 2004)<sup>19</sup>. Many researchers have found that the girls are having higher level of self esteem than boys (Tella, 2007)<sup>22</sup> and they have higher level of acceptance of failure and show greater responsibility also girls use social support more often than boys, and have fewer inadequate reactions (Al-Bahrani, 2013)<sup>1</sup>. On the other hand some researchers have found that the boys can cope more than a girl as the boys are more independent than the girls (M. Minev, 2018)<sup>13</sup>, also girls have lower self esteem than that of boys which

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causes depression and even develop suicidal tendencies (Kearney, 1999)<sup>11</sup> Some researchers have found different level of self esteem among rural and urban students but on the other hand some researchers have found there are no significant differences existing among the rural and urban populations (Joshi & Srivastava, 2009)<sup>10</sup>. Some researchers have found that the urban people are more exposed of stress full life than that of rural people but urban people are taking life more positively than the rural people. On the other hand some researchers have found opposite results (Harter, 1985)<sup>8</sup>. According to those researchers the rural people are having more self worth, more competent and that is how the level of self esteem is increasing day by day among them (Pipher, 1995)<sup>16</sup>.

### Aims and Objectives:

1. To assess the level of self esteem among college students of technical and allied subject of East Midnapore district of West Bengal.
2. Whether the level of self esteem is significantly related with areas the students are living i.e. rural, urban and semi urban areas.
3. Whether the level of self esteem is significantly related with gender of students.

### Materials and Method

A cross sectional study has conducted among the students of technical and allied subject of East Midnapore district who are studying in different private colleges located at East Midnapore district. Convenient sampling method has followed and total 200 students are included in the study and among them 159 were selected and 41 of them are rejected as 32 of them gave ambiguous answer and 9 of them left the questionnaire incomplete as they lost interests in the research. Respondents are college goers and are comfortable in English. Informed consent was obtained and signed from each respondent. A questionnaire having two parts was formed. First part is containing name, age, gender, religion, name of the college, stream, year, semester and residential information of the respondents and the second part of the questionnaire is following Rosenberg Self Esteem which a ten itemed Likert scale is having four options strongly agreed, agreed, disagreed and strongly disagreed. The items of the questionnaire have two types – 10, 9, 8, 5, 3 items are revers scored i.e. 1 for “Strongly Disagree”, 2 points for “Disagree”, 3 points for “Agree”, and 4 points for “Strongly Agreed”. Rests of the items i.e. 1, 2, 4, 6, 7,

are scored directly. Higher score indicates the higher self esteem. The interview of process was conducted during the month of November 2019. The data are analyzed by Microsoft excel and SPSS 21 version.

### Result

This study shows that among 159 respondents 87 are female and 72 are Male; 151 are Hindu and 8 are Muslims, 49 are from rural areas 74 are from semi urban areas and 36 are from Urban areas.

**Table 1: Self esteem score**

		Total Number of Respondents	Self esteem Score
Gender	Male	72	2.9569
	Female	87	2.9345
Area	Rural	49	3.0122
	Semi Urban	74	2.8824
	Urban	36	2.9806

**Table 2: Score of each items**

Items	Average Score of each items
I feel that I am valuable, at least like others.	3.31
I feel that I have some good qualities.	3.32
I feel that I am a failure.	3.10
I am able to do things as well as most other people.	3.14
I do not have much to be proud of.	2.27
I always try to take a positive attitude toward myself.	3.50
I am satisfied with myself.	3.53
I wish I could have more respect for myself.	1.91
Frequently I feel useless at times.	2.77
Sometimes I think I am no good at all.	2.56

- According to the study Male populations are having numerically higher score in self esteem than that of female population.
- The rural students have numerically higher score in self esteem and semi urban students have numerically lowest score in self esteem.
- The overall self esteem score of students of technical and allied subject is 2.94 out of 4 which about 73.5%.
- The lowest score is observed in case of item number

8 which says ‘I wish I could have more respect for myself’. The mean score of this item is 1.91. • The highest score is observed in case of 7<sup>th</sup> item which says ‘I am Satisfied with myself’. The score is 3.53.

**Table 3: The group statistics and Independent sample t test**

Descriptive Statistics associated with Self Esteem						
		N	Mean	Std. Deviation	Skewness	Kurtosis
Self Esteem Score	Male	72	2.9569	.27925	.327	.025
	Female	87	2.9345	.37287	.112	-.307
Independent samples Statistics						
		Levene’s Test for Equality of Variances		t-test for Equality of Means		
		F	Sig	T	Df	Sig- (2 tailed)
Self Esteem Score	Equal variances assumed	5.146	.025	-.422	157	.673
	Equal variances not assumed			-.434	155.537	.665

The Male group (N=72) was associated with a self esteem score M=2.9669 (SD= .27925). By comparison Female group (N=87) was associated with a numerically lower self esteem score M=2.9345 (SD=.37287). To see whether male and female population were associated with statistically significantly different mean score of self esteem an independent t test was performed.

The independent sample t test (Table 4) is showing that the self esteem score is not significantly related with gender of the students as the P value is .665 which is greater than .05 as the Levene’s test shows that equal variances is not assumed. It can be seen in table 3 the Male and the female distribution were sufficiently for the purpose of conducting a t test (i.e. skew <2 and Kurtosis i.e. <9; Schmider, Ziegler, Danay, Beyer, & Buhner, 2010)<sup>18</sup>. Thus the gender of the population is not statistically significantly different from each other.

**Table 4: The Descriptive analysis**

Self Esteem Score		
	N	Mean
Urban Areas	36	2.9806
Semi Urban Areas	74	2.8824
Rural Areas	49	3.0122
Total	159	2.9447

From the above chart it can be concluded that the mean of self esteem score in student of rural areas (3.0122) followed by Semi Urban areas (2.8824) and lastly the urban areas (2.9806). The existing self esteem score is numerically different in urban, rural and semi urban areas are collected and plotted in the SPSS and one way ANOVA was performed and it gives the output below

**Table 5: ANOVA Table**

Self Esteem					
	Sum of Squares	df	Mean Square	F	Significance
Between Groups	.557	2	.278	2.561	.080
Within Groups	16.956	156	.109		
Total	17.513	158			

From the above ANOVA table, it can be concluded that there is no significant differences existing among students from rural, urban and semi urban areas on existing level of self esteem.  $F(2, 156) = 2.561$ , and the P value is .080 which is greater than .05.

**Table 6: Multiple comparisons for knowledge level of risk of Obesity**

Areas 1	Area 2	Significance
Urban	Semi Urban	.253
	Rural	.894
Semi Urban	Urban	.253
	Rural	.110
Rural	Urban	.894
	Semi Urban	.110

The Games Howell method reveals that no significant differences among Rural - Semi Urban, Rural-Urban and Semi Urban – rural are existing in respect to level of self esteem. In case of rural - semi urban, rural-urban the p value is .110 and .894 respectively and in case of semi urban – urban, p value is .253. So multiple comparisons shows that there is no significant differences existing among rural, semi urban and urban students in respect of their self esteem score.

### Discussion

- Our study indicates that the level of self esteem among the students of technical and allied courses of east Midnapore district is 73.5%, which is satisfactory. The rural students have numerically higher self esteem score than that of urban students. The finding is opposing the research finding which says the urban self esteem is greater than the rural self esteem (Tauro, 2018)<sup>21</sup> but the finding of the study is similar to some other finding of researchers who are showing similar results (Harter, 1982)<sup>8</sup>. Some researchers hypothesises that the rural students have inferiority complex and they lost their confidence (Bronfenbrenner, 1958)<sup>6</sup> in a way to lose self esteem but it is not true in that case, in fact it shows the rural students have certain level of self worth and competencies but though the differences is not significant. The study also revealed that there are no significant differences existing between these two groups but many researchers have found significant differences existed among the rural urban population in terms of self esteem (McCaul, 1984)<sup>12</sup>.
- The study shows that the level of self esteem is

numerically higher in case of male population than that of the female population. This finding is supporting numerous findings by different researchers (M. Minev, 2018)<sup>13</sup>. The study also shows the difference between the mean score of male and female are not significantly different which is opposing many researchers who have found significant differences existed among two groups (Nasir, 2012)<sup>14</sup>. So it proves that the self esteem is not depending upon the locality of the respondents but other social, psychological factors are responsible for that.

### Conclusion

Psychological health in the college goers is important for any nation. As self esteem is a major component of psychological health so the self esteem becomes an important factor of the college goers. There should not be any kind of disparities of level of self esteem among students of different genders and areas where the students came from. Many researchers have found significant differences existing but in this case there is no significant differences existed among students of both boys and girls from rural, urban and semi urban areas of east Midnapore district. The study shows the boys haven scored numerically higher than girls which support many research finding by many researchers but the rural college goers of East Midnapore district have numerically higher self esteem score than that of urban and semi urban college goers. This is a really a unique findings because most of the researchers have found rural students are having lowest self esteem score than that of urban or semi urban population.

**Ethical Clearance:** Vice Chairman of different private colleges of East Midnapore district gave ethical. Before that we have explained the purpose of our research and on the other hand each respondent was assured by the researchers to maintain complete confidentiality.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Utility of High Fidelity Simulation Training in Improving Adherence to Critical Actions During Cardiopulmonary Arrest

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## Abstract

**Introduction:** Cardiopulmonary resuscitation (CPR) is emerging as a viable rescue strategy for refractory out-of-hospital cardiac arrest. Effective CPR implementation requires intensive and repetitive training for Emergency Medical Service (EMS) providers. Adherence to ACLS protocols throughout an event is associated with increased revival rate of cardiac arrest patients. Using high fidelity simulation for BLS ACLS training improves the quality and confidence of EMS providers, students to abide by the AHA guidelines.

**Objective:** To utilize high fidelity simulation training in improving adherence to critical actions during cardiopulmonary arrest.

**Methodology:** A high fidelity manikin was utilized to create four unique clinical simulation scenarios based on cardiac arrest. 80 students of the Post Graduate Diploma in Emergency Medical Services (PGDEMS) program participated.

Each simulation session lasted for approximately 10 minutes followed by structured debriefing lasting for 20 minutes. The video recorded sessions were analyzed by two independent facilitators to avoid bias.

At the end of 8 week period, the students underwent post intervention simulation session structured in the same format as the pre-intervention session.

**Result:** The study focused on critical performance steps to be followed as per AHA 2015 guidelines.

**Discussion:** As per AHA 2015 guidelines, there are some critical performance steps to be followed while giving Basic Life Support (BLS) to a cardiac arrest patient. These steps if followed correctly, not only provide help to the patient immediately but also increase the chance of survival of the patient.

The drastic increase in the total score obtained from pre-intervention to post-intervention underscores the importance of regular simulation sessions, to inculcate better assessment practices in a safe and non-threatening environment.

**Conclusion:** Though participants performed the critical actions and managed the scenarios as per AHA 2015 guidelines, few actions, which superficially seemed to be insignificant were not performed.

**Keywords:** Cardiac arrest, critical actions, performance measures, CPR.

## Introduction

Cardiopulmonary resuscitation (CPR) is emerging as a viable rescue strategy for refractory out-of-hospital cardiac arrest. Effective CPR implementation requires intensive and repetitive training for Emergency Medical

Service (EMS) providers. A study in the U.S. has shown that limited training of emergency medicine providers is a barrier to widespread implementation.<sup>1</sup>

EMS providers and resident doctors do not always apply proper resuscitation guidelines in hospitals.

Hence, there is a need for continuing training in basic and advanced resuscitation for all according to the guidelines.<sup>2</sup>

The American Heart Association (AHA) Advanced Cardiac Life Support (ACLS) algorithms are the standard of care for patients suffering from cardiac arrest. Adherence to ACLS protocols throughout an event is associated with increased revival rate of cardiac arrest patients.<sup>3</sup>

Correctly following ACLS protocol has improved post – code mortality but institutions should train EMS providers in implementing ACLS protocols to improve revival of patient.<sup>4</sup>

Along with proper implementation of ACLS protocols and guidelines, non-technical skills including leadership, communication skills, adaptability, handling stress etc. are responsible for successful and effective resuscitation.<sup>5</sup>

For improving and developing updated guidelines regularly, it is necessary to conduct research on resuscitation, based on cases who were treated as per the existing AHA guidelines.<sup>6</sup>

As a result, the lack of organized simulation practice results in deficient knowledge and skills because of deliberate practice. Using high fidelity simulation for BLS ACLS training, improves the quality and confidence of EMS providers and students to abide by the AHA guidelines. Numerous studies have shown that high fidelity simulation should be utilized for deliberate practice of students.<sup>7</sup>

**Objective:** To utilize high fidelity simulation training in improving adherence to critical actions during cardiopulmonary arrest.

**Methodology:** A high fidelity manikin was utilized to create four unique clinical simulation scenarios based on cardiac arrest i.e. Ventricular Fibrillation (VF), pulseless Ventricular Tachycardia (pVT), Asystole and Pulseless Electrical Activity (PEA). The scenarios underwent dry run by facilitators before the student sessions. 80 students of the Post Graduate Diploma in Emergency Medical Services (PGDEMS) program participated in the study. The students were initially taught the assessment and management of cardiac arrest through didactic lecture method and case

study discussions. For the pre-intervention simulation session, the students were divided into eight groups and prebriefed on the features of high fidelity simulation manikin and the background of their respective cases. Informed consent was taken from students to record the sessions.

Each simulation session lasted for approximately 10 minutes followed by structured debriefing lasting for 20 minutes. The video recorded sessions were analyzed by two independent facilitators to avoid bias. The student groups were rated on 15 assessment parameters as per AHA 2015 guidelines. The maximum score that could be obtained by a group was 15. The shortcomings of these students were discussed during debrief.

Over the next 8 weeks, students were trained on various cardiac arrest scenarios using High fidelity simulation. Each simulation training session lasted for four hours and the students were provided real time feedback on their performance on various critical actions to be taken in a cardiac arrest scenario. At the end of 8 week period, the students underwent post intervention simulation session structured in the same format as the pre-intervention session. Critical actions performed were again recorded for the 4 case scenarios during the test. The pre-intervention vs post-intervention data was tabulated and analyzed for difference in means.

**Result**

The study focused on critical performance steps to be followed as per AHA 2015 guidelines.

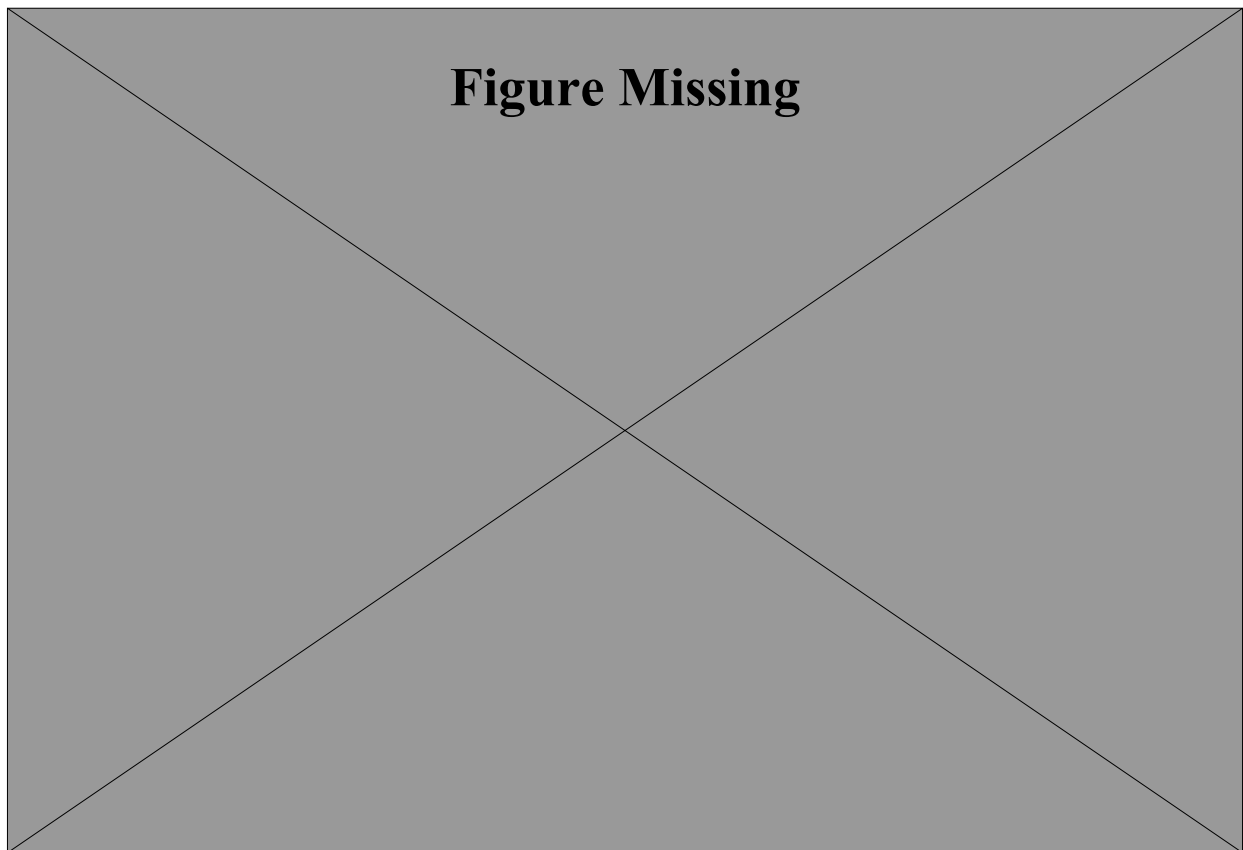
The pre and post intervention values have been tabulated below:

**Table 1: Critical actions performed (Pre-intervention vs Post-intervention)**

Cardiac Rhythm	Mean of Number of Critical actions performed (Pre-intervention)	Mean of Number of Critical actions performed (Post-intervention)
Ventricular fibrillation	8.5	13
Pulseless Ventricular tachycardia	8.5	14
Pulseless Electrical Activity	6.5	11
Asystole	7.5	11.5

**Table 2: Mean Score**

	Mean Score Obtained
Pre intervention	5.2
Post intervention	12.3



**Figure 1: Performance on individual critical action**

**Discussion**

As per AHA 2015 guidelines, there are some critical performance steps to be followed while giving Basic Life Support (BLS) to a cardiac arrest patient. These steps if followed correctly, not only provide help to the patient immediately but also increase the chance of survival of the patient.

The critical steps have been categorized under Assessment, Team Leader and Management.

During pre-intervention session, during assessment of clinical simulation scenario majority of the groups failed to perform “shout for help” step when cardiac arrest was recognized. But for post intervention four groups out of eight performed the step. It is important to perform this step to initiate chain of survival and for additional help to arrive.

For a Team Leader, steps like ensuring high quality CPR at all times, assigning team member roles and ensuring that team members perform well are critical. During pre-intervention session, only two out of eight groups ensured high quality CPR at all times, but improvement was observed in the post intervention sessions. The team leader from all groups assigned team member roles in pre –intervention as well as post–intervention test. During pre-intervention session, 5 out of 8 groups did not monitor the team members’ performance but significant improvement was seen in post intervention session.

During the pre-intervention session the students performed poorly in areas of intervention including maintaining appropriate cycles of drug-rhythm check/ shock CPR, administrating appropriate drugs and doses, verbalizing potential reversible causes (H’s and T’s).

This was found to be corrected in the post intervention session. The drastic increase in the total score obtained from pre-intervention to post-intervention underscores the importance of regular simulation sessions, to inculcate better assessment practices in a safe and non-threatening environment. High Fidelity Simulation sessions offer a chance to provide real time feedback on the critical actions that are required to be preferred during cardiac arrest. Simulation also allows to create a variety of clinical scenarios on cardiac arrest to acclimatize students to possible real clinical simulation.

### Conclusion

Though participants performed the critical actions and managed the scenarios as per AHA 2015 guidelines, few actions which superficially seemed to be insignificant were not performed.

EMS students should have proper understanding and knowledge regarding each critical action to be performed in a cardiac arrest. There is a need for more research to study the Human Factor in case of cardiac arrest using High fidelity simulation.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**Ethical Clearance:** IEC of Symbiosis International (Deemed University).

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# Effectiveness of Video Assisted Teaching on Knowledge Regarding Home Care Management among Patients Diagnosed with Acute Coronary Syndrome

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## Abstract

**Background:** Recently Coronary Artery Disease among Indians is a major challenge for many research centers worldwide.

**Objectives:** Effectiveness of VAT on knowledge regarding home care management among patients diagnosed with ACS and find the association between pretest knowledge scores with socio demographic variables.

**Methodology:** To evaluate the effectiveness of VAT on knowledge regarding home care management among patients diagnosed with ACS, Quasi experimental pretest posttest research was selected with Quantitative research approach. Purposive Sampling was used. 60 Sample Size was taken, 30 in both experimental and control group. Pretest was conducted for both groups on first day, followed by VAT program and on the seventh day posttest were conducted. The VAT program was provided only for experimental group, with 40 minutes duration, routine care was given for control group.

**Results:** The findings shows a statistically difference in post test knowledge score of experimental group regarding home care management among patients diagnosed with ACS after VAT.

**Conclusion:** Present study suggests the need for VAT program is to improve the knowledge level regarding home care management of patients diagnosed with ACS.

**Keywords:** *Effectiveness; Knowledge; Acute Coronary Syndrome; Video assisted teaching.*

## Introduction

A heart healthy lifestyle which includes eating right diet, regular exercises, maintaining a healthy weight, no smoking, and moderate amount of drinking, no recreational drugs, controlling hypertension and managing stress.<sup>1</sup> The ACS death rate is one in three.<sup>2</sup>

Medication, exercise and smoking cessation is an important component of the treatment strategy for ACS.<sup>3</sup> Depression was reported to adversely affect quality of recovery, after treatment of ACS.<sup>4</sup> In addition, self-efficacy increased self-care compliance among ACS patients.<sup>5</sup> Intervention to prevent the symptoms had a modest effect on the quality of life of patients who experience AML.<sup>6</sup> Home care management includes exercises, diet, complementary therapies, and lifestyle modifications.<sup>7</sup>

An epidemiological study was done to evaluate the incidence of ACS in Mediterranean country with a population of 2172. The results revealed that there were 22.6 events per 10000 of population.<sup>8</sup> To modify

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the risk factors or prevent their development with the aim of delaying or preventing newonset is the primary prevention of ACS.<sup>9</sup>

An article on “How to prevent and control coronary heart disease risk factors” published in the United States of America (USA) advises that children should avoid or quit smoking.<sup>10</sup>

To increase the effectiveness of interventions on lifestyle changes need to focus on the motivation of individuals with the goal of modifying their behavioral barriers<sup>11</sup> and individualizing their treatment plan under consideration of similar risk factors and efficacy<sup>12</sup>. Using these interventions, nurse-led educational meetings and telephone follow up was to assist elderly patients with ACS to achieve lifestyle changes, including healthy eating practices, regular physical activity, and smoking cessation.<sup>13</sup> For Korean patients with ACS, integrated symptom management<sup>14</sup> and motivational enhancement therapy<sup>15</sup> were identified as effective strategies for lifestyle modification. Participation rates remain less than optimal because of many barriers such as limited availability and accessibility, program length, distance and transportation, time conflicts, or financial issues<sup>16</sup>, and lack of support from family.<sup>17</sup>

## Materials and Method

**Research Approach and Design:** Quantitative research approach with Quasi experimental non randomized control group design was used for the study.

**Research Settings:** The study was conducted in Bishop Benziger hospital and Upasana hospital, Kollam.

**Population:** ACS patients in Bishop Benziger hospital and Upasanahospitals, Kollam during the data collection.

**Sample and Sampling techniques:** 60 ACS patients from Bishop Benziger hospital and Upasana hospitals, Kollam, 30 in experimental group and 30 in control group. The sampling technique used for the study was purposive sampling technique.

**Data collection Instruments:** After an extensive review of relevant literature, a semi structured questionnaire was developed. Tool consists of two

sections. Section 1: the first section included the demographic information. It contains 7 items like Age in years, Gender, Education, Occupation, Monthly income, Diet and habit. Section II was prepared which include the questions on ACS and its home care management. 20 questions are included in this section. Immediately after the pretest VAT programme of 40 minutes was given to the samples in experimental group. For control group VAT programme was not given. On the 7<sup>th</sup> day, posttest was done in both experimental and control group. Content validity of the semi structured questionnaire was determined through a panel of experts. Reliability of the tool was computed by test retest method.

**Procedure for data collection:** The ethical clearance was obtained from Thesis Review Committee and Head of the institution for conducting the study. Purpose of the study was explained and an informed consent was obtained from the samples. A pilot study was conducted to ensure the reliability of the tool, applicability of items and identify the obstacles and problems that may be encountered in data collection, this number were excluded from the studied sample. The data was analyzed using descriptive and inferential statistics.

## Results and Discussion

Sample characteristics based on socio demographic variables:

**Frequency and percentage distribution of demographic variables according to baseline characteristics:** It was found that the highest percentages (55%) of subjects were within the age group of 61-70 yrs and least (15%) percentage of subjects were within 51-60 yrs. About 31.6% of samples were female. 48.3% of samples belonged to the category of School level. 50% belong to Private employee and 21.6% belong to Self employed category. Majority (48.3%) of the samples have monthly income Rs 5001-10,000 and 20% of samples have monthly income in between Rs 10,001-15,000. Majority (60%) of Samples belong to the category of Non Vegetarian. About (45%) of the sample belong to the category of no such habits and 36.6% of the sample belong to the category of Smoking and 13.4% samples belong to the category of Alcoholism.

**Table 1: Frequency and percentage distribution of knowledge score in experimental group (n=30)**

Level of Knowledge	Pretest		Posttest	
	Frequency	Percentage	Frequency	Percentage
Poor	1	3.33%	0	0
Average	13	43.33%	5	16.67%
Good	15	50%	22	73.33%
Excellent	1	3.34%	3	10%

Data in table 1 shows that in pretest, A good percentage (50%) belongs to Good level of knowledge and the remaining (43.33%) belongs to Average level of

knowledge category. In posttest Remarkable percentage (73.33%) samples were having good level of knowledge.

**Table 2: Frequency and percentage distribution of knowledge score in control group (n=30)**

Level of Knowledge	Pretest		Posttest	
	Frequency	Percentage	Frequency	Percentage
Poor	1	3.34%	1	3.34%
Average	14	46.66%	13	43.33%
Good	14	46.66%	15	50%
Excellent	1	3.33%	1	3.33%

Data in table 2 shows that in pretest, A good percentage (46.66%) belongs to both average and good level of knowledge and the remaining (3.34%) belongs to Poor level of knowledge category. In posttest good percentage (50%) of the samples were having good level of knowledge and (43.33%) were having average level of knowledge.

**Section B:** Evaluation of effectiveness of VAT regarding home care management among patients diagnosed with ACS.

**Part I:** Comparison of pretest and posttest knowledge scores among patients with ACS in experimental group.

**Table 3: Mean, Standard Deviation and t value of pretest and posttest knowledge score in experimental group. (n=30)**

	Mean	Standard Deviation	t value
Pretest	10.57	2.68	12.184*
Posttest	12.97	2.26	

Tabulated  $t_{(29)} = 2.04, p < 0.05$  \*Significant

The Tabulated value is lesser than the calculated

paired t value at 0.05 level of significance; hence research hypothesis  $H_1$  was accepted. So there is statistically significant difference between the mean pretest and posttest knowledge scores in the experimental group.

**Section B:**

**Part 2:** Comparison of posttest knowledge scores among patients with ACS among experimental and control group.

**Table 4: Mean, Standard Deviation and t value of mean pretest knowledge score in experimental and control group. N=60**

Pretest	Mean	Standard Deviation	t value
Experimental group	10.57	2.68	0.95NS
Control group	9.9	2.77	

Tabulated  $t^{(59)} = 2.00, p < 0.05$  NS-Not Significant

The calculated unpaired t value is less than tabulated value at 0.05 level of significance. Hence there is statistically no significant difference in the mean pretest knowledge scores in experimental and control group, the homogeneity of the sample was ensured.

**Table 5: Mean, Standard Deviation and t value of mean posttest knowledge score in experimental and control group. N=60**

Posttest	Mean	Standard Deviation	t value
Experimental group	12.97	2.26	4.17*
Control group	10.26	2.73	

Tabulated  $t_{(58)} = 2.00$ ,  $p < 0.05$  \*Significant

The Tabulated value is less than the calculated value at 0.05 level of significance. Hence there is statistically significant difference in the mean posttest knowledge scores in experimental and control group.

**Section C:** Association between knowledge scores among patients with ACS with demographic variables.

Chi square value showing association between knowledge scores with demographic variables.

The data shows that there is significant association between the pretest levels of knowledge with selected demographic variables like Education, since the calculated chi square value is more than the table value at 0.05 level of significance. Hence the research hypothesis  $H_3$  is accepted.

The data shows that there is no significant association between the pretest levels of knowledge with selected demographic variables like Age in years, Gender, Occupation, Monthly income, Diet and habit, since the calculated chi square value is lesser than the table value at 0.05 level of significance. Hence the research hypothesis  $H_3$  was not accepted.

**Discussion**

In order to achieve the objectives of the study, quasi experimental non randomized control group design was adopted. The subjects were selected by purposive sampling method. The findings of the study have been discussed in relation to the objectives and other similar studies.

**Effectiveness of VAT on knowledge regarding home care management among patients diagnosed with ACS.**

The present study was supported by a similar quantitative study conducted to evaluate the effectiveness of VAT programme on knowledge regarding cardiac rehabilitation among post myocardial infarction patients admitted in cardiac inpatient department at

a selected cardiac hospital in Erode. The findings of reference study revealed that the level of knowledge in experimental group was significantly higher than the control group, which was similar to the present study. After implementation of VAT programme on cardiac rehabilitation the mean posttest knowledge score of most of the patients was found to be adequate and moderately adequate. Study concluded that video assisted teaching programme was effective among cardiac patients.

The Present study and the supporting studies show that the VAT program is effective in improving the knowledge regarding home care management among patients diagnosed with ACS.

**Association between pretest knowledge scores with selected demographic variables.**

The findings of the present quasi experimental study was supported by a descriptive study conducted to find the knowledge about risk factors, symptoms, complications and knowledge about prevention of coronary disease among patient admitted to SSMS Hospital and Mitford Hospital. The result of reference study revealed that there is a lack of awareness among a sampled Bangladeshi population regarding CAD and its modifiable risk factors. The findings of the reference study and present study revealed that there was significant association between knowledge score with selected demographic variables.

The study results along with the supportive studies show that there was a positive relationship between knowledge scores with selected demographic variables.

**Conclusion**

ACS is one of the most dangerous types of Coronary Heart Disease (CHD) and contributes to significant mortality and morbidity worldwide.<sup>18</sup> ACS is a set of symptoms due to rupture of a plaque.<sup>19</sup> In recent years, an important objective of cardiovascular research has been to find new markers that would improve the risk stratification and diagnosis of patients presenting with symptoms of ACS.<sup>20</sup> The result of the study showed that the mean posttest knowledge score of experimental group ( $12.97 \pm 2.26$ ) was higher than the mean pretest score ( $10.57 \pm 2.68$ ). Hence the research hypothesis was accepted. This shows that VAT was effective in improving knowledge regarding home care management among patients diagnosed with ACS.



**Interest of Conflict:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Permission had taken from the research committee of Bishop Benziger College of Nursing and Thesis Review Committee of Bishop Benziger College of Nursing, Kollam. Consent was obtained from the subjects.

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# Assess the Prevalence of Type 2 Diabetes Mellitus among Adults at Selected Areas in Kanchipuram District, Tamilnadu, India

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## Abstract

“Assess the prevalence of type 2 diabetes mellitus among adults” at selected areas in Kanchipuram District, Tamilnadu. The objectives were to assess the prevalence of diabetes mellitus among adults at selected area. Found out the level of diabetes mellitus among adults. To find out the association between diabetes mellitus among adults among with selected demographic variables and selected Personal information sheet of among diabetes mellitus. A non – experimental, descriptive study was conducted. The sampling technique was non-probability, purposive sampling technique with the sample of 50 and Standard Structured questionnaires (SSQ) in the form of interview schedule was used type 2 diabetes mellitus among adults. The variables were assessed the type 2 diabetes mellitus among adults. Hypotheses were formulated. The level of significance selected was  $p < 0.05$ . The investigator used personal information sheet and Standard Structured questionnaires (SSQ) was used to collect data. The data collection for the main study was done. The collected data was tabulated and analyzed. Descriptive and inferential statistical were used. The mean 9.94 value was and the standard deviation was 14.600328. The study shows that the type 2 diabetes mellitus among adults inadequate (13%) were moderate (33%) and adequate was (6%). The study concludes that there is moderate 33% the type 2 diabetes mellitus among adults.

**Keywords:** Assess, prevalence, Type 2 Diabetes Mellitus, Adult.

## Introduction

Diabetes Mellitus is a group of metabolic disorder arising either due to relative or absolute deficiency of a digestive hormone called insulin or inability or resistance of body cells to use the available insulin<sup>1</sup>. Diabetes Mellitus is a silent disease and is now recognized as one of the fastest growing threats to public health in almost all countries of the world. Every 5<sup>th</sup> person who suffer

from diabetes in the world today is an Indian<sup>2</sup>.

The main underlying causes of the disease are genetic and environmental, such as urbanization and industrialization, as well as increased longevity and changes in lifestyle from a traditional healthy and active life to a modern, sedentary, stressful life and over-consumption of energy-dense foods<sup>3</sup>. The prevalence of diabetes mellitus varies among populations due to differences in genetic susceptibility and social risk factors such as change in diet, obesity, physical inactivity and possibly, factors relating to intrauterine development. Migrants are especially affected.<sup>4</sup>

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## Research Methodology

**Research Approach:** Descriptive research approach

**Research Design:** Non experimental descriptive design

**Research Setting:** The study was conducted in the selected community area

**Population:** Adult's age of 40-55 years in a selected area

**Sample Size:** 60 Samples

**Sampling Technique:** Non probability purposive sampling

## Results

**Section-A:** Distribution of demographic variables of the prevalence of Type 2 Diabetes Mellitus among adults in selected community area.

Age in years, in which majority 44% were belongs to the age between > 55 years, 22% were belongs to the age between 40-45 years.

Sex, in which majority 60% of the samples were Male 40% of samples were Female

Area of residence in which majority 40% were belongs to urban, 26% were belongs to semi urban

Education Status, in which majority 40% were primary/secondary education, 12% were illiterate

The occupational status, in which majority were government employee 38%, 10% were self-employee

Marital status, in which majority 42% of the samples were widowed and 22% samples were divorced.

The family income per month in rupees, in which majority 40% of the samples were Rs.10,000 to 15,000, 28% samples were Rs.5,000 to 10,000.

Type of family, in which majority were joint family 40% and 28% nuclear family

The eating habits in which majority 82% were non-vegetarian and 28% were vegetarian.

The family history of diabetes mellitus in which majority were mother 32% and 12% were grandmother

**Section-B:** Distribution of knowledge on prevalence of Type 2 Diabetes Mellitus among adults in selected community area.

The study finding revealed that the frequency distribution in the study shows that majority 52% of them having Inadequate knowledge, 18% of them having moderate knowledge and 30% of them having Adequate knowledge on Type 2 Diabetes Mellitus among adults.

### Fig. 1: Distribution of knowledge on prevalence of Type 2 Diabetes Mellitus among adults in selected community area.

**Summary:** This chapter has dealt with the analysis and interpretation of the collected data from the adults on the knowledge regarding Diabetes Mellitus. The collected data was tabulated and analyzed using descriptive and inferential statistics. Statistics diagrams like, conical graph, pie chart were used to represent the important data of the study.

## Conclusion

The finding of the study revealed that there is no significant association between types 2 Diabetes Mellitus with the selected demographic variables like age, sex, marital status, education, occupation, eating habits, family history of Diabetic Mellitus. There is significant association between type 2 Diabetic Mellitus with the selected demographic variables like family income per month, area of residence.

**Source of Funding:** Nil

**Ethical Consideration:** Chettinad Academy of Research and Education, Institution Human Ethics Committee

**Conflict of Interest:** Nil

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# Assessment of Self Esteem and Peer Pressure among Adolescents in Selected College of Kanchipuram District, Tamil Nadu

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## Abstract

A descriptive study to assess of self esteem and peer pressure among adolescents in a selected college Kanchipuram district Tamil Nadu. The objectives are to assess self esteem and peer pressure among adolescents. To find out the association between levels of self esteem and peer pressure among adolescents and selected demographic variables of adolescents. The sampling technique was non probability purposive sampling. Sample size was 132 samples of adolescents. Rosenberg self esteem scale was used to assess self esteem and peer pressure inventory by brown to assess peer pressure. The demographic variables performa, structured interview schedule to collect data. The data collection was done. The collected data was tabulated and analyzed, using descriptive and inferential statistics. The self esteem mean value is 21.9 and peer pressure mean value is 8.1.

**Keyword:** *Self esteem, peer pressure, Adolescents.*

## Introduction

An Adolescents is a transitional period and it is the bridge between childhood and adulthood. It is the time of rapid development of growing to sexual maturity and social direction. Age of adolescents is age identity formation where occupation, education and personal context develop. During this period social expectation of the individual are drastically under modification.<sup>[1]</sup>

**Peer Pressure:** According to Lashbrook (2000) emphasizes processes related to peer pressure, namely

conformity. According to him, peer pressure is a specific instance of social influence, which typically produces conformity to a particular way of acting or thinking. However, one major limitation of the aforementioned conceptualization is that it neglects examples of peer pressure that do not produce conformity.<sup>[4]</sup>

Peer pressure can also be a good thing. Teens learn social norms from their peers. Similarly self confident teens can act as positive and set good examples for others. A positive peer group that your teens fits into well help boost her self esteem; it might prevent her from engaging in harmful or risky behaviors (burack 1999). Although some authors ascribe peer groups some very valuable positive functions related to negative effect is dominant (Beaty and Alexey, 2008).

**Self Esteem:** Self-esteem can be broadly defined as the overall evaluation of oneself in either a positive or negative way (Hughes, J. N etal, 2005). It is one of the basic needs of human being. The degree of our self-esteem impacts every major aspect of our lives. Deficits

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in self-esteem contribute to virtually all psychological problems.<sup>[2]</sup>

According to Brandon (1992), self esteem is an evaluation made by the individual and maintained, it expresses an agreement or disagreement, and it's indicated the extent to which an individual believes that he is capable, important, successful and worthy .In short, self esteem is a self assessment of the worthiness expressed in the individual's attitude towards him. <sup>[3]</sup>

**Statement of the Problem:** Assessment the self esteem and peer pressure among adolescents in selected college Kanchipuram district, Tamilnadu, India.

### Objectives of the Study:

1. To assess the self esteem and peer pressure among adolescents in selected college in Kanchipuram district Tamil Nadu.
2. To associate the self esteem and peer pressure among adolescents in the selected college in Kanchipuram district, Tamil Nadu with selected demographic variables.

### Operational Definitions:

**Self Esteem:** Self esteem is a well known psychological term that is used interchangeably with words such as self confidence, self respect, self efficacy, and self concept.

**Peer Pressure:** It refers to the feeling that one must do the same things as other people of one's age and social group in order to be liked and respected by their peers. Its effect on the individual is by changing their attitudes values or behaviors to conform to those of influencing group or individual.

**Assess:** It refers to the process of gathering information using Rosenberg self esteem scale to measure the; level of self esteem and peer pressure inventory by brown to assess the peer pressure among the adolescents.

**Adolescents:** It refers to the period of adolescents between age of 17 to 19 years.

## Materials and Method

**Research Approach:** Quantitative descriptive approach was used.

**Research Design:** Descriptive design was used for the study.

**Research Setting:** Research was conducted among adolescents in Madras Institute of Hotel Management and catering Technology, Tamil Nadu.

**Population:** Research was conducted among adolescents age between 17 to 19 year.

**Sampling Size:** Sample formula  $n = \frac{DEFF * Np(1-p)}{[(d^2/Z^2(1-\alpha/2*(N-1) + p*(1-p))]$ .

Sample size  $n = 132$

**Sampling Techniques:** The participants of the present study were selected by purposive sampling technique.

### Sampling Criteria:

#### A. Inclusion Criteria:

1. The adolescents available at the time of data collection.
2. Both male and female college students.
3. Adolescents who are able to read and speak English.

#### B. Exclusion Criteria:

1. Adolescents who are not willing to participate.
2. Adolescents who are having mental illness.

### Selection and Development of the Study Instrument:

#### Tool Description:

**Part 1:** This structured demographic variable consist of age(17 to 19 years), gender (male, female and others), type of family (nuclear, joint family, others), social background (income of the family), academic achievements (high, average, low),area of residence (urban, rural).

**Part 2:** Rosenberg self esteem scale, a widely used report instrument for evaluating individual self esteem, was investigated using item response theory. The scale is believed to uni-dimensional. All items are answered using a 4 point Likert scale ranging from strongly agrees to strongly disagree. It is a model that consists of 10 questions that was framed to assess the self esteem among adolescents [age 17-19 years] under peer pressure and its effects in their mental heal

**Data Collection Procedure:** In this study the researcher planned to assess the self esteem and peer pressure among the adolescents in selected college, Tamil Nadu, in demographic characteristics of adolescents was assessed with the help of demographic variable Performa and level of knowledge was assessed with the help of structured interview schedule on legal and ethical responsibilities.

**Findings:** The demographic variables shows significant percentage of adolescents was age between in age between 17-19 (41.6%). Significant percentage of adolescents family monthly income was (40.2%). Half of adolescents family were from nuclear family (53.8%). Half of the adolescents achievement in academic performance was moderate (48%). Most of the adolescents gender is male (72.7%). Most of the adolescents were from urban area (57.6%). It also showed that the mean score 21.19, mean % 52.9% and standard deviation 5.82 aspect of adolescents in self esteem and the mean score 81, mean % 50.94 and standard deviation 1.36 aspect of adolescents in peer pressure. Overall mean is self esteem and peer pressure among adolescents aspects found to be 100% the maximum score for self esteem and peer pressure were mild 41(31.06%), moderate 55 (41.66%), high 36(27.27%).

It also indicates that there is significant association between the demographic variable and the self esteem among adolescents in their age as self esteem is relatively high in childhood and that it drops during adolescent period (example: age and gender difference in self esteem- a cross cultural window by Weibke Blidorn, Ruben C. Arslan, Jasp J. A. Denissen), family monthly income because the higher the family income is the higher the self esteem among adolescents and lower the family monthly income is lower the self esteem among adolescents (example: income disparity as predictor of happiness and self esteem by Azmat Jahan, Namita Tyagi, Sushma Suri.), area because the adolescents today living in urban area has more self esteem than those who live in rural area as adolescents those who live in rural area feel that the way speak, dress, present themselves, behavior is different than those who live in urban area (example; the cost and cause of low self worth by Nicholas Emler). And there is no significant association between demographic variables and self esteem among adolescents in gender, type of family, academic performance.

And that there is significant association between the demographic variable and the peer pressure among adolescent in age as during our adolescents period we tend to want acceptance more from our peers than anyone else (example: a study done by Laurence Steinberg age differences in resistance to peer influence), area since the adolescents living in urban area are more sensitive and exposed with situations, substances (example : a study by Nicole Marie Howard on peer pressure in relation to academic performance and socialisation among adolescents). There is significant association between demographic variables and peer pressure among adolescent in gender, type of family, family monthly income and academic performance.

### Conclusion

We have conducted a research topic on assessment of self esteem and peer pressure among adolescents in selected college Kancheepuram district, Tamilnadu, India. The quantitative descriptive design was used to conduct the study on data obtained on self esteem and peer pressure among adolescents. 132 samples were collected.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Chettinad Academy of Research and Education, Institutional Human Ethics Committee on 04.02.2019.

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# A Modified Technique for Establishing the Occlusal Plane in Complete Denture Prosthesis

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## **Abstract**

Occlusal plane position is considered to be the primary link between function and esthetics. Canted occlusal planes result from the canted interpupillary line if the latter is used as reference plane. Establishing this occlusal plane correctly by orienting it is of prime importance. Bubble gauge mounted to the fox plane provides more accurate orientation of occlusal plane irrespective of reference planes. This modification can be used to achieve optimum result in facial asymmetries and canted interpupillary lines, since interpupillary line cannot be used as a guide in such cases.

**Clinical Implications:** If a clinician uses bubble gauge-fox plane approach for establishing occlusal plane, then the aesthetic outcome will be enhanced. This method is also of value since it reduces subjective variations.

**Keywords:** *Occlusal cants, reference planes, complete denture esthetics, interpupillary line.*

## **Introduction**

Occlusal plane is the average plane established by the incisal and occlusal surfaces of the teeth. Generally, it is not a plane but represents the planar mean of the curvature of these surfaces<sup>1</sup>. The orientation of the occlusal plane is lost in patients rendered edentulous and should be relocated if complete dentures are to be esthetic and to function satisfactorily. It is the most important plane to be determined in complete denture work, as it is a vital and important basis for tooth arrangement<sup>2</sup>. Complete dentures are constructed to function in the mouth as an integral part of the masticatory system; therefore, they should be designed to conform to the patient's physiologic jaw relations. The plane of occlusion forms one essential physiologic concept of jaw relation and occlusion. A well contoured occlusal rim with occlusal plane parallel to ridge posteriorly and

parallel to interpupillary line anteriorly stabilises the denture<sup>3</sup>.

During the maxillomandibular relations after forming the rim with the correct vertical heights, the plane of occlusion is modified until it is parallel with a line projected from ala of nose to the superior edge of the tragus of ear (Camper's line). The incisal-canine esthetic line should be made parallel to the interpupillary line when the patient is looking straight ahead<sup>2,4,5,6</sup>.

An occlusal plane indicator such as a Fox plane guide is used to achieve this goal<sup>7</sup>. In practice, a metallic scale is used along with Fox plane<sup>8,9,10</sup>. The Fox plane is placed inside the mouth touching the occlusal rim and is held by the operator, while the metal scale is held at the level of Camper's line or interpupillary line. Conventional methods have the following disadvantages:

It is difficult to hold the scale steady. The scale position changes every time the operator checks the parallelism. Moreover, when checking with naked eye, the operator has to be at eye-level to check the parallelism as any change in angulation of eye leads to incorrect results. This not only increases the chances of error but also makes the procedure tedious and time-consuming. Trying to imagine the interpupillary line and

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comparing it with the Fox plane guide is quite difficult. It is difficult for the practitioner to compare between the fox plane guide and an instrument that represents the interpupillary line with a distance of several centimetres apart. It is difficult to fix or stabilize the pupils because the patient doesn't understand the importance of stabilizing the pupils, nor does he/she know in which correct position to stabilize the pupils. In elderly subjects who receive the majority of the complete dentures the muscle coordination is poor<sup>3</sup>.

A range of facial asymmetries can influence the choice of occlusal plane during prosthodontic treatment. Thus, an occlusal plane parallel to the ala tragus and interpupillary lines, as often supported by prosthodontists, may result in less than ideal esthetics in the final restoration<sup>11,12</sup>.

In the event that one eye is higher than the other (which often occurs), the incisal-canine line would be made slanted in relation to true horizontal when the patient's head is erect. The interpupillary is not the best esthetic reference line and has advocated making the incisal-canine line parallel to horizontal when the patient's head is perfectly erect regardless of the eyes or any other facial feature<sup>13</sup>.

To overcome the above disadvantages a modification to the Fox plane in which, bubble gauge is mounted to the Fox plane (Fig 1). The bubble gauge consists of coloured liquid in a tube consisting of bubble and markings in the centre. The presence of the bubble in between the markings indicates that the surface is parallel to ground level or the truehorizontal<sup>14</sup>. Bubble gauge is used in automobile industry, water level monitoring etc.

Applying the same principle to complete denture prosthodontics, it can be used inmaxillomandibular relations procedure where the planes are of utmost significance.

**Procedure for use of bubble gauge:** The patient is made to sit erect looking straight ahead at horizon. The labial form of occlusal rim should provide adequate lip support and labial fullness. The vertical length of the maxillary occlusion rim is established. The occlusal plane is adjusted using the centralisation of bubble in between the markings as a guide (Fig 2). The procedure is carried out independent of the interpupillary line.

## Discussion:

Several method for the determination of occlusal plane have been proposed<sup>15,16,17,18</sup>. Conventional method have their inherent demerits. This modification is simple and inexpensive. It is very easy to use for the beginners. Need to be at eye level is eliminated and hence the chances of change in the angle of operator eye level leading to incorrect plane of occlusion are nil. This method is of advantage in cases with facial asymmetries and canted interpupillary lines. The practitioner would not need to imagine or try to present the interpupillary line with any instrument. Posture of the patient can bring about changes in the position of bubble. So the patient is made to sit erect looking straight ahead at horizon. When mounting the bubble gauge to the Fox plane, it should be done on a flat base as any inclination in surface can lead to incorrect mountings.



Fig – 1 Mounted bubble gauge on fox plane



Fig – 2 Centred bubble gauge

## Conclusion

Arranging the teeth in the correct plane of occlusion is important for the success of complete denture

prosthesis. This modification is thus reliable alternative method for the orientation of the occlusal plane and can be used with less subjective bias than that of the conventional method utilizing the interpupillary line

**Conflict of Interest:** None

**Source of Funding:** Self Funded

**Ethical Clearance:** Ethical clearance was not required hence so was not obtained

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# Quality of Life among Survivors of a Disaster in Kodagu District, India

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## Abstract

**Introduction:** Global climate is changing every day. An increased incidence of natural disasters can be attributed to this change in the climate. Natural disasters are known causes of psychosocial problems and a reduction in health-related quality of life. This study attempts to assess the quality of life of victims of a natural disaster in the Kodagu district of India.

**Method:** A community based cross-sectional survey was conducted in the disaster-affected areas, 4-6 months after the impact. Two areas were randomly selected and a total of 171 samples were assessed using the WHOQOL BREF questionnaire. The scoring was done to a scale of 0 to 100 and data was analyzed using SPSS 23. Relevant statistical tests were performed to identify the associations between different factors affecting and quality of life.

**Results:** The median score out of 100 in physical health dimension of quality of life among the study participants was 56 (interquartile range: 38-69). The psychological domain score was 69 (interquartile range: 56-81) while social relationships showed a good quality of median score 100 (interquartile range: 75-100). The median score for quality of life in the environmental domain was 63 (interquartile range: 44-81).

**Conclusion:** The quality of life among the survivors of 2018 floods and landslides was observed to be reduced. The main factors associated with the quality of life were gender, occupational status, level of education and experience of a direct disaster impact.

**Keywords:** *Quality of Life, Disaster, Flood.*

## Introduction

The incidence of natural disasters related to climate change is on the rise since the 1960s. 332 natural disasters claiming over 30000 deaths were recorded in 2011 alone.<sup>1</sup> Many people have suffered

injuries, diseases and long-term health effects as well as emotional disturbances from the traumatic events of different natural disasters.<sup>2</sup> As the climate is still changing, extreme weather events and will become more frequent and severe in the future.<sup>3</sup> Nearly 60% of the Indian landmass is susceptible to earthquakes while 40 million hectares of land is flood-prone. About 8% of the subcontinent is prone to cyclones while more than two third of the areas are susceptible to drought.<sup>4</sup>

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Kodagu (Coorg), is a district surrounded by the Western Ghats of India and agriculture is the major source of Income in the area including paddy fields and coffee and pepper agro-forestry.<sup>5</sup> Kodagu district recently witnessed its worst monsoon rainfall in the last century. Over 200 villages were affected and consequent

landslides wiped out homes, plantations, roads and bridges. 16 people have lost their lives and 39 are listed as missing. More than 1200 houses have collapsed.<sup>6</sup> The valley areas faced severe flooding while the hilly regions suffered mainly from landslides. The tourism field faced significant damage due to the floods. The disaster is expected to have long term effects especially in the agriculture and plantations.<sup>7,8</sup>

Natural disasters have a definite impact on the health-related quality of life. Different grades of disaster impact showed definite changes in the quality of life from studies from different countries.<sup>9</sup> Even though many epidemiological studies have been conducted on the psychological impacts of natural disasters in India, not much data is available on the effect on the quality of life by disasters in the country. So the study was conducted with the objectives to assess the quality of life among the survivors of the disaster in Kodagu and the factors influencing the quality of life of the survivors.

### Methodology

The main features of the 2018 Kodagu disaster were landslides and floods. This community based cross sectional study was conducted between 4<sup>th</sup> and 6<sup>th</sup> month after the impact of the disaster from December 2018 to February 2019. The Madikeri taluk of Kodagu district was selected randomly by lottery method to conduct the study. From the list of primary health centres which were affected by landslide and flood in Madikeritalukas, one rural primary health center viz. Bhagamandala and one urban primary health centre viz. Madikeri Urban, were selected randomly again using lottery method. The study area of Bhagamandala was principally affected by floods while landslides caused major devastation in Madikeri town and adjacent areas. A total sample size of 171 was decided by convenience and 86 samples were selected from Bhagamandala and 85 from Madikeri. In each area, the disaster-affected localities were identified and from the centre of the locality, one direction was selected randomly and all the houses in the selected lane were selected for the study. All eligible members in the house were studied until the sample size was met.

Residents who were residing in affected areas in Kodagu district during the floods and continue to reside at the same settlement and aged between 18 to 65 years were included in the study. Persons not willing to participate were excluded from the study.

Informed consent was obtained from the study

participants and socio-demographic information like age, gender, education, occupation, income, marital status, and type of family was collected. Mode of Impact of the disaster was assessed using the preformed questionnaire and WHOQOL-BREF questionnaire was used to assess the quality of life.<sup>10</sup>

**Statistical Analysis:** The data were entered into Microsoft Excel and analysed using SPSS 23. The descriptive data were represented using percentages and inferential statistical tests like Mann Whitney U Test and Kruskal Wallis Test were used for testing associations between the variables.

**Findings:** Among the 171 participants, 69% were females and 31 % were males. Majority of the participants (46.2%) were belonging to the age group of 46 to 65 years. 39.7% of them were in the age group 26 to 45 years and the rest of them (14%) were under 25 years.

Out of the 171 individuals participated in the study, 83% were married and 10.5% were not married. 5.8% were widowed and one person was separated from the spouse. Most of the study participants lived in nuclear families (77.2%) while 18.7% were living in three-generation families and 4.1% in joint families. The educational status of the participants was varying. 38.6% of samples were educated till high school while 16.1% had diplomas or finished their pre-university college education. 11.1% had upper primary and 10.5% had lower primary education. 9.4% of persons participated in the study were graduates or postgraduates and 14% had formal education. 26.9% of participants were belonging to the occupational category of clerical/ shop owners and farmers. While 1.8% were semi-professionals, and 18% were skilled workers, 5.3% were semi-skilled workers and 5.8% were unskilled workers. 58.5% of the participants in the study were unemployed.

Among the 171 study participants, 40.4% had to move to temporary shelters during the disaster. 45% faced partial or complete damage to their house. Only one person was identified with a direct physical injury. 12.9% had damage to their source of income that is agriculture fields or plantations. 32.2% of participants, all of whom were farmers and/or plantation owners were expecting a long term reduction in their income due to the damages happened in the plantations. (Table 1.0)

The median score out of 100 in physical health dimension of quality of life among the study participants

was 56 (interquartile range: 38-69). The psychological domain score was 69 (interquartile range: 56-81) while social relationships showed a good quality of median score 100 (interquartile range: 75-100). The median score for quality of life in the environmental domain was 63 (interquartile range: 44-81). (Figure 1.0)

The quality of life in all domains was compared among different demographic factors for association. On analysis, a statistically significant association (Mann Whitney Test p value <0.05) was observed between the gender and quality of life in physical and environmental quality of life. An association, which is statistically significant, was observed between different occupational categories and quality of life in all four domains. (Kruskal Wallis Test p value <0.05). The Kruskal Wallis test showed a significant association between the level of education and quality of life in all the domains. The presence of at least one disaster experience (Direct disaster impact) was proven to be a factor significantly associated with the physical and environmental quality of life (Mann Whitney Test p value <0.05). (Table 2,3,4,5).

**Discussion**

The physical and environmental domains of quality of life where the scores were higher among males. All domains of quality of life showed variation in different occupational groups and educational. People with a history of a direct impact/experience of disaster were having a lower quality of life in physical and environmental domains.

Comparing the quality of life scores obtained by this study to existing studies where defining norms for quality of life scores in general population was attempted, a

decrease in the quality in domains of physical health, psychological health, and environmental health was observed.<sup>11</sup> A paradoxical increase in the quality of social relationships of disaster survivors was noted in the study. This was comparable with similar studies from different parts of the world. An overall decrease of quality of life with a paradoxical increase in social relationships was also observed by Marco Valenti et al following an earthquake in L’Aquila, Italy, and A Ardalan et al, following an earthquake in Iran.<sup>12,13</sup> However no such observation was made in another post-disaster study from Sichuan, China, by Liang Y, where a uniform decrease in quality of life was observed in all domains of life of elderly people residing in the area.<sup>14</sup>

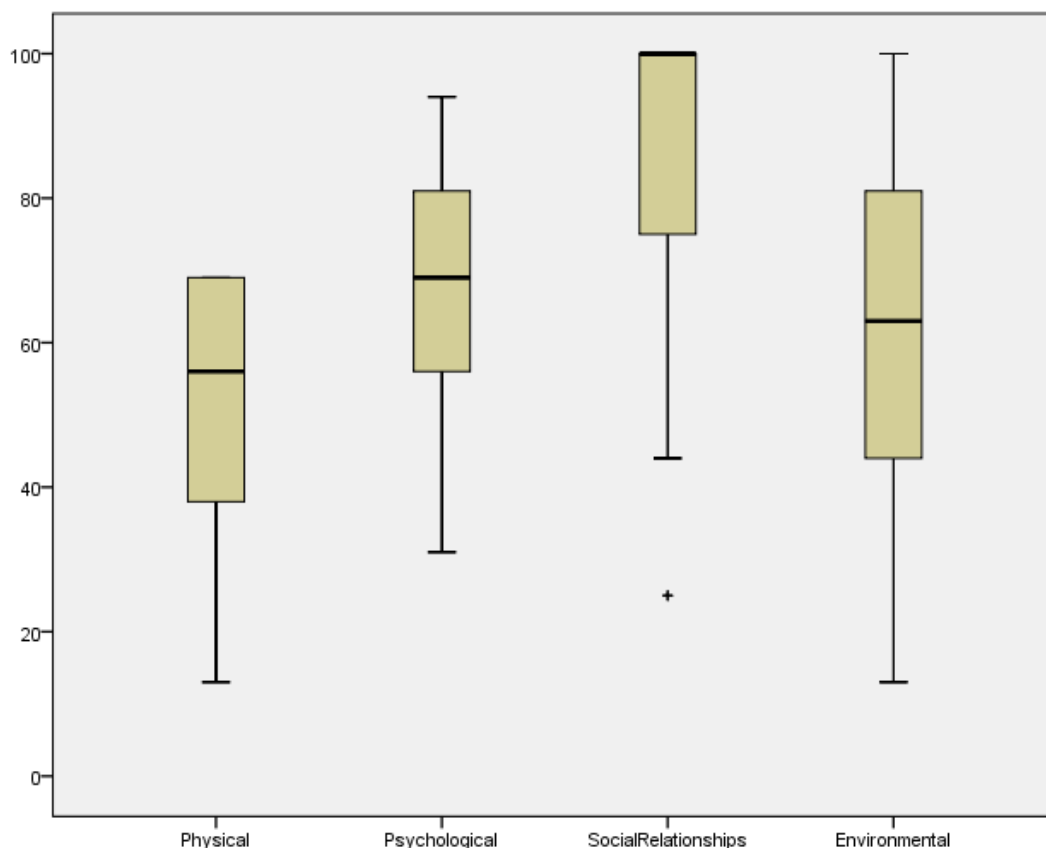
As the study was conducted 4-6 months after the disaster, most of the victims who faced complete damage to their house or had a severe impact from the disaster had moved from the localities and hence many such individuals could not be identified in this study. Since only limited number of similar studies were available from the area regarding the health-related quality of life designed by world health organization among flood-affected individuals, the study could not benefit from adequate comparisons.

**Conclusion**

The quality of life among the survivors of 2018 floods and landslides was observed to be reduced. The main factors associated with the quality of life were gender, occupational status, level of education and experience of a direct disaster impact. Hence we recommend a comprehensive primary care level approach from the authorities to improve the quality of life of disaster victims.

**Table 1: Distribution of study participants based on their disaster experience**

Disaster Experience	Number	Percentage
Moved to Relief Camps/ Temporary Shelters	69	40.4
Partial or Complete Damage to House	77	45.0
Suffered Physical Injury	01	0.6
Damage to Land/ Source of Income	22	12.9
Long term Reduction in the Income/Plantation	55	32.2
Suffered at least one of the above (Direct Disaster Impact)	137	80.1



**Figure 1: Quality of life among the study participants**

**Table 2: Factors Associated with Physical Quality of life**

Factors Associated		Median Score	Inter Quartile Range	P value
Gender	Male	56	44-69	0.010*
	Female	53	38-63	
Education	Undergraduate or Postgraduate	66	63-69	<0.005*
	Diploma/ Post High school	59.50	39.50-69	
	High school	56	44-69	
	Middle school	44	38-63	
	Primary school	44	31-57.75	
	Illiterate	38	31-54.50	
Direct Disaster Impact	Yes	50	38-63	0.003**
	No	63	56-69	

\*Mann Whitney Test, \*\*Kruskal Wallis Test

**Table 3: Factors Associated with Psychological Quality of life**

Factors Associated		Median Score	Inter Quartile Range	P value
Occupation	Semi-professional	81		0.001**
	Clerical/ Shop owner/ Farmer	78	69-81	
	Skilled worker	69		
	Semi-skilled worker	63	56-81	
	Unskilled worker	56	48.50-72	
	Unemployed	69	56-75	

Factors Associated		Median Score	Inter Quartile Range	P value
Education	Undergraduate or Postgraduate	81	75-81	<0.001**
	Diploma/ Post High school	72	63-81	
	High school	69	63-81	
	Middle school	69	56-75	
	Primary school	56	50-69	
	Illiterate	56	50-67.50	

\*Mann Whitney Test, \*\*Kruskal Wallis Test

**Table 4.0: Factors Associated with Social Relationships Domain of Quality of Life**

Factors Associated		Median Score	Inter Quartile Range	P value
Occupation	Semi-professional	100	75-100	0.031**
	Clerical/ Shop owner/ Farmer	100	94-100	
	Skilled worker	100	100-100	
	Semi-skilled worker	100	75-100	
	Unskilled worker	75	48.50-100	
	Unemployed	100	75-100	
Education	Undergraduate or Postgraduate	100	100-100	0.001**
	Diploma/ Post High school	100	94-100	
	High school	100	75-100	
	Middle school	94	69-100	
	Primary school	84.50	75-100	
	Illiterate	75	69-100	

\*Mann Whitney Test, \*\*Kruskal Wallis Test

**Table 5: Factors Associated with Environmental Domain of Quality of life**

Factors Associated		Median Score	Inter Quartile Range	P value
Gender	Male	75	50-94	<0.001*
	Female	59.50	44-70.50	
Occupation	Semi-professional	94		<0.001**
	Clerical/ Shop owner/ Farmer	81	36-94	
	Skilled worker	56		
	Semi-skilled worker	56	44-78.50	
	Unskilled worker	44	36.25-59.50	
	Unemployed	56	44-69	
Education	Undergraduate or Postgraduate	75	57.75-92.50	<0.001**
	Diploma/ Post High school	72	50-94	
	High school	63	50-81	
	Middle school	56	44-69	
	Primary school	44	31-64.50	
	Illiterate	47	32.75-56	
Direct Disaster Impact	Yes	56	44-75	0.001*
	No	75	56-89.50	

\*Mann Whitney Test, \*\*Kruskal Wallis Test



**Ethical Clearance:** Taken from Institutional Ethical Committee, JSS Academy of Higher Education and Research.

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**Conflicts of Interest:** Nil

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# Surgical Approaches to Infra Orbital RIM Fractures: A Review Literature

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## Abstract

In most people, the relationship between the ocular globes and the cheek tissues is such that on lateral view, the cheek projects beyond the eye. This relationship is primarily due to the development of the facial bones beneath the cheek tissues, fractures of the infra orbital rims causes severe deformity to the face with ocular imbalance, so infra orbital rim is essential to maintain the anatomy of the eye and shape of the eye.

**Keywords:** *Infra orbital rim, diplopia, retro bulbar haemorrhage, sub conjunctival incision.*

## Introduction

The zygoma articulates with the frontal, sphenoid, temporal, and maxillary bones and contributes significantly to the strength and stability of the midface. The forward projection of the zygoma causes it to be injured frequently<sup>(1)</sup>. The zygoma may be separated from its four articulations. This is called a zygomatic complex fracture. The terms trimalar or tripod fracture are therefore inaccurate. These terms reflect an inability to easily identify the orbital (zygomaticosphenoid) portion of the injury before the advent of computed tomography (CT). The zygomatic arch may be fractured independently or as part of a zygomatic complex fracture. All zygomatic complex fractures involve the orbital floor, and therefore an understanding of orbital anatomic features is essential for those treating these injuries. The orbit is a quadrilateral pyramid that is based anteriorly. The orbital floor slopes inferiorly and is the shortest of the orbital walls, averaging 47 mm<sup>(2)</sup>. It is composed of the orbital plate of the maxilla, the orbital

surface of the zygomatic bone, and the orbital process of the palatine bone. The medial and lateral walls converge posteriorly at the orbital apex. The medial wall consists of the frontal process of the maxilla, the lacrimal bone, the orbital plate of the ethmoid, and a small portion of the sphenoid body. The lateral orbital wall is the thickest and is formed by the zygoma and the greater wing of the sphenoid. The orbital roof is composed of the frontal bone and lesser wing of the sphenoid.

The sensory nerve associated with the zygoma is the second division of the trigeminal nerve. The zygomatic, facial, and temporal branches exit the foramina in the body of the zygoma and supply sensation to the cheek and anterior temporal region. The infraorbital nerve passes through the orbital floor and exits at the infraorbital foramen. It provides sensation to the anterior cheek, lateral nose, upper lip, and maxillary anterior teeth. Muscles of facial expression originating from the zygoma include the zygomaticus major and labius superioris.

The position of the globe in relation to the horizontal axis is maintained by Lockwood's suspensory ligament. This attaches medially to the posterior aspect of the lacrimal bone and laterally to the orbital (Whitnall's) tubercle (which is 1 cm below the zygomaticofrontal suture. Accompanied by an anti mongoloid downward cant of the lateral canthal region caused by displacement of the zygoma on the medial aspect of the frontal process of the zygoma). The shape and location of the medial

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and lateral canthion of the eyelid are maintained by the canthal tendons. The lateral canthal tendon is attached to Whitnall's tubercle. The medial canthal tendon is attached to the anterior and posterior lacrimal crests. Zygomatic complex fractures are often accompanied by an antimongoloid (downward) cant of the lateral canthal region caused by displacement of the zygoma.

**Causes and Etiology:** Zygomatic fractures are common facial injuries, representing either the most common facial fracture or the second in frequency of facial fractures. The incidence, etiology, age, and sex predilection of zygomatic injuries vary, depending largely on the social, economic, political, and educational status of the population studied. The common etiological factors for these type of fractures are R.T.A, Altercations, Falls, Sports related injuries.

**Pathology of Infra Orbital RIM Fracture:** In total medial displacement, the orbital rim is completely severed at the frontozygomatic suture. The Zygoma is depressed in the orbital region as well, leading to reduction in size of the orbit. This can lead to exophthalmos, which may be aggravated by further haematoma. On the other hand with a defect of the floor of the orbit, orbital tissue may prolapse into the maxillary sinus so that enophthalmos would result due to medial displacement. The telescoping intrusion of the Zygoma into the orbit and maxillary sinus can lead to incarceration and injury of orbital fatty tissue and musculature causing diplopia as a result of disturbances of mobility. As the medial fracture line is always in the region of the infra orbital nerve, the nerve is pinched or torn in medial displacement fractures.

Inferior displacement arises when force impinges on the body of the Zygoma obliquely from above. Temporal fascia prevents inferior displacement of the zygoma by its broad attachment. The frontal process of the Zygomatic bone may be tilted dorsally or forward, In this type of displacement, the orbital cavity is enlarged. This leads to exophthalmos with the eye lowered and double vision. Sagging of the lateral wall of the orbit leads to displacement of the palpebral fissure in the lateral region in a caudal direction (antimongoloid). The total medial fracture dislocation can lead to restriction of mouth opening as a result of impingement of the coronoid process on the zygoma.

**Various Approaches for the Management of Infra Orbital RIM:** Several approaches to the orbit through the skin surface of the lower eyelid have been

described. They differ in the level at which the skin incision is made and level of dissection to the infraorbital rim. The subtarsal approach is one of the more frequently used approaches for access to the infraorbital rim and orbital floor. The subciliary approach, also called the infraciliary approach, or blepharoplasty, has been favored by a number of U.S. surgeons over the past 20 years. The skin incision is made approximately 2 mm inferior to the grayline of the lower eyelid, along the entire length of the lid. The transconjunctival approach, also called the inferior fornix approach, was originally described by Bourguet in 1928. Two basic transconjunctival incisions have since been described, the preseptal and retroseptal approaches, which vary in the relationship of the orbital septum to the path of dissection

Dr. P Tessier (1973): He described the transconjunctival approach, both preseptal and retroseptal for the repair of fractures involving the orbital floor and rim. The main advantage to this technique is the lack of visible scar Bromely S. Freeman (1962)<sup>(3)</sup>: stresses the need for direct exposure to investigate the anatomic position of bony continuity in fractures of the anatomic position of bony continuity in fractures of the midfacial area with the exploration of the orbital floors. He advises the use of a graft material in the reconstruction of orbital floor as against blind elevation of the floor with packs or balloons which do not always maintain the position of the floor, frequently caused reactions are relatively clumsy, often offensive and at best, approximately accurate.

## Discussion

Paul N. Manson et al (1987)<sup>(4)</sup>: state their experience with a single lower eye lid incision with mobilization of the lateral canthus is described for exposure of the zygoma, lower and lateral orbit, zygomaticofrontal suture and the incision may be either subciliary with a skin muscle flap or transconjunctival. Both require mobilization of the canthus. They are of the opinion that reattachment of the canthus is not required in acute zygomatic fracture treatment but is preferred for secondary orbital reconstruction or in patients in whom a simultaneous coronal incision is employed. They also state that the approaches described reduce cutaneous scarring and provide generous exposure of the lower and lateral orbit. Kuniolkemura et al (1988)<sup>(5)</sup>: did a study in fractures of zygomatic complex and found that there is no displacement of zygoma after fixation at frontozygomatic region using a miniplate and additional

wiring at the infra orbital rim. They suggest that there is no need for three point or four point fixation of zygoma except for complex or comminuted fractures as a bone plate gives stability in three planes.

Vriens JP, Moos KF (1995): They said that open reduction and fixation of an orbitozygomatic complex fracture offer a better prognosis for complete recovery of the infraorbital nerve function than elevation only with or without Kirschner wire fixation. Jan P M Vriens et al 1998<sup>(6)</sup> presented a study on infra orbital nerve function following the treatment of orbitozygomatic complex fractures. The patients were treated with various available method. Sensory nerve function was assessed using several method for a period of 6.3 months on an average. The study revealed that sensory disturbances were more pronounced in patients who underwent closed reduction without mini plate fixation.

Yonehara et al (2005)<sup>(7)</sup> studied patients for whom treatment of zygomatic fractures without inferior orbital rim fixation was done. They stated that inferior orbital rim fixation with mini or microplates is recommended for reduction of comminuted fractures and orbital floor fractures with herniation of internal orbit components. They found out in their study that patients who did not undergo inferior orbital rim fixation were free of inferior orbital rim deformity, diplopia, and postreduction rotation.

**The main advantages of the subtarsal approach are the following:**

1. It is relatively easy;
2. The incision is placed in a natural skin crease so that the scar is imperceptible; and
3. It is associated with minimal complications. It has few disadvantages

The subciliary approach, also called the infraciliary approach, or blepharoplasty, has been favored by a number of U.S. surgeons over the past 20 years. The skin incision is made approximately 2 mm inferior to the grayline of the lower eyelid, along the entire length of the lid. The incision may be extended laterally approximately 1 to 1.5 cm in a natural crease inferior to the lateral canthal ligament. The main advantage to this incision is the imperceptible scar that it creates. The disadvantages are the following: (1) the procedure is technically difficult for the novice; and (2) a higher risk of postoperative ectropion exists.<sup>(8-12)</sup>

The transconjunctival approach, also called the inferior fornix approach, was originally described by Bourguet in 1928<sup>(13)</sup>. Converse et al<sup>(14)</sup> have added a lateral canthotomy to the transconjunctival retroseptal incision for improved lateral exposure. The advantage of the transconjunctival approaches is that they produce superior cosmetic results when compared with any other commonly used incision because the scar is hidden behind the lower lid. Other advantages are the following: (1) these techniques are rapid; and (2) no skin or muscle dissection is necessary. In a study by Wray et al<sup>(15)</sup> in which the transconjunctival approach was used for orbital floor and rim fractures.

### Conclusion

Incisions and approaches are always on the hands of the surgeons. If the fracture can be treated with existing laceration, it gives positive result with proper closure, age, sex and severity of the injury also plays a vital role in reduction and fixation. Always subconjunctival and subciliary incisions are better when compared to the infra orbital incisions. Since it is placed in Rstl lines of the face which gives minimal scar with less post operative complications.

**Conflict of Interest:** Nil.

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# Caffeine: Benefits, Risks and Effects-A Review

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## Abstract

Caffeine, the world's most widely consumed psychoactive drug is a central nervous system(CNS) stimulant of the methylxanthine class. It is a white crystalline purine, a methylxanthine alkaloid which is bitter in taste. Caffeine is structurally related to the adenine and guanine bases of DNA and RNA. It is found in the nuts, seeds or leaves of a number of plants native to East Asia, Africa, and South America, and its natural function is to prevent germination of nearby seeds and to protect them against predator insects. Caffeine can have both positive and negative impact on human health. It can be used to treat and prevent the premature infant breathing disorders such as bronchopulmonary dysplasia of prematurity and apnea of prematurity. Caffeine citrate is on the WHO Model List of Essential Medicines which confers a modest protective effect against some diseases, including Parkinson's disease. Caffeine is classified by the US FDA as generally recognized as safe(GRAS). Toxic doses are over 10 gm/day for an adult, which are much higher than the typical dose of under 500 mg/day. However, pure powdered caffeine, available as a dietary supplement, can be lethal in tablespoon-sized amounts. In this review article, we discuss about the health benefits and adverse effects of caffeine along with its future prospects.

**Keywords:** *Caffeine, coffee, dependence, safety doses, toxicity.*

## Introduction

The world was and still continues to be a big fan of coffee, the beverage that is globally accepted with open arms. Coffee is a major source of caffeine for most populations<sup>[1]</sup>. Coffee is often produced from the roasted beans of great variety of coffee crops<sup>[2]</sup>. The two most economically important species-Coffea canephora and Coffea arabica<sup>[3,4]</sup>. The world coffee trade is increasing each year showing the importance of coffee to the global

economy. The composition of the two main coffee species (Arabica and Robusta) varies consistently with the origin, storage and terroir conditions. During the roasting process a number of reactions give rise to the organoleptic properties of coffee<sup>[5]</sup>. Coffee contains mineral ingredients such as Ca, K, Fe, P, Ni, Mg, and Cr<sup>[6,7,8]</sup> among others. The bioactive compounds of coffee include the following: methylxanthines (caffeine, theobromine and theophylline), diterpenes (kahweol and cafestol), phenolic compounds (chlorogenic acid and its derivatives), nicotinic acid<sup>[9]</sup>. These compounds have been associated with many potential health benefits. For example, diterpene alcohols and chlorogenic acids(CGA) have chemo-preventive and antioxidant activity, whereas caffeine reduces risk of developing neurodegenerative disease<sup>[10]</sup>.

Caffeine, the common name for 1,3,7-trimethylxanthine (C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>), was derived from the German word kaffee and the French word café.

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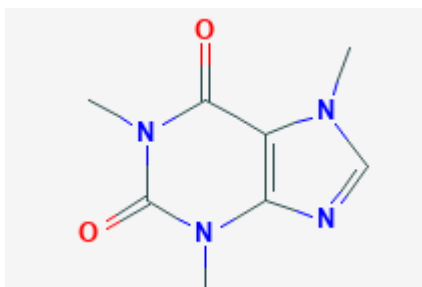


Fig 1: Structure of caffeine<sup>[11]</sup>

Caffeine is the most widely consumed psychoactive substance in the world<sup>[11]</sup>. The psychostimulant properties of caffeine are due to its interaction with neurotransmission in different regions of the brain, to promote behavioral changes, such as attention, mood, vigilance, and arousal<sup>[12]</sup>. By suppressing the actions of adenosine, caffeine increases neural activity in the brain, which leads to a temporary increase in mental alertness and thought processing, while reducing drowsiness and fatigue. At low to moderate doses of caffeine, the most prominent behavioral effects are amplified alertness and attention. Higher doses of caffeine encourage negative effects such as anxiety, insomnia, restlessness and tachycardia<sup>[13]</sup>. The WHO identifies caffeine dependence as a clinical disorder<sup>[14]</sup>. Caffeine is found in common beverages, in products containing cocoa or chocolate, and in medications (Table 1).

Table 1: The average amounts of Caffeine in various food products.(Food Regulation Standing Committee, Caffeine Working Group. (2013))

Product	Average caffeine content (mg/100 ml)
Red Bull®	32.0
Mountain Dew®	15.0
Coca Cola®	9.7
Diet Coke®	9.7
Coke Zero®	9.6
Brewed black-tea	22.5
Brewed green-tea	12.1
Coffee (cappuccino)	101.9
Coffee (flat white)	86.9
Coffee (long black)	74.7
Coffee (from ground coffee beans)	194.0
Chocolate (milk-added milk solids)	20.0
Chocolate (dark-high cocoa solids)	59.0

**Synthesis:** The biosynthesis of caffeine is considered as an example of convergent evolution among different species. Primary substrates for Caffeine synthesis are malonic acid and dimethylurea. For commercial use, caffeine is produced as a byproduct of decaffeination.

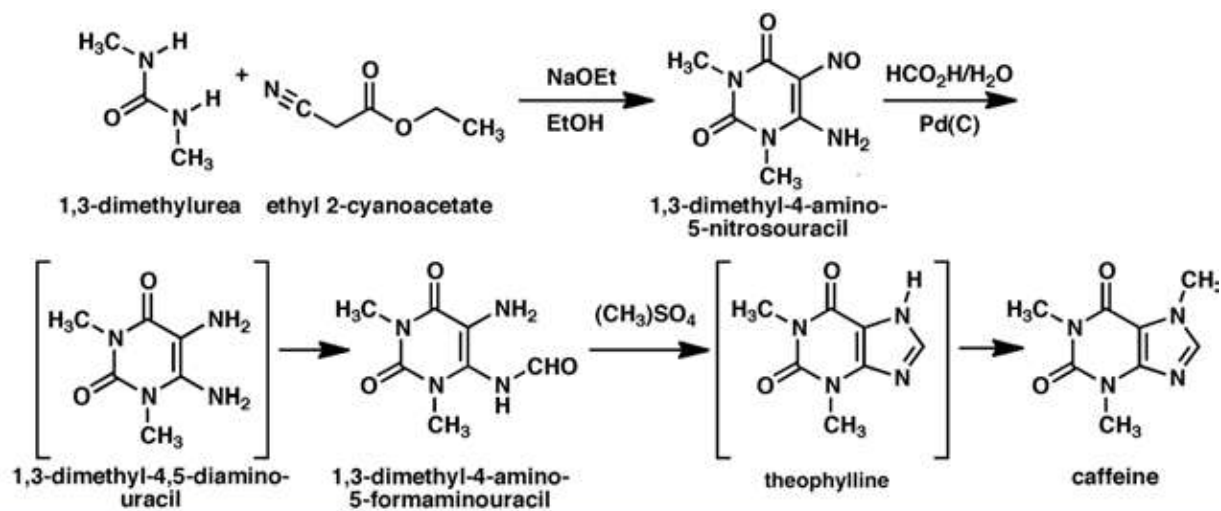


Fig 2: Synthesis of Caffeine

**Decaffeination:** Caffeine and decaffeinated coffee, are produced by using solvents such as benzene, trichloroethylene, chloroform, and dichloromethane have all been used over the years but for safety reasons,

environmental impact, cost, and flavor, they have been superseded by the subsequent main method:

- Supercritical carbon dioxide extraction:

Supercritical CO<sub>2</sub> is an excellent nonpolar solvent usually safer than other organic solvents used regularly. It has gas like properties that enable it to penetrate deep into the beans and also has liquid-like properties that dissolve 97–99% of the caffeine. During the extraction process CO<sub>2</sub> is forced to enter the green coffee beans at pressures above 73atm and temperatures above 31.1°C (“supercritical” conditions for CO<sub>2</sub>). The caffeine-laden CO<sub>2</sub> is then sprayed with high-pressure water to remove the caffeine. The caffeine is then isolated by charcoal adsorption, distillation, recrystallization or reverse-osmosis.

- Water extraction: Coffee beans are soaked in water. This water is then passed through activated charcoal for removing caffeine. The water is then added back to the beans and evaporated dry, leaving decaffeinated coffee with its original flavor. The recovered caffeine is sold for use in soft drinks and/or over-the-counter caffeine tablets.
- Extraction by organic solvents: organic solvents such as ethyl acetate and use of triglyceride oils obtained from spent coffee grounds is also preferred. these compounds are less hazardous to health and environment compared to aromatic compounds.

Commercial decaffeinated coffee does contain caffeine in some cases. Studies have shown that decaffeinated coffee contained 10mg caffeine per cup, compared to approximately 85mg caffeine per cup for regular coffee.

**Pharmacokinetics of Caffeine:** The liver is the primary caffeine metabolism site. Rate of metabolism varies across the population; the half-life is diminished in smokers, but augmented during pregnancy and in women taking oral contraceptives<sup>[15]</sup>. Caffeine is quickly and entirely absorbed from the gastrointestinal tract, with 99% being absorbed within 45 min of ingestion<sup>[16]</sup>.

Peak plasma concentrations take place between 15–120 minutes after oral ingestion. This wide variation in time might be because of variation in gastric emptying time and the presence of other dietary constituents, for example, fiber<sup>[17]</sup>. Caffeine has a physiological half-life of 3.5 to 6 hours<sup>[18,19]</sup>. Its physiological impacts are seen in less than 1h. Infants do not metabolize caffeine and therefore have a half-life of around 4 days<sup>[20]</sup>. CYP450 oxidase enzyme system is predominantly involved in caffeine metabolism. This metabolic process

involves conversion of caffeine by the CYP1A2 isozyme into three dimethylxanthines,<sup>[21]</sup> paraxanthine (72%), theobromine (20%) and theophylline (8%)<sup>[22]</sup>, each of which effect the body in various ways.

- Paraxanthine: Increases lipolysis, causing rise in glycerol and free fatty acid levels<sup>[22]</sup>.
- Theobromine: Along with being the key alkaloid in cocoa bean, it dilates blood vessels and increases urine volume<sup>[22]</sup>.
- Theophylline: Relaxes smooth muscles of the bronchi and are utilized to treat asthma<sup>[22]</sup>.

Further metabolism takes place in each of these metabolites, followed by renal excretion. Caffeine can accrue in people with severe liver disease as expressed before, expanding its half-life<sup>[23]</sup>.

During pregnancy estrogens and gestates inhibit CYP1A2 activity, this increases the half-life time up to 16 hours(3-4 times longer than in non-pregnant women). Since caffeine can't be metabolized by neither fetus nor placenta, caffeine readily crosses the placenta into the fetus. Given the prolonged half-life of caffeine during pregnancy, fetus of caffeine consuming women are exposed to caffeine and its metabolites for a significantly prolonged time. Several genetic and non-genetic factors have been reported that significantly affect caffeine metabolism by CYP1A2 for various population groups. Considering the reduced maternal clearance and prolonged half-life during pregnancy and the fetus' exposure to maternal caffeine plasma levels, the unborn child is the most vulnerable to adverse effects of caffeine among the general population.

**Pharmacodynamics Effects:** In the absence of caffeine little adenosine is present in neurons. Over time adenosine accumulates in the neuronal synapse, and binds to the adenosine receptors found on certain CNS neurons; this binding of adenosine to its receptors produces a cellular response that increases drowsiness. When caffeine is consumed, it antagonizes adenosine receptors; in other words, caffeine prevents adenosine from activating the receptor by blocking the location on the receptor where adenosine binds to it. As a result, caffeine temporarily prevents or relieves drowsiness, and thus maintains or restores alertness. It also temporarily increases the production of dopamine, a chemical substance in the brain that is associated with increased concentration.



Four adenosine receptors (A1, A2A, A2B and A3) are present in humans, the distribution of these receptors ultimately affects caffeine activity at various organs and tissues. For example: psychomotor stimulant effect of caffeine is generated by affecting a particular group of projection neurons located in the striatum (high levels of adenosine A2A receptors).

**Health Benefits:** The positive effects of caffeine consumption have been reported through clinical studies. At a dose of 6 mg/Kg body mass, it exhibited an ergogenic effect, in sedentary men<sup>[24]</sup>.

Its stimulatory activity was tested on Parkinson's disease patients, it seemed to be helpful in managing both motor and non-motor symptoms<sup>[25]</sup>. In a mouse model,  $\beta$ -amyloid peptides (characteristic feature of Parkinson's disease patients) accumulation reduced with crude caffeine intake<sup>[26]</sup>. Another study showed that 4.1% of people in the US are suffering from clinical depression. In a Harvard study published in 2011, women who drank 4 or more cups of coffee per day had a 20% lower risk of becoming depressed<sup>[27]</sup>.

Studies show that coffee drinkers have up to a 40% lower risk of liver cancer<sup>[28,29]</sup>. Similarly, one study in 489,706 people found that those who drank 4–5 cups of coffee per day had a 15% lower risk of colorectal cancer<sup>[30]</sup>.

Investigations have revealed that crude caffeine did possess hydrophilic antioxidant activity (145  $\mu$ mol Trolox equivalent (TE)/g) and lipophilic antioxidant activity (66  $\mu$ mol TE/g), and its administration led to the inhibition of cyclooxygenase-2 enzyme better than aspirin<sup>[31]</sup>.

#### Adverse Effects

Some of the adverse effects of high doses of caffeine include overstimulation of CNS, decrease tonus of lower esophageal sphincter muscle, and intrauterine growth retardation<sup>[32]</sup>. High doses of coffee intake during pregnancy increase the risk of miscarriage, independent of pregnancy related symptoms<sup>[33]</sup>.

Caffeine-induced anxiety-disorder is one of four caffeine-related syndromes. Extremely high intake of 1,000mg/day or more have been reported to cause nervousness, jitteriness and similar symptoms in most people, whereas even a moderate intake may lead to similar effects in caffeine-sensitive individuals<sup>[34,35]</sup>.

Increased urination is a common side effect of high caffeine intake due to its stimulatory effects on the bladder. Most of the research on the compound's effects on urinary frequency has focused on older people and those with overactive bladders<sup>[36,37,38]</sup>. In one study, 12 middle-aged people with overactive bladders who consumed 2 mg caffeine per pound (4.5mg/kg) of body weight daily experienced significant increases in urinary frequency and urgency<sup>[37]</sup>.

Caffeine's ability to keep people awake is one of its most prized qualities. However, too much caffeine can disrupt the sleep cycle. Studies have found that higher caffeine intake increases the time taken to fall asleep. It may also decrease total sleeping time, especially in the elderly<sup>[38,39]</sup>.

**Regulations:** The FDA in the US currently allows only beverages containing less than 0.02% caffeine, but caffeine powder, which is sold as a dietary supplement, is unregulated<sup>[40]</sup>. It is a regulatory requirement for packaged food to show presence of additives such as caffeine in the label. However, there is no regulatory provision for mandatory quantitative labeling of caffeine, (e.g., milligrams caffeine per stated serving size). There are a number of food ingredients that naturally contain caffeine. These ingredients must appear in food ingredient lists.

#### Future Prospects and Conclusion

Refined western tastes for specialty blends and developing economies have led to an increase in coffee demand worldwide with the International Coffee Organization expecting the market to grow almost 25% by 2020. With the rising demand, supply is unable to keep up. Coffee supply chain networks are structured to reward roasters and distributors, leaving growers with not much in return for their labor. Poor economic futures combined with the mounting threat to crop yields due to global warming have created a problem that will take time to resolve. As temperatures rise, so will farms. Only 2% of the land currently appropriate for the farming of coffee is actually used to produce the crop. However, a warming climate will cut suitable land in half. Available geographical terrain for coffee production will shift in latitude and increase in elevation. A recent study done by Conservation International reported that tropical forests cover 60% of future farmable land with one-third of that marked as a pristine and protected area. Parts of Central America, the Andes and Southeast Asia are

under the greatest threat of deforestation which would impact and destroy crucial ecosystems that presently assist in carbon storage and provide both freshwater and biodiversity for communities. “Coffee Rust” is the most detrimental disease to coffee plants and has accompanied rising global temperatures.

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# Internet Addiction among Medical Postgraduate Students: A Cross- Sectional Study

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## Abstract

**Introduction:** Internet addiction was not officially recognized as a disorder by the psychiatric community till recently. However, with internet access becoming widespread, problematic internet use is increasingly being reported. It has been suggested that excessive internet use could represent addictive behavior with mental health implications. Therefore, the present study was conducted with the objective to assess the prevalence of internet addiction and pattern of internet usage among post graduate students in a medical college.

**Materials and Method:** A cross sectional study was conducted among post graduates of Jawaharlal Nehru Medical College, Belagavi. The study was conducted from January 2018 to June 2018 with a universal sample size. The data was collected by using Kimberly Young IAT questionnaire. The data was further tabulated and analysed.

**Results:** The study revealed that 138 (92%) reported internet addiction and 12 (8%) reported normal internet usage. The students residing in hostel were more prone for internet addiction. Almost two thirds of participants used internet for communication, social networking and entertainment.

**Conclusion:** Although being trapped in the busy schedules, medical postgraduates were also prone to internet addiction, leading to various mental disorders like depression. To overcome that various internet rehabilitation centres, regulation of use of internet in working hours can be done.

**Keywords:** *Internet, Post Graduate, Addiction.*

## Introduction

Internet has been a revolution in the world of technology since its inception and changed the world in terms of communication. However, this “new” technology has also introduced, especially among

young people, problematic use such as addiction to online gaming, gambling, chatting and pornographic videos watching<sup>1</sup>. Internet addiction was not officially recognized as a disorder by the psychiatric community till recently<sup>2</sup>. In addition, there were various tools and cutoff points to measure the addiction levels and thus, there was a wide range of reports on the prevalence rate of internet addiction among youth<sup>3,4</sup>.

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Internet users’ population worldwide had increased from 360 million in December 2000 to 4383 million in March 2019; this shows that worldwide internet penetration rate in June 2017 was 56.8%. In Asia, it had grown from 114 million internet users in December 2000 to 2197 million in March 2019, this shows that internet penetration rate in Asia was 51.8%, which represents

50.1% of internet users are only in Asia, whereas rest of the world represent 49.9% of users in March 2019. In India, there were about 560 million internet users as on March 2019, as compared to 5 million in 2000, so the internet penetration in India is 40.9% of population, which represents 25.5% of internet users of Asia<sup>5</sup>.

There have been growing concerns worldwide for what has been labeled as “internet addiction”. The term “internet addiction” was proposed by Dr. Ivan Goldberg in 1995 for pathological compulsive internet use.<sup>6</sup> “Addiction” has generally been associated with substance use. However, with internet access becoming widespread, problematic internet use is increasingly being reported. It has been suggested that excessive internet use could represent addictive behavior with mental health implications.<sup>7-9</sup> Psychological and environmental factors in the lives of college students may leave them disproportionately vulnerable to Internet addiction.<sup>10,11</sup>

As internet addiction is increasing at an alarming trend among the current younger generation laying a significant impact on their comprehensive development, it appears to be a major public health concern. Internet usage, both by broadband and mobile users, has increased in India and abroad. The university campuses are being made wireless with free and unlimited access to the internet. Many online courses are now available for the medical students interested in pursuing such courses, to add to their credentials.<sup>12</sup> However, when it comes to students of professional courses especially medical field, the scenario may be different in consideration of lack of time to access internet with these students.

A number of studies across the world have studied internet addiction especially among adolescents. Research specifically on internet addiction among young adults in health care system, is relatively new and limited.<sup>12</sup> Therefore, the present study was conducted with the objective to assess the prevalence of Internet addiction and pattern of internet usage among post graduate students in a medical college.

## Materials and Method

A cross sectional study was conducted among post graduates of Jawaharlal Nehru Medical College, Belagavi. The study was conducted from January 2018 to June 2018 with a universal sample size of 176. The data was collected by using Kimberly Young questionnaire.

The rationale behind applying the Internet Addiction Test (IAT) by Kimberly Young in this study was that it is a validated instrument to assess internet addiction among adolescent and adult populations.<sup>13</sup> The IAT is a 20 item, 6 point Likert scale with scores ranging from 0 to 5 for each item, which measures the severity of self-reported compulsive use of the internet. After all the questions have been answered, numbers for each response were added to obtain a final score. Total internet addiction scores were calculated, with possible scores for the sum of 20 items ranging from 0 to 100. Higher the score, greater the level of internet addiction and the problems internet usage causes. A score of 0-19 was considered as no addiction/normal internet usage, 20-49 points as mild addiction, 50-79 as moderate addiction and 80-100 as severe addiction.<sup>14-16</sup> The data was analysed using the software SPSS version 24.0.

## Results

A total of 150 out of 176 questionnaires were analyzed, 26 forms were rejected because of being incompletely filled. Out of the 150 study subjects, 84 (56%) were males and 66 (44%) students were females, 82 (55%) resided in hostel whereas 68 (45%) were non hostelites (Table 1).

**Table 1: Socio demographic profile of study**

Gender	Frequency	Percentage
Male	84	56
Female	66	44
Total	150	100
Residence	Frequency	Percentage
Hostel	82	55
Non Hostel	68	45
Total	150	100

The study revealed that 138 (92%) reported internet addiction and 12 (8%) reported normal internet usage. The internet addiction test scores revealed 12 (8%) in the score range of 0-19 i.e. no addiction, hence normal users, 111 (74%) in the score range of 20-49 i.e. mild internet addiction and 21 (14%) in the score range of 50-79 i.e. moderate internet addiction and 6 (4%) of the study subjects reported severe addiction i.e. with a score range of 80-100 (Table 2). Among the study population, 123 (82%) had a low risk (score  $\leq$ 49 points) while 27 (18%) had a higher risk (score  $\geq$ 50 points) for internet addiction.

**Table 2: Internet addiction test inferences**

Score	Description	Number	Percentage
<20	No internet addiction	12	08
20-49	You are an average on-line user. You may surf the Web a bit too long at times, but you have control over your usage	111	74
50-79	You are experiencing occasional or frequent problems because of the Internet. You should consider their full impact on your life.	21	14
>80	Your Internet usage is causing significant problems in your life. You should elevate the impact of the Internet on your life and address the problems directly caused by you Internet usage.	06	04

Chi square test was applied as a test of proportions and it was found to be statistically insignificant, with males and females being equally addicted to the internet ( $\chi^2=4.686, P = 0.19$ ) (Table 3), where as when it was

applied with residence of participants, hosteliars were more prone for internet addiction and its effects. ( $\chi^2=4.686, P = 0.19$ )

**Table 3 - Association between gender and internet addiction**

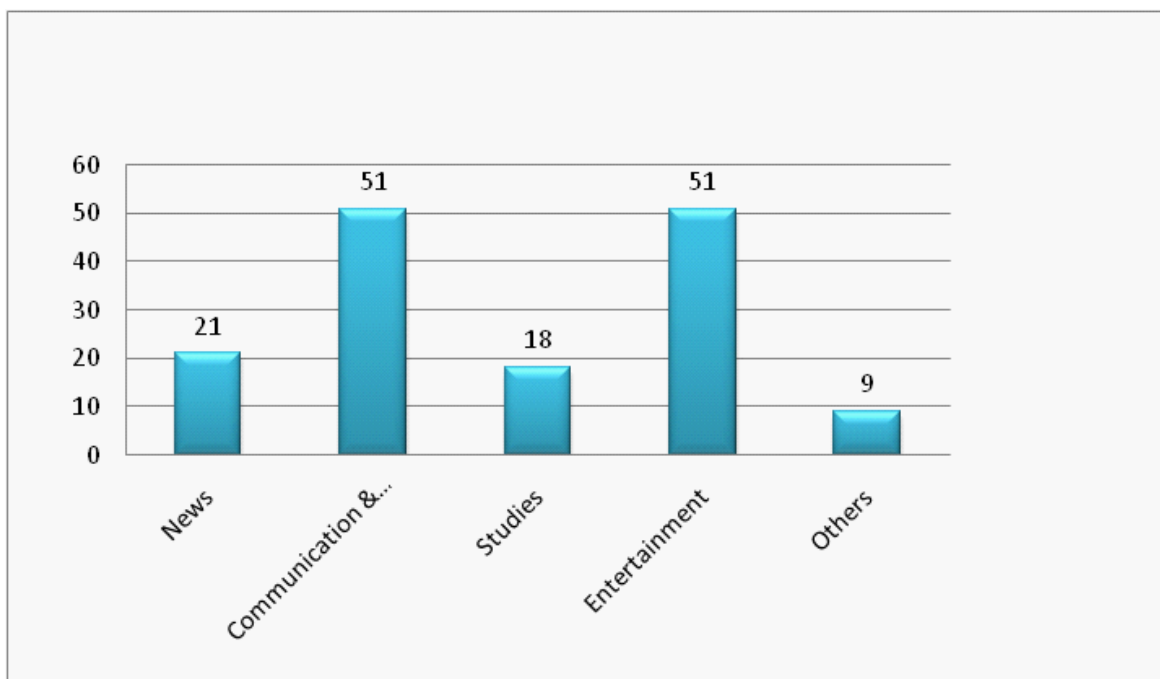
Severity of addiction	Male	Female	Total
Normal	06	06	12
Mild	58	53	111
Moderate	15	06	21
Severe	05	01	06
Total	84	66	150
Chi square – 4.686, p – value – 0.19			

**Table 4 - Association between residence and internet addiction**

Severity of addiction	Hostel	Non Hostel	Total
Normal	01	11	12
Mild	65	46	111
Moderate	12	09	21
Severe	04	02	06
Total	84	66	150
Chi square – 11.474, p – value – 0.0094			

The pattern of usage of internet among participants was analysed. 51 (34%) agreed to the fact that their monthly budget was hampered due to excessive internet usage, 27 (18%) felt it hampered their health and well being. Among the study participants, 16% used internet for more than 5 hours a day, 42% were using internet for more than 10 years.

The purpose of use of internet was also assessed, which revealed that 51 (34%) participants used internet for communication or social networking and entertainment, followed by 21 (14%) for news, 18 (12%) for studies and 9 (6%) for other purpose. (Graph 1)



**Graph 1: Purpose of internet usage**

## Discussion

The prevalence of internet addiction among the study subjects in the present study was 74% mild, 14% moderate and 4% severe, while 8% students reported normal internet usage. In a study conducted in Kurnool, prevalence of internet addiction was 52.63% mild, 24.21% moderate.<sup>12</sup> In another similar study in China, a prevalence among participants was 16.2%.<sup>17</sup> Chathoth Vidya Mavila et al, reported prevalence of internet addiction (representing moderate and severe addiction) as 18.88% in undergraduate Medical students in Mangalore, which was similar to our study.<sup>18</sup>

In the present study, it was observed that there was no statistical difference in the gender which was contradictory compared to the study conducted by Arvind Sharma et al, where the male students were more addicted to internet than the female students ( $\chi^2=22.673$ ,  $P=0.0001$ ).<sup>19</sup> This may be due to the time availability among post graduates, as both males and females are equally posted in the duties, their addiction is also similar.

In this study we found statistical significance between internet addiction and their place of residence. ( $\chi^2=4.686$ ,  $P=0.19$ ) Participants staying in hostels are more prone to being alone and often stuck to the screen,

where as if they lived outside, students tend to be pre occupied by outdoor activities.

In this study, we found that 84% participants spent <5 hours per day on internet. Grover et al, in their study found that more than half (56.73%) of the sample was using Internet at least for 2 h/day.<sup>20</sup> The time spent using internet per day also majorly depends on the speed of the internet connection.

## Conclusion

Majority of the study participants fell into the category of “Average On-line user” with no apparent signs of internet addiction. Medical postgraduate students were also addicted to internet, which can be a boon or bane. Residence plays a major role in internet addiction. Almost half of the participants used internet for Communication or Social Networking and entertainment, which enhances the current need of socialization. Only 18% participants opined that the effects of internet usage on health are adverse.

**Recommendations:** Internet addiction disorder is not included in DSM-V and should be inducted in the next cycle. Awareness of ill-effects of internet addiction should be increased and people should be advised about various other constraints occurring due

to internet addiction. Use of Internet during work hours should be monitored and regulated. This study can be replicated in other colleges to get a broader perspective of the situations like depression and other major mental disorders occurring due to internet addiction.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** No intervention was done in the study and only the data was collected by questionnaire and analysed.

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# Sickness Absenteeism and Associated Factors among Foundry Workers in Belagavi, Karnataka: A Cross Sectional Study

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## Abstract

**Introduction:** Absenteeism is an important factor determining the productivity of a given industry, and it depends upon worker's health, and also on other factors including personal and socioeconomic conditions of workers. Recorded sickness absences accurately reflect the health of working populations, when health is understood in terms of physical and social functioning.

**Materials and Method:** A cross sectional study was conducted among individuals working in Foundry in Belagavi district. The study was conducted from January 2018 to June 2018 with a universal sample size of 250. Data was collected from the patients regarding the socio-demographic details, employment status, details regarding their leaves. Further the absence details were cross checked with the records of the attendance in the foundry.

**Results:** The prevalence of sickness absenteeism among foundry workers was 61.6%, the mean days lost per worker per year was 21.09 days. Common causes for sickness absenteeism included social factors followed by medical factors. Among medical factors, diseases related to musculoskeletal system were more common. 90% of sickness absenteeism was seen among blue collar workers, which shows the amount of stress they bear.

**Conclusion:** Foundry workers are more prone for sickness absenteeism and injuries due to various factors related to the work pattern. To overcome that various recreational activities, medical checkups, cross trainings can be conducted.

**Keywords:** *Sickness Absenteeism, Foundry Workers, Occupational Health.*

## Introduction

Sickness absenteeism is the major occupational health problem in developing countries where the majority of working population are engaged in hazardous sectors,

such as foundry; causing loss of work-hours, reduced productivity and workplace injuries. Absenteeism is a complex phenomenon whose predictors vary according to the frequency – related to workers' tasks, aspects of leadership and work shift, to the company's organization and to lack of measures to control absences – and the duration of the periods of absences<sup>1,2,3,4</sup> (influenced by age, working conditions, benefits and access to medical care).<sup>1</sup> A few days of absence are mainly associated with organizational culture, which allows absences i.e., more related to labour structure and process than to health problems. Long-term absenteeism is considered a reflex of health conditions and family problems.<sup>1</sup> Sick leaves might be better explained by the influence of complex interrelation mechanisms between individual-related

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factors and factors related to the physical and social environment.<sup>5</sup>

Sickness absenteeism is dependent on various individual factors like age, sex, education status, marital status, duration of employment, distance of workplace from home, socioeconomic conditions, health conditions, habits and occupational factors like type of work, shifts, physical environment, workplace injuries, workplace relations, psychosocial environment etc.

The study of illnesses causing absence of workers from work in industries is a practical method to obtain health status of industrial workers and to identify occupational health hazards.<sup>6</sup> Absenteeism is an important factor determining the productivity of a given industry, and it depends upon worker’s health, and also on other factors including personal and socioeconomic conditions of workers.<sup>7</sup> Recorded sickness absences accurately reflect the health of working populations, when health is understood in terms of physical and social functioning.<sup>8</sup>

Study of health conditions of workers is important to identify health problems and studying the health of workers in relation with their social and family related factors provides understanding of the burden of health problem, in relation to social context, which can help to bring necessary changes in labour welfare policies and to create healthy working conditions of workers. Since sickness absenteeism has not been stressed upon among foundry workers in India, the present paper was aimed to analyse the prevalence and risk factors of sickness absenteeism among foundry workers in Belagavi.

**Materials and Method**

A cross sectional study was conducted among individuals working in foundry in Belagavi district, after obtaining a written permission from the management of the foundry. The study was conducted from January 2018 to June 2018 with a universal sample size of 250. All the workers working in the day shifts were included in the study. Written informed consent was obtained from the participants. Data was collected from the participants regarding the socio-demographic details, employment status, details regarding their leaves on one on one interview. Further the absence details were cross checked with the records in the foundry. Ethical clearance was obtained from ethics committee of Jawaharlal Nehru Medical College (JNMC), Belagavi. The data was analysed using the software SPSS version 24.0.

**Results**

A total of 250 foundry workers participated in the study. Out of these, 34.4% were between the age group of 26-35 years, with mean age being 36.8 ± 10.1 years. 84.4% participants were males, 71.2% were literates and 49.2% belonged to socio economic status Class 3. A complete demographic profile of participants is given in Table 1.

An overview of participants’ work pattern and work related variables is given in Table 2. 90.8% participants have blue collar jobs, 80.7% are temporary workers and almost half of participants have work experience of 5 years.

**Table 1: Sociodemographic Variables**

Age Group	Number (%)	Education	Number (%)	Type of Family	Number (%)
<25	32 (12.8)	Illiterate	47 (18.8)	Nuclear	185 (74)
26 – 35	86 (34.4)	Primary	42 (16.8)	Joint	60 (24)
36 – 45	77 (30.8)	Secondary	85 (34)	Broken	05 (02)
46 – 55	49 (19.6)	PUC	36 (14.4)	Socio Economic Status	Number (%)
>55	06 (2.4)	Degree	40 (16)	Class 2	30 (12)
				Class 3	123 (49.2)
				Class 4	93 (37.2)
				Class 5	04 (1.6)
Religion	Number (%)	Marital Status	Number (%)	Sex	Number (%)
Hindu	247 (98.8)	Married	218 (87.2)	Male	212 (84.8)
Muslim	03 (1.2)	Unmarried	32 (12.8)	Female	38 (15.2)

**Table 2: Work Related Variables**

Type of Work	Number (%)	Work Experience	Number (%)
White collar	23 (9.2)	<5 years	142 (56.8)
Blue collar	227 (90.8)	≥5 years	108 (43.2)
Employment Type	Number (%)	Hrs of Work in a Day	Number (%)
Temporary	202 (80.7)	08 hrs	182 (72.8)
Permanent	48 (19.3)	12 hrs	68 (27.2)

The prevalence of sickness absenteeism among the workers was 61.6%. Among the participants, 61.6% of workers missed atleast a working day due to the reasons of sickness or injury in the past 12 months. The missed working days was further confirmed with the records.(Table 3).

**Table 3: Prevalence of Sickness Absenteeism**

Sickness Absenteeism	Number	Percentage (%)
Yes	154	61.6
No	96	38.4
Total	250	100

Among the reasons for sickness absenteeism, most common reason was due to any social commitment (61.03%), followed by medical (46.10%), non occupational (37.01%) and economic (31.81%). (Table 4).

**Table 4: Reasons for Sickness Absenteeism**

Reasons	Number(*)	Percentage
Economic	49	31.81
Social	94	61.03
Medical	71	46.10
Non occupational	57	37.01
*- Multiple answers		

Among blue collar workers health problems related to musculoskeletal system (36) and gastrointestinal system (11) were found to be high whereas among white collar workers musculoskeletal system (5) was the only health problem seen. The comparison of health problems is shown in Table 5.

**Table 5: Health Problems among Blue and White Collar Workers**

	Gastrointestinal	Respiratory	Musculoskeletal	Others	Total
White collar	00	00	05	00	05
Blue collar	11	04	36	15	66
Total	11	04	41	15	71

Overall 21.09 days were lost per worker per year due to sickness absence (see Table 6). A blue collar worker lost 21.9 days compared to 13.2 days by a white collar worker ( $p = 0.02$ ).

**Table 6: Number of Workdays Lost Per Worker Per Year**

Variables	Mean Work Days Lost Per Worker/12 Months
Type of work	
White collar	13.2
Blue collar	21.9
p value - 0.024	

## Discussion

Our study estimated 61.6% of sickness absenteeism among workers, with a loss of 21.09 days per worker per year due to sickness absenteeism, which was higher in men as compared to women. When compared with previous studies on sickness absenteeism in India, our study had higher values.<sup>9,10</sup> The higher prevalence could be due to the work pattern of the study participants who were involved, as the iron and steel industry is believed to be a more strenuous place of work, resulting in higher sickness absenteeism, than other industries.<sup>11,12</sup>

The reasons for sickness absenteeism were most common due to social reasons. This can be explained by the fact that majority of the workers never got leave for their social commitments, so they had get it under sickness absenteeism.

Blue collar workers experienced more health problems than white collar workers, among which problems related to musculoskeletal system (57.7%) and gastrointestinal system (15.5%) were found to be high. Similar finding were seen in a study conducted by Manjunatha R et al in 2011.<sup>13</sup>

The proportion of hospitalization among blue collar workers was also found to be high (11.2%) and blue collar workers had higher sickness absenteeism than white collar workers; they lost more number of working days (21.9 days) due to sickness absenteeism when compared to white collar workers (13.2 days). As workers in Blue collar work are exposed to harmful physical and chemical work environments,<sup>14</sup> it increases the risk of having health problems, mainly involving musculoskeletal system and respiratory system,<sup>15</sup> resulting in higher sickness absences.<sup>14</sup>

## Conclusion

Sickness absenteeism is high among foundry workers when compared with other workers due to the stress and work pattern they have. Blue collar workers loose significant number of days due to sickness absence, and they face more problems related to musculoskeletal system and gastrointestinal system in comparison to other workers. It was not possible to visit each unit so current picture was not assessed completely. Personal biases of the respondents might have affected the responses. Only small sample was considered which doesn't reflect the exact picture. Further studies with larger sample size need to be conducted for the same.

**Recommendations:** We can offer employees medical, dental checkups and rehabilitation of chronic absentees as healthy employees are happy employees. A set schedule and recreational facilities can be provided, so that employees get a chance to rest. Cross training should be done to avoid burnout. Employer should have positive mindset and should have healthy relationship with employees.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** No intervention was done in the study and only the data was collected and analysed retrospectively.

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# The Burden Leprosy Diseases in India: A Study with Special Reference to Tamilnadu and their Districts

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## Abstract

**Background:** Leprosy is one of the oldest diseases known to mankind. Despite the advancements made by science and technology, this curable disease remains misunderstood and dreaded. India is home to the largest number of new leprosy cases globally. Tamilnadu is one among state of high level of leprosy cases in India. The country was still seen to have largest number of leprosy patients in 2018 especially female and children. Keeping this view, “*The Burden Leprosy Diseases in India: A study with special reference to Tamilnadu and their Districts*” was undertaken.

**Data and Method:** The paper uses the secondary data from Report of the National Leprosy Eradication Programme, Ministry of Health and Family Welfare and other research studies and carries out the bi-variate analysis to realise its objectives.

**Findings and Suggestion:** The Tamilnadu contribution of growth of leprosy diseases was continuously decreased because our government will take more steps to reduce the number of leprosy cases. Then only it is possible to reach less than one like Kerala and Punjab. Chennai (9.07%), Erode (9.93%) and Villupuram (9.48%) are the large number new leprosy cases deducted district in Tamilnadu. The budget allocation of Tamilnadu share was very low than the other states in India for the purpose of treatment of leprosy diseases. Government will educate the female and children to prevent from the communicable diseases like leprosy.

**Keywords:** *Leprosy, Communicable Diseases, Prevalence Rate, Tamilnadu.*

## Introduction

Leprosy is one of the oldest diseases known to man. East Africa is the more likely place of origin of leprosy. Leprosy also known as Hansen’s disease (HD), is a chronic infection caused by the bacteria *Mycobacterium leprae* and *Mycobacterium lepromatosis*. Leprosy is not highly infectious. It is transmitted via droplets, from the nose and mouth, during close and frequent contacts with

untreated cases. Untreated, leprosy can cause progressive and permanent damage to the skin, nerves, limbs and eyes. In 1982 multi drug therapy (MDT) consisting of Rifampicin, Clofazimine and Dapsone were identified as cure for leprosy on recommendation of WHO came into use<sup>1</sup>.

**Signs and Symptoms:** The mode of transmission of leprosy is still unknown. It is widely believed that the most common mode of entry of leprosy bacilli into the body of the contact person is the inhalation of bacilli laden droplets of nasal secretions of the affected patient<sup>2</sup>. The peak age of onset is between 10 - 20 years. The entry of leprosy in human body ranges from 3 months to 20 years and more, the average being 2-3 years<sup>1</sup>. A person affected by leprosy, management of disability can be assisted or aggravated by that person’s own attitude and surrounding environment. It is essential for the patient

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to be part of the process of management of disability<sup>3&4</sup>. Leprosy usually starts with a non-itching and non-painful patch or patches in the skin. These patches may appear on the visible or non-visible parts of the body. Untreated leprosy can lead to Claw hands, Ulcers and wounds in feet and hands due to anaesthetic condition. Absorption of fingers and toes, Eyelids do not close and eyeballs are damaged resulting in blindness and wrist and ankle drop due to nerve damage.

**Setting the Problem:** India shares about one fourth of the global estimated leprosy case load and over 60 per cent of the registered cases<sup>5</sup>. There has been a steady increase in the number of cases through successive decades starting with 1.5 million in 1941 and reaching 79,426 cases in 2018. About 50 per cent of the patients are female and children<sup>2</sup>. Tamilnadu is one among state of high level of leprosy cases in India. Keeping this view, **“The Burden Leprosy Diseases in India: A study with special reference to Tamilnadu and their Districts”** was undertaken with the following aims.

**Objectives:** The following are the objectives of this paper: (1) To understand the Incidence and percentage share leprosy diseases in states and union territories of India; (2) To study the percentage share and prevalence rate of leprosy cases in Tamilnadu; (3) To assess the burden of new detected leprosy cases of female and children in Tamilnadu and (4) to suggest some control and prevention method to overcome the leprosy diseases in Tamilnadu.

**Data and Method:** The paper uses the secondary data from report of the National Leprosy Eradication Programme, Central Leprosy Division Directorate General of Health Services<sup>6</sup>, Ministry of Health and Family Welfare, Government of India<sup>7</sup> and other research studies and carries out the bi-variate analysis to realise its objectives.

## Results and Discussion

The percentage share of leprosy diseases in Tamilnadu during the period of 2011 to 2108 is presented in the *table-1*. The Tamilnadu contribution of growth of leprosy diseases was continuously decreased over the years except in the period of 2016 (3.7) and 2017 (3.6) in India. The Tamilnadu government will take more steps to reduce the number of leprosy cases because the percentage share of Tamilnadu was slightly increased. So Health education programmes should be better implemented to prevent the physical disabilities,

to reduce the traditional cultural beliefs and values associated with leprosy<sup>8</sup>. Then only it is possible to reach less than one per cent of leprosy cases deducted like Kerala and Punjab. But in the number of leprosy cases wise concern, India's position was continuously increased and Tamilnadu position (vice versa) is continuously decreased. In overall the table results reflects the India will have to take some more effort to reduce the leprosy problem especially to concentrate major populous states, then only possible to decline trend of leprosy cases in India.

The prevalence rate of leprosy cases in Tamilnadu is explained in the *Table-2*. The prevalence rate is calculated from the number of leprosy cases affected by their total population multiplied by one lakh. It is nothing but how much leprosy cases deducted per one lakh population in Tamilnadu. On an average four persons was affected by leprosy diseases per one lakh population in every year in Tamilnadu. The prevalence rate was less than 4.0 in 2013, 2015 and 2018. The prevalence rate was more than 4.0 in 2011, 2012, 2016 and 2017. The prevalence rate of leprosy disease in present situation is very low than the previous mentioned years in Tamilnadu. It clearly reflects the National Leprosy Eradication Programme was taken massive steps for the main reason was reduce the leprosy in Tamilnadu.

Percentage share of female and children affected by the leprosy diseases in Tamilnadu are presented in the *Table-3*. In recent years, female and Children are the most vulnerable group of population affected by the leprosy diseases in Tamilnadu. The table clearly explain the percentage share of female was continuously increasing for affected by the leprosy diseases in Tamilnadu after 2011. The current status of female leprosy cases in Tamilnadu was 2113 (65.9%). By their children wise concern, nearly and more than one fourth of the percentage of children affected by the leprosy diseases from the following years 2011 (22.7%), 2016 (24.8%) and 2017 (27.2%) by the total affected cases in Tamilnadu. In overall the table clearly reveals the percentage share of majority leprosy cases were female and children only in Tamilnadu. So our government will concentrate more on children and female and divert the more amount of public health expenditure to the female and children leprosy cases. This is the way to reduce the number and percentage share female and children leprosy cases in Tamilnadu.

*Table-4* explains the District wise percentage share

of leprosy cases in Tamilnadu during the period from 2015 to 2017. Chennai (9.07%), Erode (9.93%) and Villupuram (9.48%) are the large number new leprosy cases deducted district in Tamilnadu for following period of 2015, 2016 and 2017. Perambalur (0.86%) and Nilgiris districts (0.14%) had less than one per cent share of leprosy cases deducted in Tamilnadu in the year of 2015 in and Ariyalur (0.95%) and Nilgirs Districts (0.18%) had less than one per cent share of leprosy cases deducted in 2017. But in the year of 2016, four districts had less than one per cent share of leprosy cases deducted, they are Ariyalur (0.91%), Karur (0.75%), Perambalur (0.91%) and Nilgirs (0.37%). In overall, Villupuram district is the only district the percentage share of leprosy cases are high in all the mentioned years.

The percentage share of allocation released and expenditure during the financial year 2014-15 to 2016-17 in Tamilnadu is presented in the **table-5**. The table found that the budget allocation of Tamilnadu share was very low than the other states in India in all mentioned years but at the same time the share is slightly in increasing trend from 2015 to 2017 likewise leprosy cases deducted. By their released amount wise concern, less amount was released in the financial year of 2016-17. The Tamilnadu Government was more amount of rupees utilised for removing or reducing leprosy diseases than the allocation amount of budget.so that the new leprosy deducted from Tamilnadu in controlled manner.

**Table-1: Percentage Share of Leprosy Diseases in Tamilnadu**

Year	India	Tamilnadu	Percentage Share
2011	83041	3195	3.8
2012	83687	3074	3.7
2013	80607	2930	3.6
2014	86319	2993	3.5
2015	88833	2888	3.3
2016	86028	3144	3.7
2017	88166	3207	3.6
2018	90709	3077	3.4

Source: NLEP Progress report, 2011-18

**Table-2: Prevalence Rate of Leprosy Diseases in Tamilnadu**

Year	Total Population	Cases affected	Prevalence Rate (PR)*
2011	72138958	3195	4.4
2012	73192187	3074	4.2
2013	74260793	2930	3.9
2014	75345001	2993	4.0
2015	76445038	2888	3.8
2016	77561135	3144	4.1
2017	78693528	3207	4.1
2018	80885648	3077	3.8

Source: NLEP Progress report, 2011-18, Note: PR= (leprosy cases/Total Population)\*100000

**Table-3: Percentage Share of Female and Children affected by Leprosy in Tamilnadu**

Year	Female %	Children %	Persons
2011	45.1	22.7	3195
2012	39.3	15.4	3074
2013	34.4	13.0	2930
2014	37.4	11.7	2993



Year	Female %	Children %	Persons
2015	41.3	15.8	2888
2016	60.6	24.8	3144
2017	65.9	27.2	3207
2018	NA	NA	3077

Source: NLEP Progress report, 2011-18

**Table-4: District wise Percentage Share of New Leprosy Cases in Tamilnadu**

S.No	District	2015	2016	2017
1	Ariyalur	1.25	0.91	0.95
2	Chennai	9.07	3.76	6.16
3	Coimbatore	3.25	2.68	3.63
4	Cuddalore	6.05	3.13	4.90
5	Dharmapuri	3.25	2.13	1.96
6	Dindigul	2.11	2.21	2.03
7	Erode	2.83	9.93	6.28
8	Kancheepuram	6.02	6.36	4.96
9	Karur	1.64	0.75	1.36
10	Krishnagiri	3.50	2.54	1.90
11	Madurai	5.49	4.04	3.10
12	Nagapattinam	1.25	2.11	2.39
13	Kanniyakumari	2.16	1.44	2.07
14	Namakkal	2.94	4.99	4.42
15	Perambalur	0.86	0.91	1.09
16	Pudukottai	2.14	1.97	1.68
17	Ramanathapura	1.33	1.04	1.01
18	Salem	4.91	5.58	6.56
19	Sivaganga	1.78	1.30	1.54
20	Thanjavur	3.14	4.06	4.88
21	Theni	2.19	2.36	1.88
22	Thirunelveli	2.80	3.41	3.61
23	Thiruvallur	4.52	6.68	3.77
24	Thiruvannamala	4.08	5.73	5.55
25	Thiruvarur	1.44	2.36	1.94
26	Thiruppur	1.91	1.64	1.34
27	Trichy	3.14	2.66	2.57
28	Tuticorin	1.66	1.30	1.22
29	Vellore	3.80	4.12	4.29
30	Villupuram	7.77	5.89	9.48
31	Virudhunagar	1.58	1.64	1.30
32	Nilgiris	0.14	0.37	0.18
	Tamilnadu	100.00	100.00	100.00

Source: NLEP Progress report, 2011-18

**Table-5:: Share of Allocation and Expenditure during Financial Year 2014-15 to 2016-17 in Tamilnadu**

Category (Rs. In Lakhs)	2014-15	2015-16	2016-17
<b>India</b>			
Budget Allocation	3950.00	4098.00	3998.00
Released amount	3689.36	4098.00	2150.40
Utilised expenditure	4395.64	4371.07	4383.80
Unspent Balance	-706.28	273.07	-2233.40
<b>Tamilnadu</b>			
Budget Allocation	109.02	159.00	200.00
Released amount	109.02	159.00	150.50
Utilised expenditure	220.33	251.4	197.47
Unspent Balance	-111.31	-92.4	-46.97
<b>Percentage Share</b>			
Budget Allocation	2.76	3.88	5.00

Source: Ministry of Health & Family Welfare, GOI

### Findings and Conclusion

The Tamilnadu contribution of growth of leprosy diseases was continuously decreased over the years except in the period of 2016 (3.7) and 2017 (3.6). The percentage share of Tamilnadu was slightly increased. So the Tamilnadu government will take more steps to reduce the number of leprosy cases. Then only it is possible to reach less than one like Kerala and Punjab. But in the number of leprosy cases wise concern, India’s position was continuously increased and Tamilnadu position (vice versa) is continuously decreased. In overall the result reflects the India will have to take some more effort to reduce the leprosy problem especially to concentrate major populous states, then only possible to decline trend.

On an average 4 persons only affected by the leprosy diseases per one lakh population in Tamilnadu every year. The prevalence rate of leprosy disease in present situation is very low than the previous mentioned years in Tamilnadu. The result clearly reflects the National Leprosy Eradication Programme was taken massive steps for the main reason was reduce the leprosy in Tamilnadu. In recent years, female and children are the most vulnerable group of population affected by the leprosy diseases in Tamilnadu. The percentage share of female was continuously increasing from 2011 onwards. So our government will concentrate more on children and female and divert the more amount of public health expenditure to the female and children leprosy cases.

This is the way to reduce the number and percentage share female and children leprosy cases in Tamilnadu. Chennai (9.07%), Erode (9.93%) and Villupuram (9.48%) are the large number new leprosy cases deducted district in Tamilnadu. The budget allocation of Tamilnadu share was very low than the other states in India for the purpose of treatment of leprosy diseases. By their released amount wise concern, less amount was released in the financial year of 2016-17. The Tamilnadu Government was more of amount of rupees utilised for removing or reducing leprosy diseases than the allocation amount of budget. That’s why the new leprosy cases deducted from Tamilnadu in controlled manner.

India achieved the goal of elimination of leprosy as a public health problem. Mahatma Gandhi did lot of work for upliftment of people affected with leprosy. There are lots of myths, socio-cultural beliefs, and the stigma attached to leprosy, so Government will conduct more awareness programme about misbelief and misconception of leprosy diseases to the public people. Most of the people they don’t have awareness about its curability. So NGOs’ will take responsibility to create awareness through the already cured people. Government will educate the children and female to prevent from the communicable diseases like leprosy. In that way only, Tamilnadu will reduce the number of leprosy affected cases in future.

**Ethical Clearance:** NLEP-Tamilnadu

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Post Endodontic Treatment in Diabetic Patients and Correlation with their Glycemic Status: A Study

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## Abstract

**Aim:** The aim of this study was to investigate the prevalence of flare up post endodontic treatment in diabetes mellitus (DM) patients and compare between the controlled and uncontrolled diabetic patients and to examine the effect of glycemic control on the prevalence of flare ups.

**Materials and Method:** A study was conducted of convenience sampling among 20 diabetic patients from a private dental clinic who had undergone Root canal treatment in the past one year and their post RCT radiographs and glycemic status were collected in order to correlate the success and failure of endodontic treatment.

**Result:** The prevalence of periapical pain was higher in uncontrolled diabetic group than in the controlled diabetic group (13.5 vs 11.9% respectively) this difference was statistically significant ( $p = 0.000$ ). The poorly controlled DM group had a higher prevalence of the restored tooth being extracted post complications compared with the well-controlled DM group (18.29 vs 9.21 respectively). This difference was statistically significant ( $p = 0.000$ ).

**Conclusion:** This survey therefore demonstrates a higher prevalence of flare ups in uncontrolled diabetic patients compared with controlled diabetic group, with an increased prevalence of persistent chronic apical periodontitis. Compared with a well-controlled diabetic group, a poor glycemic control may be associated with a higher prevalence of Apical Periodontal disease and increased rate of endodontic failures.

**Keywords:** Endodontic treatment, Diabetes mellitus, Periapical pain.

## Introduction

Diabetes mellitus (DM) is a group of complex multisystem metabolic disorders due to a deficiency in insulin secretion caused by pancreatic  $\beta$ -cell dysfunction and/or insulin resistance in liver and muscles. Patients with diabetes present impaired capacity of polymorphonuclear leukocytes (leukocyte adhesion, chemotaxis, and phagocytosis), hindered bactericidal activity, altered reaction to the antigens, and altered capacity of T lymphocytes. Numerous studies have shown a clear connection between chronic irritation and the advancement of Type 2 Diabetes Mellitus (DM2). The mechanisms of the effect of chronic periapical infections on diabetic patients is the Chronic inflammation through the action of inflammatory

mediators and is mainly associated with the development of insulin resistance, which is influenced by genetically modified environmental factors, including decreased physical activity, poor nutrition, obesity and infection.

Apical periodontal disease (AP) is an acute or chronic inflammatory lesion around the apex of a tooth caused by microorganism infection of the pulp canal system. Periradicular lesions consecutive to AP result from a periapical inflammatory response triggered by polymicrobial irritants from root canals. AP may be a current drawback in the treatment of endodontic treatment in patients who suffer from uncontrolled diabetes<sup>(1)</sup>. Once the disease has progressed treatment is aimed toward restoring the periradicular tissues to health: this may be usually applied by treatment

with surgical extraction<sup>(2)</sup>.The periradicular infection produces a spread of native tissue responses with the likely purpose to confine and limit the spreading of the infectious components, AP may not entirely be a localised development. In its non-balanced acute stage, spreading of the infection and additionally the inflammatory technique to close tissue compartments is possible and can increase in its severity, but it is rare to produce fatal inflammatory conditions.

Since diabetes is the third most prevalent condition in medically compromised patients seeking dental treatment, dentists should be aware of the possible relationship between endodontic infections and diabetes and take it into account in the dental treatment of diabetic patients. The prognosis of the diabetic patients undergoing root canal treatment is to be examined because of the factors that follow diabetes may promote conditions like delayed healing and less salivary flow that lead to the failure of the endodontic treatment.

### Materials and Method

A study was conducted among 20 diabetic patients from a private dental clinic who had underwent root canal treatment in the past one year and their post RCT radiographs and glycemc status were collected in order to correlate the success and failure of endodontic treatment.

### Results

The prevalence of periapical pain was higher in uncontrolled diabetic group than in the controlled diabetic group (13.5 vs 11.9% respectively) this difference was statistically significant (p = 0.000) as shown in (Table-2). The poorly controlled DM group had a higher prevalence of the restored tooth being extracted after complications compared with the well-controlled DM group (18.29 vs 9.21 respectively). This difference was statistically significant (p = 0.000) as shown in (Table-1).

**Table 1: Tooth extraction \*Group**

Crosstab					
			Group		Total
			Controlled Diabetes	Uncontrolled Diabetes	
Tooth extraction	Yes	Count	2	2	4
		% within Group	20.0%	20.0%	20.0%
	No	Count	8	8	16
		% within Group	80.0%	80.0%	80.0%
Total		Count	10	10	20
		% within Group	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000 <sup>a</sup>	1	1.000		
Continuity Correction <sup>b</sup>	.000	1	1.000		
Likelihood Ratio	.000	1	1.000		
Fisher's Exact Test				1.000	.709
Linear-by-Linear Association	.000	1	1.000		
N of Valid Cases	20				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.00.

b. Computed only for a 2x2 table

**Table 2: Periapical pain \*Group**

Crosstab					
		Group			Total
		Controlled Diabetes	Uncontrolled Diabetes		
Periapical pain	Yes	Count	8	7	15
		% within Group	80.0%	70.0%	75.0%
	No	Count	2	3	5
		% within Group	20.0%	30.0%	25.0%
Total		Count	10	10	20
		% within Group	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.267 <sup>a</sup>	1	.606		
Continuity Correction <sup>b</sup>	.000	1	1.000		
Likelihood Ratio	.268	1	.605		
Fisher's Exact Test				1.000	.500
Linear-by-Linear Association	.253	1	.615		
N of Valid Cases	20				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.50.					
b. Computed only for a 2x2 table					

**Discussion**

DM affects many functions of the immune system and is associated with delayed healing and compromised immune responses<sup>(6)</sup>. DM-induced changes in immune cell function produce an inflammatory immune cell phenotype (up-regulation of pro-inflammatory cytokines from monocytes / polymorphonuclear leukocytes and down regulation of growth factors from macrophages). This predisposes to chronic inflammation, progressive tissue breakdown, and diminished tissue repair capacity<sup>(7)</sup>.

In our study the results were found to be significant for patients who had uncontrolled diabetes to contract with periapical pain followed by extraction of the tooth which is in correlation with the other scientific literature that shows a higher prevalence of periapical lesions in patients with poorly controlled diabetes<sup>(9,13)</sup>. A recent clinical study showed that patients with DM2 presented a significant association with an increased incidence of periapical lesions and endodontic treatments<sup>(14)</sup>. Regarding the success rate of endodontic treatment, another article published in 2011<sup>(15)</sup> states that patients with DM had a lower success rate in primary root canal treatment in comparison with non-diabetic patients,

while both groups presented the same success rate in secondary root canal treatment.

Bender et al.<sup>(8)</sup> reported that, in cases of poorly controlled DM, peri-apical radiolucencies tend to develop during treatment but, if DM is under therapeutic control, periapical lesions heal as readily as in non-diabetics, this is in correlation with our study.

Bender & Bender<sup>(9)</sup> found a high rate of asymptomatic tooth infections in diabetics exhibiting poor glycaemia levels of an unclear cause. Falk et al.<sup>(10)</sup> conducted a clinical and radiographic investigation showing a greater prevalence of periapical lesions in type 1 diabetics this is in contrary to the present study where all the patients examined had type 2 diabetes mellitus.

Fouad & Burlison<sup>(11)</sup> investigated endodontic diagnostic and treatment outcome data in patients with and without diabetes. A multivariate analysis showed that patients with diabetes have increased periodontal disease in root-filled teeth and have a reduced likelihood of success of root canal treatment in cases with preoperative periradicular lesions. Britto et al.<sup>(12)</sup> investigate the prevalence of radiographic periradicular radiolucencies

in root-filled teeth and untreated teeth in patients with and without diabetes. Results showed that men with type 2 diabetes who had root canal treatments were more likely to have residual lesions, this is in correlation with the present results from this study which also showed post treatment radiolucencies.

The incidence of peri-apical pain in patients with controlled and un-controlled diabetes provide evidence that the treatment objectives and definition of success should be different for these patients. A recent review concluded that current knowledge about the microbiology of endodontic infections and inflammatory reactions is limited, and that such knowledge could help implement new forms of treatment for these patients. Further research is required to better understand the issue and so as to increase the success rates of endodontic treatment among these patients<sup>(16)</sup>.

### Conclusion

This study demonstrates a higher prevalence of flare ups in uncontrolled diabetic patients compared with controlled diabetic group, with an increased prevalence of persistent Chronic Apical Periodontitis. Compared with a well-controlled diabetic group, a poor glycemic control may be associated with a higher prevalence of AP and increased rate of endodontic failures. It's been shown that diabetes exists in a bidirectional relationship with disease and should result in different oral pathologies. For this reason, doctors and dentists should be open-eyed with reference to the varied oral manifestations of diabetes so as to form an early diagnosis. Full understanding and awareness of the pathophysiology, manifestations, and management of different types of diabetes-related orofacial infection by the endocrinologist and also the dental practitioner are essential to optimizing the care of diabetic patients.

**Conflict of Interest:** Nil

**Source of Funding:** Self

Ethical Clearance: Not needed

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# A Descriptive Study to Assess the Knowledge, Practice and Attitude on Iron Deficiency Anemia among Adolescent Girls at Selected Private School, Kanchipuram Dt, Tamilnadu, India

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## Abstract

Prevalence of iron deficiency anemia is more common among adolescent girls. A descriptive study to assess the knowledge, practice and attitude on iron deficiency anemia among adolescent girls was conducted. The study objectives were to assess the level of knowledge, practice and attitude on iron deficiency anemia among adolescent girls, and to find out the association between the level of knowledge, practice and attitude on iron deficiency anemia among adolescent girls and with their selected demographic variables, and to find out the correlation between the knowledge & practice, knowledge & attitude and practice & attitude. 100 Adolescent girls in the age group of 13-18 years were selected as a sample for this study, based on inclusion criteria. The purposive sampling technique was used. Structured questionnaire, check list and likert scale was used as a tool to collect the data on knowledge, practice and attitude on iron deficiency anemia.

Chi-square and Karl Pearson Coefficient of correlation were used for data analysis. The study result shows that, Majority (75%) of adolescent girls were having moderate knowledge, 24% were having inadequate knowledge, and only 1% were having adequate knowledge on iron deficiency anemia. Majority (75%) of adolescent girls were having desirable practice, few 25% were having undesirable practice on iron deficiency anemia. In this study, for the knowledge, practice and attitude, mean, mean percentage and standard deviation was estimated. For the knowledge, practice and attitude, the association with the demographic variable were partially accepted. The correlation between knowledge & practice, knowledge & attitude and practice & attitude were rejected. The study concluded that, Adolescents girls were not having sufficient awareness regarding iron deficiency anemia. The study recommended that, health teaching regarding iron deficiency anemia to adolescent girls is must to overcome the high prevalence rate.

**Keywords:** Anemia, Iron deficiency anemia, knowledge-practice-attitude on anemia, Adolescent girls.

## Introduction:

Globally anemia is one of the most common and

intractable nutritional problem. Iron deficiency anemia occurs at all stages of life, but it is more prevalent in pregnant women and young children<sup>[1]</sup>. Adolescents especially girls are particularly more vulnerable to iron deficiency. The highest prevalence is between the age of 12-15 years, when requirements are at peak<sup>[2]</sup>.

In all members states of the south east Asia region, except Thailand, more than 25% of adolescent girls are reported to be anemic; in some countries the prevalence is as high as 50%<sup>[3]</sup>. Adolescence is a time of increased iron needs because of the expansion of blood volume

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and increase in muscle mass [4]. Young women are at particular risk for the development of iron deficiency due to menstrual blood loss [5]. In addition, adolescent athletes and adolescents who limit their intake of meat products are at risk. Iron deficiency affects both physical endurance and cognitive performance in adolescents [6].

**Title of the Study:** A descriptive study to assess the knowledge, practice and attitude on iron deficiency anemia among adolescent girls at selected private school, Kancheepuram Dt.

**Objectives of the Study:**

- To assess the level of knowledge, practice and attitude on Iron deficiency anemia among adolescent girls.
- To find out the association between the level of knowledge, practice and attitude on iron deficiency anemia among adolescent girls and with their selected demographic variables.
- To find out the correlation between the knowledge & practice, knowledge & attitude and practice & attitude.

**Operational Definition:**

**Assess:** It is the organized, systematic and continuous process of collecting data from adolescent girls regarding iron deficiency anemia.

**Knowledge:** It refers to the facts, information and skills acquired by the sample regarding iron deficiency anemia, which was evaluated through structured questionnaire.

**Practice:** It refers to the use or application of a gained knowledge and acquiring skills in their daily life by the sample regarding iron deficiency anemia, which was evaluated through check list.

**Attitude:** It refers to the sample point of view or perception regarding iron deficiency anemia, which was evaluated through likert scale.

**Iron Deficiency Anemia:** Anemia is defined as haemoglobin (Hb) level less than 12.0 g/dl in women and less than 13.0 g/dl in men. The decreased number of haemoglobin level due to poor intake of iron rich foods[1].

**Adolescent Girls:** It refers to the girls who attained puberty between the 13 to 18 years of age, studying 9<sup>th</sup>

Standard.

**Material and Method**

**Research Approach:** Quantitative, Evaluative approach was seems to be the most appropriate approach for this study.

**Research Design:** Non Experimental, Descriptive design was to be the most appropriate design for this study.

**Research Setting:** This study was conducted at Buvana Krishnan Matriculation Higher Secondary School, Kelambakkam, Kanchipuram Dt, Tamilnadu, India.

**A. Population:**

**Participants:**

- Adolescent girls who attained puberty between the age of 13-18 years at Buvana Krishnan Matriculation Higher Secondary School, Kelambakkam, Kanchipuram Dt, Tamilnadu, India.

**B. Sampling Technique:**

- Non probability purposive-Sampling technique was used for this study.

**C. Sample Size:**

- Sample size  

$$n = [DEFF * Np(1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p*(1-p)]$$
- Confidence Level : 95%
- Confidence Interval : 5%
- Population : 300
- Sample size : 100

At the confidence level of 95%, the sample size (n) is 100

**G. Sampling Criteria:**

**(A) Inclusion Criteria:**

- The study includes the adolescent girls who were
- attained puberty between the age of 13-18 years.
  - can able to understand Tamil and English.
  - willing to participate in this study.

**(B) Exclusion Criteria:**

The study excludes the adolescent girls who were,

- less than 13 years and more than 18 years of age.
- absent on the day of data collection.
- not willing to participate in this study.

**Datacollection Tool:** The data was collected by using Structured Tool.

**It contains two parts:**

**Section-A:** Selected demographic variables of adolescent girls.

**Section-B:** It includes the three parts

Part-1: It includes Multiple choice questions to assess the level of knowledge on iron deficiency anemia.

Part-2: It includes Dichotomous questions (Yes/No) to assess the practice regarding iron deficiency anemia.

Part-3: It includes Likert scale to assess the attitude of sample regarding iron deficiency anemia.

**Plan for Data Collection:**

- The researcher planned to collect the data for the period of one week.
- The written consent was obtained from the participants before gathering the information.
- In this present study the researcher, collected the demographic data and Responses for the tool to assess the knowledge, practice and attitude on iron deficiency anemia among adolescent girls.

**Plan for Data Analysis:** The data was organized, tabulated and analyzed by using descriptive and inferential statistics.

**(A) Descriptive Statistics:**

- It includes mean, frequency, percentage, range, and standard deviation.

**(B) Inferential Statistics:**

- Chi-square test was used.
- Karl Pearson Coefficient of correlation was used.

**Analysis and Interpretation:**

**Research Design:**

- Descriptive study was used to conduct this study. The data obtained from the adolescent girls from June 11.06.2019 to June 15.06.2019 in Buvana Krishna Matriculation Higher Secondary School,

Kelambakkam.

- Sample of 100 adolescent girls were selected, who met the inclusion criteria were selected for the study by using purposive sampling method. Structured questionnaire, check list and likert scale was used as a tool to collect the data on knowledge, practice and attitude on iron deficiency anemia.
- Prior permission and consent were obtained from the respective authorized person. Chi- Square test was used to find out the association related to knowledge, practice and attitude on iron deficiency anemia. Correlation Coefficient was used to find out the correlation between the knowledge & practice, knowledge & attitude and practice & attitude.

**Assessment of Demographic Variable of Adolescent Girls:**

The study findings revealed that

Majority of (79%) of adolescent girls were in the age group of 12-14 years. Most (56%) of the adolescent girls father's educational status were belongs to the High school education. Most (49%) of the adolescent girls Mother's educational status were belongs to the High school education. Most (48%) of the adolescent girls father's occupational status were belongs to the private sector. Most (57%) of the adolescent girls mother's occupational status were belongs to the category of home maker. Most (69%) of the adolescent girls family type was belongs to the Nuclear family. Most (56%) of the adolescent girls were belongs to the category of having only 1 sibling. Majority (54%) of their family income of adolescent girls was above RS.10,000. Majority (85%) of the adolescent girls dietary pattern were belongs to the category of mixed diet. Most (48%) of the adolescent girls attained menarche in the age of 13-14 years. Majority (56%) of the adolescent girls having 3-5 days of menstrual flow. Majority (61%) of the adolescent girls having the menstrual cycle of 20-25 days once. Majority (70%) of adolescent girls received information on Iron Deficiency anemia through their teacher. Majority (92%) of adolescent girls not having the family history of Iron deficiency anemia.

**Assessment of Level of Knowledge of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that

Majority (75%) of adolescent girls were having moderate knowledge, 24% were having inadequate

knowledge, and only 1% were having adequate knowledge on iron deficiency anemia.

#### **Assessment of Level of Practice of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that

Majority (75%) of adolescent girls were having desirable practice, few 25% were having undesirable practice on iron deficiency anemia.

#### **Assessment of Level of Attitude of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that,

Majority (75%) of adolescent girls were having moderate knowledge, 24% were having inadequate knowledge, and only 1% were having adequate knowledge on iron deficiency anemia.

**Mean, Mean Percentage and Standard Deviation of Knowledge, Practice and Attitude on Iron Deficiency Anemia:** In this study, for the knowledge, practice and attitude, mean, mean percentage and standard deviation was estimated. For the knowledge, mean value is 12, mean percentage is 53% and standard deviation is 4. For the practice, mean value is 6, mean percentage is 57% and standard deviation is 2. For the attitude, mean value is 68, mean percentage is 68% and standard deviation is 7.

#### **Association between the Demographic Variable and Knowledge of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that,

Demographic characteristic of age of the adolescent girls had a significant association [(P = 0.01) ( $X^2 = 16.3$ ) at  $P < 0.01$  level] with the level of knowledge of adolescent girls on iron deficiency anemia. The adolescent girls who were in the age group of 12-14 years had more level of knowledge on iron deficiency anemia than the 15-18 years. Other demographic characteristics such as father's educational status, mother's educational status, father's occupational status, mother's occupational status, type of family, number of siblings, family income, dietary pattern, age of menarche, duration of bleeding, length of menstrual cycle, source of information and family history of iron deficiency anemia, not had a significant association with the level of knowledge of adolescent

girls on iron deficiency anemia at the level of  $p = 0.05$ . Hence, the null hypothesis  $H_01$  is partially accepted.

#### **Association between the Demographic Variable and Practice of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that,

Demographic characteristic of age of the adolescent girls had a significant association [(P = 0.01) ( $X^2 = 19.53$ ) at  $P < 0.01$  level] with the level of practice of adolescent girls on iron deficiency anemia. The adolescent girls who were having a family monthly income of RS.10,000 and above, had more level of desirable practice on iron deficiency anemia than the family income of RS.5000 and RS.5001-10,000.

Other demographic characteristics such as father's educational status, mother's educational status, father's occupational status, mother's occupational status, type of family, number of siblings, dietary pattern, age of menarche, duration of bleeding, length of menstrual cycle, source of information and family history of iron deficiency anemia, not had a significant association with the level of practice of adolescent girls on iron deficiency anemia at the level of  $p = 0.05$ . Hence, the null hypothesis  $H_02$  is partially accepted.

#### **Association between the Demographic Variable and Attitude of Adolescent Girls on Iron Deficiency Anemia:**

The study findings revealed that,

Demographic characteristics such as age, father's educational status, father's occupational status, mother's occupational status, family income, type of family, number of siblings, dietary pattern, age of menarche, duration of bleeding, length of menstrual cycle, source of information and family history of iron deficiency anemia, not had a significant association with the level of attitude of adolescent girls on iron deficiency anemia at the level of  $p = 0.05$ .

Demographic characteristics of mother's educational status, not had a significant association with the level of attitude of adolescent girls on iron deficiency anemia at the level of  $p = 0.01$ . Hence, the null hypothesis  $H_03$  is partially accepted.

#### **Correlation of Knowledge and Practice of Adolescent Girls on Iron Deficiency Anemia.**

In this study, while comparing the knowledge score along with practice, it shows that, there is a moderately positive correlation between knowledge and practice. It indicates that, when knowledge increases practice also increases ( $r = 0.5$ ). Hence, the null hypothesis  $H_04$  is rejected.

#### **Correlation of Knowledge and Attitude of Adolescent Girls on Iron Deficiency Anemia.**

In this study, while comparing the knowledge score along with attitude, it shows that, there is a moderately positive correlation between knowledge and attitude. It indicates that, when knowledge increases attitude also increases ( $r = 0.5$ ). Hence, the null hypothesis  $H_05$  is rejected.

#### **Correlation of Practice and Attitude of Adolescent Girls on Iron Deficiency Anemia.**

In this study, while comparing the practice score along with attitude, it shows that, there is a moderately positive correlation between practice and attitude. It indicates that, when practice increases attitude also increases ( $r = 0.6$ ). Hence, the null hypothesis  $H_06$  is reject.

#### **Recommendation:**

- The same study can be replicated on a larger sample and at a different settings.
- The research can be conducted on nutritional assessment, and hemoglobin estimation for assessing iron deficiency anemia.
- A structured teaching programme can be prepared and given to the Village Health Nurse and Schools to incorporate their knowledge on iron deficiency anemia among adolescent girls.
- A true experimental study can be conducted to assess the effectiveness of Instructional Teaching Programme on iron deficiency anemia.

## **Conclusion**

Adolescence is an opportunity time for interventions to address anemia. Interventions to prevent and correct the iron deficiency anemia therefore must include measures to increase iron intake through food based approaches, namely dietary diversification and food fortification with iron; iron supplementation and by improved health services and sanitation.

**Conflict of Interest:** Nil

**Source of Funding:** Self funding and no external funding.

**Ethical Clearance:** Obtained clearance from institutional human ethical committee on 04.02.2019.

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# Effectiveness of Structured Teaching Programme Regarding Weaning Practices among Primipara Mothers in a Selected Area at Kanchipuram District, Tamilnadu, India.

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## Abstract

To evaluate the effectiveness of structured teaching programme regarding weaning practices among Primipara mothers. To determine the association on weaning practices with the selected demographic variables. The convenience sampling technique with the sample of 53 primipara mothers and self structured questionnaire to assess the pre-test and post-test knowledge of mothers on weaning practices. The structured teaching programme to assessing the level of knowledge of primipara mothers on weaning practices. The level of significance selected was  $p < 0.05$ . The data collection tools was validated and reliability was established. The data were collected by self structured questionnaire. The collected data was tabulated and analyzed. Descriptive and inferential statistics were used. The pre test mean value is 8 and post test mean value is 97 and the pretest standard deviation is 2.227 and post test standard deviation is 336.4. The study showed that pretest on 1.88 % of primipara mothers had adequate knowledge, 58.4% of primipara mothers had moderate knowledge, 39.6% of the primipara mothers had inadequate knowledge and post test on 92.4% of primipara mothers had adequate knowledge, 7.54 % of primipara mothers had moderate knowledge, 0% of the primipara mothers had inadequate knowledge on weaning practices and there was a significant association of the knowledge with demographic variables.

**Keywords:** Knowledge, Weaning practices, Primipara mothers.

## Introduction

*“Children are the wealth of tomorrow; take care of them if you wish to have a strong India ever ready to meet various challenges”* —[Jawaharlal Nehru]

The term ‘to wean’ means to ‘accustom’ and it is defined as the process by which the infant gradually becomes accustomed to the full adult diet. The physiological process of weaning is complex and includes biochemical, microbiological, immunological,

nutritional and psychological adjustments. Weaning food is important both socially and nutritionally. Additional protein becomes necessary towards the end of the first year of life and the infant also wants bulk of roughage about this time (K. Park, 2005).<sup>[14]</sup>

Weaning is the term which will be familiar for every mother. Proper knowledge and training is required to perform effective weaning. Many studies conducted on Weaning practices in India and abroad reveal that most of the mothers, especially primipara mothers have inadequate knowledge regarding effective weaning practices as they are following traditional feeding practices. Effective weaning in the child requires proper knowledge and good technique skills in the mothers. The investigator found the Structured Teaching Programme to improve the level of knowledge on primipara mothers regarding Weaning.<sup>[12]</sup>

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Weaning is one of the many milestones in baby’s process of development. It is very important for baby’s health and development. Weaning is process were baby moves or shifts from having breast feed to consuming solid or semi solid or Its gradual adaptation of the baby from breast feed to other foods(Piyush Gupta 2014).<sup>[12]</sup>

Weaning can be initiated by child, mother or it may be shared decision of both in age between 4 month to 4 years. It is unknown for an infant younger than 12 months to self wean. The duration of weaning varies from child to child.<sup>[11]</sup>

Weaning can be a very emotional time for the woman and child. It is not just a transition to another feeding method, but conclusion of special relationship between mother and child. During this process child may need more attention and cuddle time to take the place the nursing (Ghai OP, Paul VK, Bagga.A 2015).<sup>[11]</sup>

**Research Methodology:** A Quantitative approach with descriptive design was used in the study. The study was conducted among Primipara mothers above(6 months-1 year) in a Selected area, Kanchipuram District, Tamil Nadu, India. Non-probability purposive sampling technique was used to select 58 samples with the following inclusion criteria.Primipara mothers who are:After 6 months of postpartum period,Accessible during the study,Willing to participate in the study,Who can read and understand Tamil and English.The data was analysed by using descriptive and inferential statistics.

**Research Tool:** It consists of self structured questionnaire to assess the pre-test and post-test knowledge of mothers on weaning practices.A structured teaching programme will be prepared for weaning practices as a tool for data collection. It will consist of the following section.

**Part-1:** Questions related to socio demographic profile of mother which includes.Age of mother (in years) at time of delivery, Type of family, Mothers education, Mothers working status, Monthly income in rupees, Nationality, Types of delivery, Gestational age, History of baby admitted in NICU, Information regarding weaning practice.

**Part-2:** Self-structured Questionnaires related to weaning practices.

**Scoring Interpretation:**

Scoring	Level of Knowldege
Below 75%	Adequate knowledge
51-75%	Moderated knowledge
Above 50%	Inadequate knowledge

**Summary, Finidings, Implications, Limitations, Conclusion And Recommendations:** The essence of any research project lies in reporting the findings this chapter gives brief of the present study including conclusion drawn from the finding recommendation,Ilimitations, suggestion for future studies and running implication.

**Summary:** The objectives of the study were

1. Evaluate the effectiveness of structured teaching programme regardingweaning practices among Primipara mothers.
2. Determine the association on weaning practices with the selecteddemographic variables.

**The study attempted to examine the following research hypothesis that**

H<sub>0</sub>. There is no significant association on weaning practices with selected demographic variables among primipara mothers in a selected area at Kanchipuram District, Tamil Nadu, India.

The review of literature enabled the investigator to develop methodology of the study literature review was done and organized as studies to knowledge on weaning practices among primipara mothers .

1. The research approach used was quasi experimental one group pretest post test research design to evaluate the weaning practice among primipara mothers.
2. 53 samples were selected by sampling the main study was done in a selected area at Kancheepuram District, Tamil Nadu, India.
3. A self structured questionnaire was used to collect the data regarding the knowledge on weaning practices being among primipara mothers.
4. The data gathered were analyzed by using descriptive and inferential statistical method .The finding were presented on the basis of objectives of the study.

**Findings:** Findings of the study were presented under the following headings based on the study objectives.

**Objective 1:** To evaluate the knowledge on structured teaching programme regarding weaning practices among Primipara mothers.

**The Findings of the Present Study Reveals that Pretest:**

S.No.	Level of Knowledge	Frequency	Percentage
1	Adequate knowledge (below 75%)	01	1.88%
2	Moderate knowledge (51-75%)	31	58.4%
3	Inadequate knowledge (above 50%)	21	39.6%
		<b>Total</b>	<b>100%</b>

**The Findings of the Present Study Reveals that Post Test:**

S.No.	Level of Knowledge	Frequency	Percentage
1	Adequate Knowledge (below 75%)	49	92.4%
2	Moderate Knowledge (51-75%)	04	7.54%
3	Inadequate Knowledge (above 50%)	0	0%
		<b>Total</b>	<b>100%</b>

**Objective 2:** To determine the association on weaning practices with the selected demographic variables among primipara mothers.

To find out the association between pretest level of knowledge regarding weaning practices with selected sociodemographic variables. But since there is inadequate pre test level of knowledge between selected socio demographic variables, the investigator cannot proceed to analyze the association between pre test level of knowledge with selected socio demographic variables.

The findings of the study shows that there is a statistically significant difference between pre test and post test level of knowledge and there was no statistical significant in pre test level of knowledge with regard to age of mother (in years at time of delivery), types of family, mothers education, mothers working status, types of delivery, gestational age, baby admitted to the NICU, received information on weaning practices.

**Nursing Implication:**

**Nursing Practice:** The community health nurses working in the health services should be equipped with the knowledge to evaluate the knowledge on weaning practices among primipara mothers.

Health teaching programmes to evaluate knowledge regarding weaning practices are to be scheduled on fixed days and time. The nurse to evaluate the knowledge on primipara mothers by using appropriate audio visual aids like flash cards and through mass media.

**Nursing Education:** During training period, emphasis needs to be given in preparing health education regarding importance of monitoring the health status.

A structured teaching programme regarding weaning practices on conduct the pretest and post test should be given special focus in nursing education. The students are given opportunity to do flash card to the primipara mothers regarding weaning practices. In area setting people are utilized to teach the mothers to gain knowledge on post test regarding weaning practices.

**Nursing Administration:** The community health nursing administrator holds more responsibilities in understanding weaning practices of primipara mothers.

The administrator should initiate health education programmes in a community utilizing the trained staff and encouraging them in such activities.

Extend the role in strengthening and designing the primary health centre services as per the felt of the community to bring healthy future citizens.



Regular follows-up services are to be planned in an effective way to strengthen and widen the peripheral approach.

The administration should facilitate to implementation of various health education programmes and such activities need to be documented for better implementation.

**Nursing Research:** Nurse researchers should be motivated to conduct more studies on weaning practices.

Nurse researchers should concentrate on weaning practices children.

Nurse researchers should come forward to develop validate new strategies standardized tool to improve knowledge on primipara mothers.

**Limitations:** Primipara mothers in early postpartum period (Before 6 months) are only included in the study.

Mothers who are not willing.

**Recommendations:** The study can be conducted in the rural area.

The study can be conducted at the hospital setting, PHC, child clinic.

The study can be taken for the cross sectional, pre experimental study.

Health education like flash cards, booklet, modules regarding weaning practices can be taught to the postnatal mothers.

### Conclusion

The finding of the present study reveals that pretest on 1.88% had Adequate knowledge, 58.4% had Moderate knowledge, 139.6% had Inadequate knowledge, that post test on 92.4% had Adequate knowledge, 17.54% had Moderate knowledge, 0% had Inadequate knowledge, The findings of the study shows that there is a statistically significant difference between pre test and post test level of knowledge and there was no statistical significant in pre test level of knowledge with regard to age of mother (in years at time of delivery, types of family, mothers education, mothers working status, types of delivery, gestational age, baby admitted to the NICU,

received information on weaning practices with selected demographic variables.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Anthropometric Profile of Mentally Challenged Children

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## Abstract

A concise report on mentally challenged children was focused on to their health and wellbeing by assessing their somatotype characteristics. For this study 25 (male) participants, age ranging in between 14 - 18 years, trainable and educable mentally challenged without any multiple disabilities were selected from Special School for Mentally Challenged People under Department of Teacher Training & Non-formal Education, Jamia Millia Islamia, New Delhi. Purposive sampling method and Ex-post facto design were applied. By using Heath- Carter Anthropometric Method each subject was somatotyped. Analysis of Data done through SOMATOTYPE (Computer Programs for Somatotype Analysis) to calculate somatotypes, descriptive and comparative statistics and plotting somatocharts with mean, standard deviation. The result clearly indicated that mentally challenged participants have low level of body fat and observed more percentage in mesomorphic and ectomorphic category and it has been observed that they all were having improper skeleto-muscular development, unbalanced lifestyle. So, it is necessary for mentally challenged participants to involve in special physical education program to develop their fitness level.

**Keyword:** Somatotype, Heath- Carter, somatometry, somatochart, somatoplot.

## Introduction

In anthropology Somatometry is a fundamental research method used for the assessing the somatic symmetries of human beings in order to understand growth, exercise, performance, and nutrition. Before starting the measurement, it is imperative to ask certain questions as like; 1) Why am I measuring; 2) kind of data to be generated; 3) how to determine the points of measurement on the body; 4) by which instruments, measurement should be taken (Toth, T., et.al 2014)<sup>1</sup>?

Any somatotype will be evaluated by denoting three numerical; the first number being the endomorphic;

second numerical denotes the mesomorphic status; and the third numerical denotes ectomorphic status. Any component below 2.5 is considered low in rating, from 3.0 to 5.0 represents medium and 5.5 to 7.0 as high status. Higher than 7.5 values are always considered as extreme. The calculated triple-numbers are applied to a sphere-shaped triangle (asomatograph) on the each side of peak are like marginal types; in the centre, balanced types; and inside medium types (Carter, 1996)<sup>2</sup>.

Sheldon's typology was the principle, who gave the concept of somatotypology by classifying people into three types *viz.* endomorphic, mesomorphic, and ectomorphic based on thousands of photographs and measurements that he yielded during data collection from Ivy League schools (Carter and Heath, 1990)<sup>3</sup>. The estimations of each segment and their common proportion express the particular individual variations in the shape and composition of a human body and its parts.

Persons with disabilities (PwDs) stay among the most minimized in every society. While the International

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Human Rights framework is the agency responsible to deal with the issues of human rights and it has changed lives of all, especially persons with disabilities (PwDs). It's a starking fact that PwDs are the last in long que to get the basic human rights. Most of the PwDs have to look at the others' face to help them in mundane activities of life.

As the case with every regular human needs, the expert guidelines for systemic physical activity for the PwDs is very scarce. From the last thirty years, we have been seeing the importance of regular physical activity in the open sunlight as it was also highlighted by (Rimmer, Braddock, and Pitetti, 1996)<sup>4</sup>.

*"The benefits of physical activity and physical fitness have become one of the more popular topics in media circles, with findings from new studies being reported on the evening news, radio talk shows, and in newspapers and magazines around the country. But despite all this publicity, the message seems to be reaching only a small percentage of Americans. Much of the rest of the country remains sedentary, and despite knowing very little about the physical activity habits of persons with disabilities, it is generally accepted that they are at the forefront of this sedentary existence"*.

As, we all know the impact of regular systemic physical activities on one's well-being to preserve and maintain health, hence more efforts are needed to scrutinize exercise guidelines for PwDs.

The outsized collection of somatotype studies has specified up much constructive information in relation to normal children's body type. Nevertheless presently any studies have been hardly conducted on mentally challenged children, especially in India. Keeping this in mind an effort has been made to study anthropometric somatotype profile of mentally challenged children's of India.

## Material and Method

Participants of the Study: 25 (male) participants, age ranging in between 14 - 18 years, trainable and educable mentally challenged without any multiple disabilities were selected from Special School for Mentally Challenged People under Department of Teacher Training & Non-formal Education, Jamia Millia Islamia, New Delhi.

**Research Design:** Ex-post facto design was used.

**Study Population and Sampling:** The targeted population included male adolescents with mental disabilities. A purposive sampling of adolescents was used to collect sample and retrieved information. Purposive sampling is suitable for the difficult-to-reach special target population stated by (Neuman, 2006)<sup>5</sup>.

**Equipment for Somatotype:** Anthropometric equipment include a stadiometer and headboard, weighing scale, small sliding caliper, flexible steel tape measure, and a skin fold caliper. The small sliding caliper is a modification of a standard anthropometric caliper or engineer's vernier type caliper. For accurate measuring of biepicondylar breadths the caliper branches must extend to 10 cm and the tips should be 1.5 cm in diameter (Carter, 1980)<sup>6</sup>. Skinfold caliper should have upscale interjaw pressures of 10 gm/mm<sup>2</sup> over the full range of openings.

**Measurement Techniques:** The following procedure was adopted from (Carter and Heath, 1990)<sup>7</sup> for analyzing anthropometric somatotype for that we are needed to calculate ten (10) anthropometric bodily measurements i.e. height, body mass, four skinfolds (triceps, subscapular, supraspinale, medial calf), two bone breadths (biepicondylar Humerus and femur), and two limb girths (arm flexed and tensed, calf).

**Procedures to Prepare Somatochart:** A computer program SOMATOTYPE developed by Carter and Goulding, was used for Somatotype Analysis to calculate somatotypes, descriptive and comparative statistics and for plotting somatocharts too (Carter & Goulding, 2007)<sup>8</sup>.

## Results and Discussion

The descriptive statistics Table 1, shows the mean, median, standard deviation and range from all the selected variables of the participants' in which all the major components of somatotype (Endomorphy, Mesomorphy, Ectomorphy); *somatotype attitudinal distance (SAD)* which is the three-dimensional distance from a profile to the mean of all profiles; *Height-Weight Ratio (HWR)* calculated as height (cm) divided by mass (kg) raised to the power 1/3, i.e.  $HWR = \text{Height}/(\text{Mass})^{1/3}$ ; *Age*; and *Anthropometric Variables* (Height and Mass; Triceps, Subscapular, Supraspinale and Calf Skinfolds; Flexed Arm and Calf Girth; Biepicondylar Humerus and Femur Breadth) were given below.

The following table presents descriptive statistics of 10 anthropometric variables, which were also

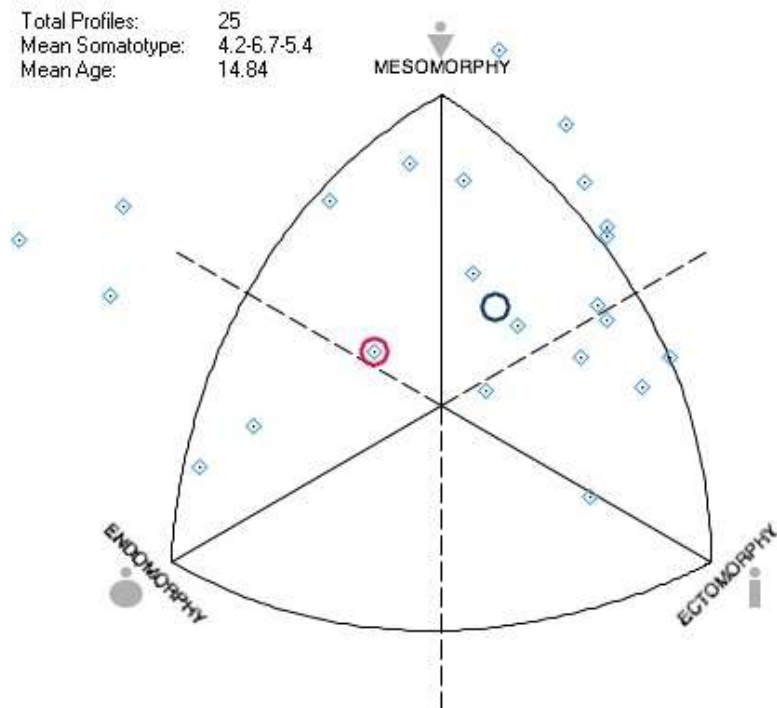
recorded for the assessment of anthropometric profile of the participants. The mean value of height and weight was 154.2 cm (SD 16.98 cm),38.86 kg (SD

10.96 kg) respectively. Descriptive statistics for other anthropometric variables e.g. skin folds; breadths and girths measurements are also given in the Table 1.

**Table 1: Descriptive Statistics of Anthropometric Measurements of Mentally Challenged Participants.**

Variable	Mean	Median	SD	Range
ENDOMORPHY	4.16	3.4	2.86	0.9-10.4
MESOMORPHY	6.67	7	2.19	0.1-10.3
ECTOMORPHY	5.35	4.8	5.08	0.8-28.1
SAD	4.16	3.11	4.55	0.48-23.9
HWR	46.33	45.57	6.94	39.91-77.39
AGE	14.84	15	1.91	12.-18
HEIGHT	154.2	150	16.98	122-199
MASS	38.86	40	10.96	17-57
TRICEPS SF	13.5	11.1	8.95	4.0-32
SUBSCAPULAR SF	12.41	6.3	11.99	4.4-45
SUPRASPINALE SF	16.16	10.1	14.9	4.1-53.2
CALF SF	13.23	6.5	9.74	5.1-35.5
ARM GIRTH	20.41	21	3.74	14.26.5
CALF Girth	28.96	29	4.04	22-37
HUMERUS B	8.74	9	0.79	7.2-10
FEMUR B	11.13	11	0.8	9.5-12.6

A Somatochart below in the Figure 1, showing all the anthropometric profiles with mean somatotype from all the categories which is shown by the profile marker inside an empty circle. And, a brief description of the individual’s Somatotype is presented in the Table 2.



**Figure 1: The Mean Somatotype for All the Profiles**

**Table 2: Brief Description of Individual Somatotype**

S.No.	Endomorphy	Mesomorphy	Ectomorphy	HWR	X-Value	Y-Value	Region
A	6	6.3	4.5	45.13	-1.5	2.1	mesomorph-endomorph
B	5	7.7	2.5	42.49	-2.5	7.9	endomorphic mesomorph
C	1.6	5.1	6.7	48.14	5.1	1.9	mesomorphic ectomorph
D	1.7	7.6	4.9	45.67	3.2	8.6	ectomorphic mesomorph
E	2	7.1	5.7	46.89	3.7	6.5	ectomorphic mesomorph
F	4.6	5.4	5.6	46.71	1	0.6	mesomorph-ectomorph
G	9.4	9.7	2.3	42.21	-7.1	7.7	mesomorph-endomorph
H	9.9	8.3	2.5	42.41	-7.4	4.2	mesomorphic endomorph
I	7.8	5.3	3.6	43.91	-4.2	-0.8	mesomorphic endomorph
J	1.8	10.3	0.8	39.91	-1	18	endomorphic mesomorph
K	3.7	8	3	43.11	-0.7	9.3	endomorphic mesomorph
L	3.4	5.9	6.5	47.93	3.1	1.9	mesomorphic ectomorph
M	4.1	6.5	5.8	47	1.7	3.1	ectomorphic mesomorph
N	4	3.9	7.3	49.02	3.3	-3.5	balanced ectomorph
O	0.9	0.1	28.1	77.39	27.2	-28.8	balanced ectomorph
P	2.7	6.2	6.4	47.84	3.7	3.3	mesomorph-ectomorph
Q	10.4	8.9	1	40.31	-9.4	6.4	mesomorphic endomorph
R	4.1	7	4.8	45.57	0.7	5.1	ectomorphic mesomorph
S	1.6	4.2	6.1	47.33	4.5	0.7	mesomorphic ectomorph
T	2	7.3	5.7	46.78	3.7	6.9	ectomorphic mesomorph
U	8.2	4.3	2.8	42.87	-5.4	-2.4	mesomorphic endomorph
V	2.8	7.4	3.3	43.54	0.5	8.7	balanced mesomorph
W	1.7	9.2	3	43.16	1.3	13.7	ectomorphic mesomorph
X	2.7	6.4	6.2	47.47	3.5	3.9	mesomorph-ectomorph
Y	1.9	8.7	4.7	45.52	2.8	10.8	ectomorphic mesomorph

From the Table 2, total percentage of profiles which falls under each of the significant somatotype categories has been shown in table no. 3.

**Table 3: Percentage of profiles which fall under each of the significant somatotype categories.**

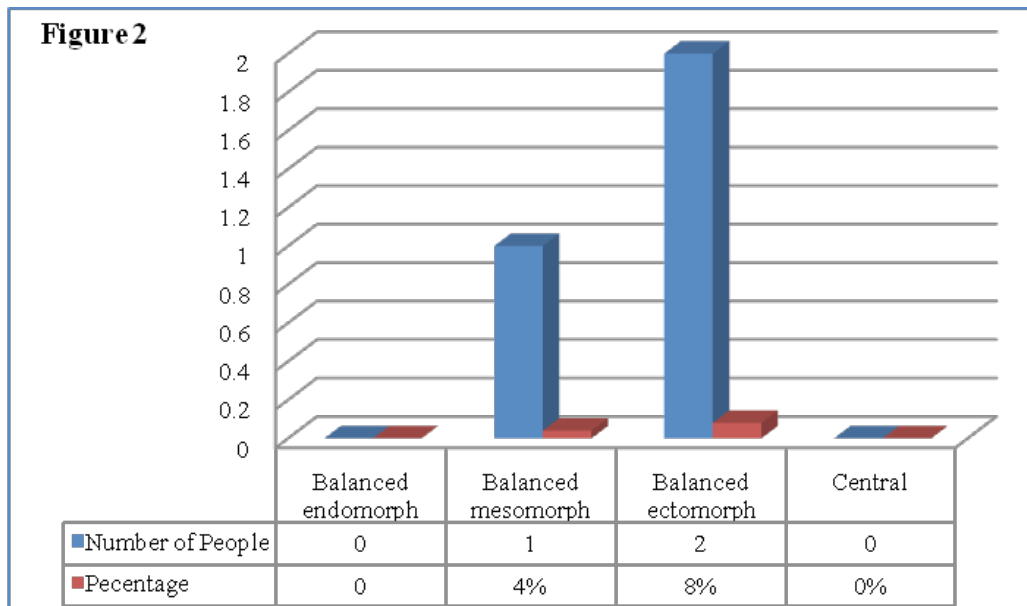
S.No.	Major Somatotype Categories	Number of People	Percentages
1	Endomorph-Ectomorph	0	0
2	Ectomorphic endomorph	0	0
3	Balanced endomorph	0	0
4	Mesomorphic endomorph	4	16%
5	Mesomorph-endomorph	2	8%
6	Endomorphic Mesomorph	3	12%
7	Balanced Mesomorph	1	4%
8	Ectomorphic Mesomorph	7	28%
9	Mesomorph-Ectomorph	3	12%
10	Mesomorphic Ectomorph	3	12%
11	Balanced Ectomorph	2	8%
12	Endomorphic Ectomorph	0	0%
13	Central	0	0%
	<b>Total</b>	<b>25</b>	<b>100%</b>

From the category chart, the result reveals that mentally challenged participants were found more mesomorphic and less endomorphic in comparison to ectomorphic from the overall participant's profiles Somatotype data.

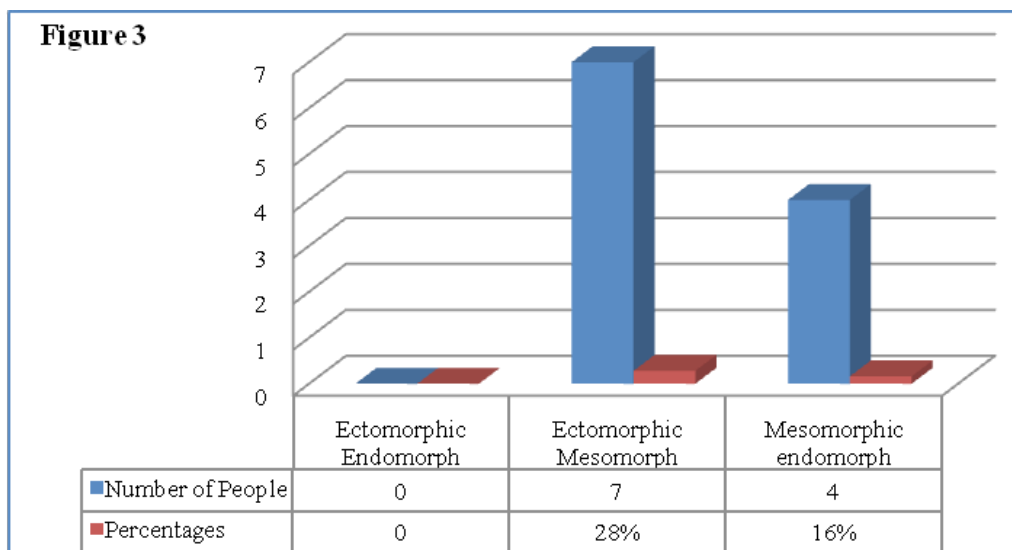
And from Table 3, graphical representations of all the major somatotype categories as per the somatotype

category chart are presented and given below in the Figure 2, 3, & 4.

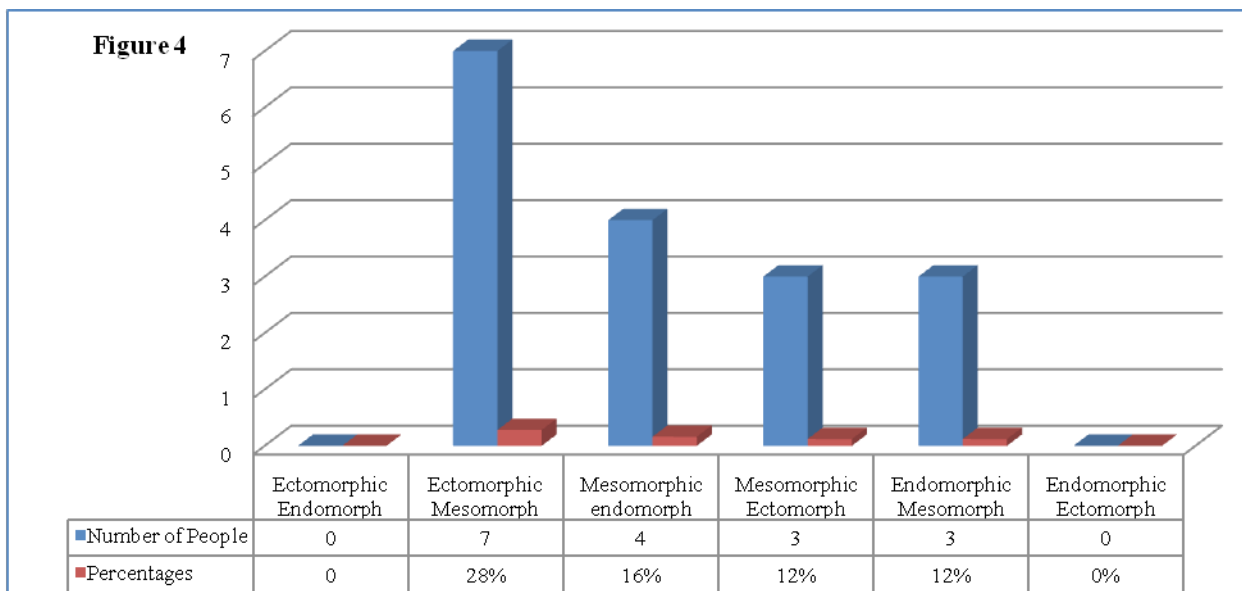
The Figure 2, shows the total number of people and total number in percentage which fall under the category of Balanced Mesomorph (4%), Balanced Ectomorph (8%) from overall Somatotype profiles data.



The Figure 3, shows the total number of people and total number in percentage which fall under the category of Mesomorph-Endomorph (8%), Mesomorph-Ectomorph (12%) from overall Somatotype profiles data.



The Figure 4, shows the total number of people and total number in percentage which fall under the category of Ectomorphic Mesomorph (28%), Mesomorphic-Ectomorph & Endomorphic Mesomorph are (12%), Mesomorphic endomorph (16%) from overall Somatotype profiles data.



### Conclusion

The data show that endomorphic component is lower in comparison to ectomorphic and mesomorphic, the maximum number of participants falls under ectomorphic mesomorph category. This shows that participants found greater in number in mesomorphic and ectomorphic in comparison to endomorphic characteristics. In balanced category of Mesomorph, mentally challenged participants are found lowered in comparison to Ectomorph from overall Somatotype profiles data. Result clearly indicates that mentally challenged participants have low level of body fat and observed more percentage in mesomorphic and ectomorphic category. It is very important for mentally challenged participants to get involved in physical activity because they have improper skeleto-muscular development system and having unbalanced lifestyle. It is necessary for mentally challenged participants to involve in special physical education program to develop their fitness level.

**Conflicts of Interest:** There is no conflict of interest in between the author(s).

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# The Relationship of Low Birth Weight Babies with Stunting in Toddlers Aged 12-36 Months in Bogor Regency, 2019

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## Abstract

**Background:** The incidence of short toddlers to as stunting is one of the nutritional problems experienced in the world and in Indonesia. Stunting is caused by many factors, one of the most basic factors is Low Birth Weight Babies (LBW). To assess the association of LBW to stunting in toddlers aged 12-36 months in Bogor Regency, Indonesia is the purpose of this study.

**Method:** This study used a cross-sectional study design with a total sample of 500 toddlers aged 12-36 months taken in Bogor Regency, West Java Province, Indonesia. Stunting status is assessed based on the height/age indicator  $<-2$  z-score, while the LBW categorization is baby born weight  $<2500$  grams. Analysis of the association between LBW and stunting in this study uses multivariate cox regression analysis and the magnitude of the effect is expressed in the prevalence ratio (PR) with a confidence interval (CI) of 95%.

**Result:** The results of this study indicate the prevalence of stunting in toddlers aged 12-36 months in Bogor regency is 39.2%. Cox regression test results of LBW relationship with stunting showed PR 1.51 (95% CI: 1.01-2.24) which means that toddlers born with LBW ( $<2500$  grams) had a stunting prevalence of 1.51 times higher than toddlers with normal birth weight ( $>2500$  grams) after being controlled by the variable "mother's education".

**Conclusion:** Stunting can be prevented by reducing LBW rates by increasing maternal nutrition during pregnancy and improving mother's education so it will increase mother's knowledge related to nutrition intake consumed during pregnancy and toddlers with LBW will be reduced.

**Keywords:** *Stunting, 12–36 months, Child, Low Birth Weight, Bogor Regency.*

## Introduction

The incidence of short toddlers or commonly referred to as stunting is one of the nutritional problems experienced by toddlers in the world today. In 2017, 22.2% or around 150.8 million toddlers in the world experienced stunting. More than half the stunting toddlers in the world came from Asia (55%), while 39%

lived in Africa. Indonesia is included in the third country with the highest prevalence in the South-East Asia Regional (SEAR), stunting prevalence data collected by the World Health Organization (WHO). The average prevalence of stunting toddlers in Indonesia in 2005 - 2017 is 36.4%<sup>(1)</sup>.

According to Decree of the Minister of Health Number 1995/MENKES/SK/XII/2010 concerning Anthropometric Standards for Assessment of Child Nutrition Status, the short and very short definition is nutritional status based on Body Length Index by Height by age which is the equivalent of the terms stunted (short) and severely stunted (very short). Short toddlers (stunting) can be known if a toddler has measured his length or height, then compared to the standard,

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and the results are below normal. Short toddlers are toddlers with nutritional status based on length or height according to age when compared to the standard WHO-MGRS (Multicenter Growth Reference Study) in 2005, the Z-score is less than -2 SD and is categorized very short if the Z-score is less than -3 SD<sup>(2)</sup>.

Basic Health Research 2018 reported the prevalence of stunting in toddlers in Indonesia has reach 30.8%<sup>(3)</sup>. West Java is a province in Indonesia that still has high prevalence in stunting, which has significant increase in cases from 25.1% in 2016 to 29.2% in 2017. While regencies in West Java with Stunting cases that are still high, one of them is Bogor Regency 28.5%<sup>(4)</sup>.

Stunting not only caused by one factor, but it is caused by many factors, which are interconnected with one another. There are three main factors that cause stunting: unbalanced food intake (related to nutrient content in food, namely carbohydrate, protein, fat, minerals, vitamins and water), history of low birth weight (LBW), and history of diseases. One of the risk factors that influence the incidence of stunting in toddlers is a history of low birth weight (LBW). As a result of low birth weight babies will be disrupted, if this condition continues with inadequate feeding, frequent infections, and poor health care can cause stunting<sup>(5)</sup>.

LBW, which is baby birth weight less than 2500 grams will carry the risk of death, impaired growth and development of children, including the risk of being short if not handled properly. The percentage of children aged 0-59 months with low birth weight less than 2500 grams (LBW) in Indonesia was 11.1% in 2010 and there was a slight decrease in 2013 to 10.2%<sup>(2)</sup>.

According to the Puskesmas (Community Health Center) report from Bogor Regency in 2017, there were 1557 male and female LBW babies or 1.28% of the total number of babies born to 131,446 babies<sup>(6)</sup>. Because of that, the purpose of this study is to assess the relationship of LBW to stunting in toddlers aged 12-36 months in Bogor Regency, Indonesia.

## **Method**

This research used a cross sectional design which taken in Tamasari District, Bogor Regency, Indonesia<sup>(7)</sup>

<sup>(8)</sup>. Tamansari District was chosen because has the highest stunting prevalence in Bogor Regency. Tamansari district has 3 Puskesmas with 111 Posyandu (Integrated Service Post). Among 46 of 111 posyandu were selected as sampling locations because they carrying out activities compared to other. The study population was 10,447 toddlers aged 12-36 months<sup>(6)</sup>. The research sample was 500 toddlers aged 12-36 months that were randomly selected with probability proportional to size (PPS).

Toddlers live with parents and have lived at the research site for at least one year are eligible to include in this study. Meanwhile, toddlers with abnormalities (disabilities) thus hampering the process of anthropometric measurement and mothers who refuse to participate are excluded from this research.

Data collection was carried out on July 2019 using a questionnaire by enumerators of Nutritionist and Epidemiology Masters Students who were trained in advance.

The dependent variable is stunting status while the independent variable is LBW with mother's education, family's income, maternal body mass index (BMI), toddler's calorie intake and protein intake covariate. Anthropometric data for toddler height were measured using a Length Measuring Board (LMB) for ages 12-24 months and microtoise for ages 25-36 months. Data on the age of toddlers is obtained by reading birth certificates or maternal and child health books (MCH). Calorie intake data used a 24 hour recall questionnaire. Data on birth weight of babies are obtained from the MCH book.

Data analysis was performed using the statistical data analysis software. To determine stunting status based on weight/age z-score value using WHO Anthro software, caloric intake status using Nutri Survey software and for categorizing LBW variable data are made into 2 categories, babies born normally if birth weight  $\geq 2500$  grams and babies born low if birth weight  $< 2500$  grams. Analysis of the association between independent and dependent variables using multivariate cox regression analysis, and for the interpretation of the effect is expressed by the PR and Confidence interval of 95%<sup>(9)(10)</sup>.

## Result

**Table 1. Individual Characteristics in Tamansari District, Bogor Regency, West Java, Indonesia in 2019**

Variable	Frequency	Proporsi
	n=500	%
<b>Stunting</b>		
Stunting	196	39.2
Normal	304	60.8
<b>Birth Weight</b>		
LBW	49	9.8
Normal	451	90.2
<b>Mother's Education</b>		
Low (< 12 years)	376	75.2
High (≥ 12 years)	124	24.8
<b>Family's Income</b>		
< 2 million	177	35.4
≥ 2 million	323	64.6
<b>Maternal Body Mass Index</b>		
Underweight	54	10.8
Normal	295	59
Overweight	151	30.2
<b>Toddler's Calorie Intake</b>		
Poor	287	57.4
Satisfactory	213	42.6
<b>Toddler's Protein Intake</b>		
Poor	293	58.6
Satisfactory	207	41.4

Based on the results of univariate analysis in Table 1. The proportion of toddlers aged 12-36 months with stunting was 39.20%. The proportion of toddlers in the LBW category was 9.80%. The proportion of mothers with low education is much greater 75.2% compared to mothers with high education 24.8%. The proportion family income ≥ 2 million rupiah 64.60%. Based on the

body mass index (BMI) of mothers, the proportion of mothers whose BMI is quite greater is 59.0% compared to the proportion of BMI of women less than 10.8% and more than 30.2%. The proportion of poor calorie intake was 57.40%. The toddlers with less protein intake was 58.60%.

**Table 2. Low birth weight and stunting in toddlers aged 12-36 months in Taman Sari District, Bogor Regency, West Java**

Variable	Stunting	%	Normal	%	Total	PR	95% CI	P value
	N=500		N=500					
<b>LBW</b>								
LBW	29	59.2	20	40.8	49	1.60	1.23 – 2.08	0.0026
Normal	167	37.0	284	62.9	451			

In table 2 the analysis of the relationship between LBW and stunting shows that there were 29 (59.2%) children born with LBW and stunted, while among children born normal, 167 (37.0%) had stunting. Chi Square test results obtained p value = 0.0026, it can be concluded that there is a significant association between LBW and stunting events. From the analysis also obtained PR value = 1.60, meaning that children with low birth weight have a prevalence of 1.60 times higher to experience stunting compared to children who were born normal.

**Table 3. Risk Factors for Stunting in toddlers aged 12-36 months**

Stunting Risk Factors	PR	95% CI	P-Value
LBW	1.54	1.03–2.29	0.034
Mother’s Education	1.61	1.09–2.37	0.016
Family’s Income	1.23	0.92–1.64	0.172
Maternal Body Mass Index	1.14	0.90–1.44	0.278
Toddler’s Calorie Intake	1.00	0.67–1.50	0.999
Toddler’s Protein Intake	0.87	0.58–1.31	0.511

In Table 3. a full model of the results of the bivariate analysis is included in the multivariate cox regression analysis. To control the effect of confounding variables from the results of the full model, the selection is done by looking at the difference in PR for the main variable by removing the confounding candidate variables individually.

**Table 4. Final Model Risk Factors for Stunting in toddlers aged 12-36 months**

Variable	PR	95% CI	P-Value
LBW	1.51	1.01–2.24	0.042
Mother’s Education	1.63	1.12–2.39	0.011

Table 4 above shows the final multivariate models that have been carried out. In the multivariate confounding assessment, there are no potential variables as confounders because the difference between PR crude and PR adjust is still <10%. However, in substance there is a potential variable as a confounder, namely mother’s education so that both variables are included in the final model. PR are 1.51 (95% CI 1.01 - 2.24) which means that children born with LBW (<2500 grams) have a stunting prevalence of 1.51 times higher than normal born children (≤2500 grams) after being controlled by the “mother’s education” variable.

## Discussion

From this study, it was found that LBW controlled by mother’s education was significantly PR 1.51 (95% CI 1.01 - 2.24) which is risk of stunting in the Bogor District, West Java, Indonesia. LBW is an indicator of public health because it is closely related to mortality, morbidity, incidence of malnutrition in the future, one of which is the status of short nutrition/stunting<sup>(11)</sup>. LBW about 20% of the occurrence of stunting<sup>(1)</sup>. This study is consistent with the results of the study of Paudel et al. (2012) in Nepal which shows that low birth weight is a factor in the incidence of stunting. Toddlers with low birth weight have a stunting prevalence of 4.47 times higher than toddlers with normal birth weight<sup>(12)</sup>.

Fetus with dismaturity, since in the womb has experienced intrauterine growth retardation and will continue after they birth and will experiencing growth and development slower than babies born normally, and often failed to follow the growth rate that should be achieved at age after birth<sup>(13)</sup>. Growth barriers that occur are related to brain maturity, which growth barriers occurred before 20 weeks’ of gestation related to brain maturity, such as somatic changes<sup>(14)</sup>.

This information shows the importance of giving birth to a normal baby, because if the baby is born short, its growth will be hampered, and even has an impact on other consequences, such as stunted development and the risk of suffering from infectious diseases later in adulthood. As a result, this toddlers will be short and in the future if someday they will be mothers, they porbably will give birth to a short generation, and so on so that it occurs short across generations<sup>(15)</sup>.

Besides LBW, mother’s education level is also a factor causing stunting in toddlers. Based on Table 4, the mother’s education shows that the percentage is higher in the group of low educated mothers (75.2%). This result is in line with the research of Ramli et al in Maluku (2009) finding that mother’s education is significantly related to the incidence of stunting in toddlers<sup>(15)</sup>. Research in Nepal, from Tiwari et al (2014) showed the same thing that mother’s education is related to the incidence of stunting of toddlers<sup>(16)</sup>.

Mothers with higher education can make decisions that will improve the nutrition and health of their children. The level of education of the mother also determines the ease of the mother in absorbing and understanding the nutritional knowledge gained. This can be used as a

basis for distinguishing appropriate counseling method. From the importance of family nutrition, education is needed so that a person, especially the mother, will be more responsive to nutritional problems in the family and can take immediate action<sup>(17)</sup>.

Knowledge about nutrition in parents is influenced by several factors including age. The process of mental development will become good, in line with age and intelligence or the ability to learn and think abstractly in order to adjust to new situations, also the environment in which a person can learn good things is also bad depending on the nature of the group. Culture also plays an important role in knowledge, education is fundamental to developing knowledge, and experience is the best teacher in honing knowledge<sup>(18)</sup>.

### Conclusion

From this study, it was shown that LBW after being controlled by mother's education variables significantly increased the risk of stunting in Bogor Regency, West Java, Indonesia. Children with a history of LBW have a risk of 1.51 times greater for stunting than children with a history of normal birth. A good way to prevent stunting is to prevent children born with LBW in pregnant women by increasing mother's knowledge so that related knowledge about nutritional intake consumed during pregnancy will increase. Health workers are expected to monitor the nutritional status of pregnant women to prevent LBW. This can be done by holding home visits to pregnant women who do not routinely to health services, as well as providing motivation and counseling to mothers to undergo a healthy pregnancy so that they will give birth to babies with normal birth weight. In addition, it can also provide information and socialization to the public through IEC media in order to improve the nutritional status of children under five, especially stunting. In addition, we also recommend for future research on stunting in a wider population and not only in regency.

**Ethical Considerations:** This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Indonesia University (Ket-560/UN2.F10/PPM.00.02/2019).

**Competing Interests:** The authors declared that no competing interests exist.

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# Bio-monitoring of Atmospheric Heavy Metals Deposited on Selected Tree Leaves in Kanchipuram, Tamilnadu

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## Abstract

Kanchipuram, one of the holiest cities is highly polluted with heavy metals due to industrialization and urbanization. It is most important to know the role of plants in the cleansing process of heavy metals in this temple city. In this study, the heavy metals ( $\text{Fe}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Al}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{As}^{2+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}$ ) from the dust deposited on the leaves of the trees were analyzed. The tree species were collected from different zones of the Kanchipuram town such as residential area, traffic area, Institutional area, hospital area and industrial area. Heavy metals concentrations were analyzed by inductively coupled plasma mass spectrometry. Most of the heavy metals were found below their detectable limits ( $\text{Pb}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cr}^{3+}$ , and  $\text{As}^{2+}$ ). Some of the heavy metals were in highly increased values ( $\text{Fe}^{2+}$ ,  $\text{Al}^{2+}$ ) almost in selected species. In few locations the content of  $\text{As}^{2+}$  and  $\text{Mn}^{2+}$  in lower levels were deposited on some species. The results obtained from the analysis were compared statistically and correlated by using Pearson's co-efficient. The results obtained from the analysis shown that the heavy metals were emitted from various combustion processes and other anthropogenic activities. The tree species selected can be used in bio monitoring as bio indicators of increased  $\text{Fe}^{2+}$ ,  $\text{Al}^{2+}$  in the ambient air.

**Keywords:** Heavy metals, Bio Monitoring, Bio Indicators, Species, Deposition, Correlation.

## Introduction

Pollution due to air is one of the major issues in heavily populated towns and cities, which mainly begins from fast and unsystematic development of industrialization and urbanization<sup>1,2</sup>. As human undergone industrialization the quantity of waste thrown away in the ambience starts to increase enormously. This increased population and industries force the environment as highly polluted<sup>3,4</sup>. Out of various pollutants heavy metals are one of the major pollutants in the cities due to various anthropogenic activities such as emission from combustion processes, automobile exhaust and disposal from industries<sup>5,6</sup>. Heavy metals distributed in the local and regional areas are not clearly defined but they worsen the quality of air<sup>7</sup>. The study and analysis of heavy metal pollution in the environment is very important and interest due to their severe and harmful health disorders. The characteristics of air, water and soil, microbial activities and growth of vegetation are greatly disturbed by heavy metals<sup>8,9</sup>. Heavy metals

are also named as silent killer when they are exceeding their values of  $5\text{gm}/\text{m}^3$  but they are generally specified as toxic metals. Hence the testing of heavy metals is an important mechanism to improve and regulate the environmental impact assessment in developed and developing cities and towns<sup>10</sup>.

Bio monitoring is one of the simplest and cheapest method for detecting heavy metal concentration in the ambient air<sup>11,12</sup>. Plant bio monitoring is the better choice for determining the air quality compared to other conventional method because of its cheapness and easy to carry out the work. Monitoring by equipment poses the problem in setting the proper stations and also suitable for confined areas but plant species are readily available and existing at all places and easy to monitor<sup>13</sup>. The plant called as a good bio monitor, when it should be widespread in the topography and to find and collect at the time of sampling<sup>14</sup>. Bio indicators give the feasible way of estimating the pollutant level in the environment and it has been used for several years to examine the

accumulation and deposition of heavy metals on the leaves. Plants absorbed the various air borne pollutants thereby reducing the pollutant level. The degree of absorption and adsorption capacity differs from plant to plant without showing any toxic effects and they are acting as a sink for gases, particulate matters and toxic heavy metals<sup>15</sup>. Lower plants like mosses and lichens are acting as ideal bio indicators but it is difficult to plant in the urban areas and in industrial areas, higher plants can serve this purpose. Different types of higher species are used as bio indicators to monitor and detect the heavy metal pollution<sup>16,17,18</sup>. The dust deposited on the tree leaves predict the level of heavy metal contamination in the environment<sup>19</sup>. Most of the countries are successfully using the different types of species as bio indicators for analyzing the various levels of pollutant in the atmospheric air<sup>20</sup>.

The purpose of this study is to determine the present levels of atmospheric trace element pollution in the Kanchipuram town. Therefore, two different plant species such as *Saraca Asoca* and *Terminalia Cattappa* were selected as potential biomonitors of trace elements including iron, lead, copper, zinc, Aluminum, chromium, cadmium, arsenic and manganese (mg/Kg, dry weight). The samples were collected from two different heights of each tree species as high point and low point. Inductively coupled Mass spectrometry was used to determine the concentrations of trace elements.

### Method

i. Species: *Saraca asoca* is an important tree grown mostly in various parts of India. It is an evergreen tree grown up to a height of 9.14m. This tree is effectively used for controlling noise pollution hence it is commonly planted in all places Fig.1. *Terminalia Cattappa* is a large tree grown in tropical areas. It grows up to a height of 35m with horizontal

branches and grown equally and properly at its top. The leaves are 0.1-0.14m broad, large and 0.15-0.25m long.

ii. Study Area: Kanchipuram is one of the districts in the northeast of the state of Tamil Nadu in India and 72 km (45 mi) from Chennai. It lies between 77° 28' to 78° 50' longitudes and 11° 00' to 12° 00' latitudes. Total geographical area of the district has 4,432 km<sup>2</sup> (1,711 sq mi) and coastline of 57 km (35 mi). It is very famous for temples and silk sarees hence it is named as temple city and silk city. Kanchipuram is one of the important industrial cities, which is very nearer to Chennai, capital of Tamil Nadu. The population of the town is suddenly increased which leads to heavy traffic and urbanization.

iii Sample sites: In this study the sites were selected from industrial areas Vella Gate near rice mills(site1), institutional areas near National highway(site2), sensitive areas as hospital located on the highways(site3), heavy traffic zone(site4), residential area Pallavar Medu (site5) and commercial area such as collector office(site6).

iv. Sampling: Samples from *Saraca Asoca* and *Terminalia Cattappa* were collected the

height of above 1.8m. The leaves were collected in air tight zip lock polythene bags and taken to the laboratory for analysis. The heavy metals were analyzed by using closed-system mineralization by microwave digestion and measurement with inductively coupled plasma mass spectrometry.

**Statistical Analysis:** The results obtained from the study were correlated using Pearson's correlation coefficient and statistical analysis was carried out for the results. Statistical analysis was done with SPSS software package. The results were given in Table 1.

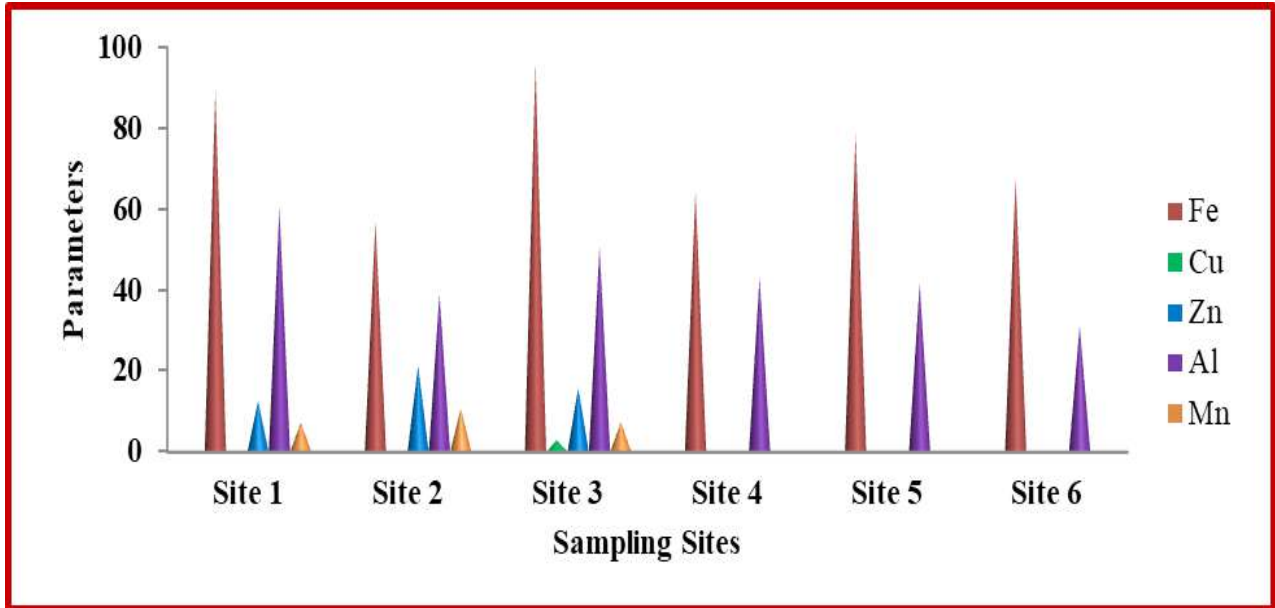
**Table 1. Heavy metals deposited on species from six sites**

Parameters	Saraca Asoca					Terminalia Catappa				
	Mean	Median	Max	Mini	SD	Mean	Median	Max	Mini	SD
Fe	75.5	73.15	96	57	15.18	36.25	21.9	131	0	47.35
Cu	0.5	0	3	0	1.22	0.53	0	3.2	0	1.31
Zn	52.6	6.3	21.3	0	9.49	4.41	3.5	10.5	0	4.96
Al	44.3	42.4	60.4	31.1	10.09	20.48	8.85	82	2.8	30.49
Mn	4.25	3.65	10.8	0	4.82	4.02	2.25	10.3	0	4.82

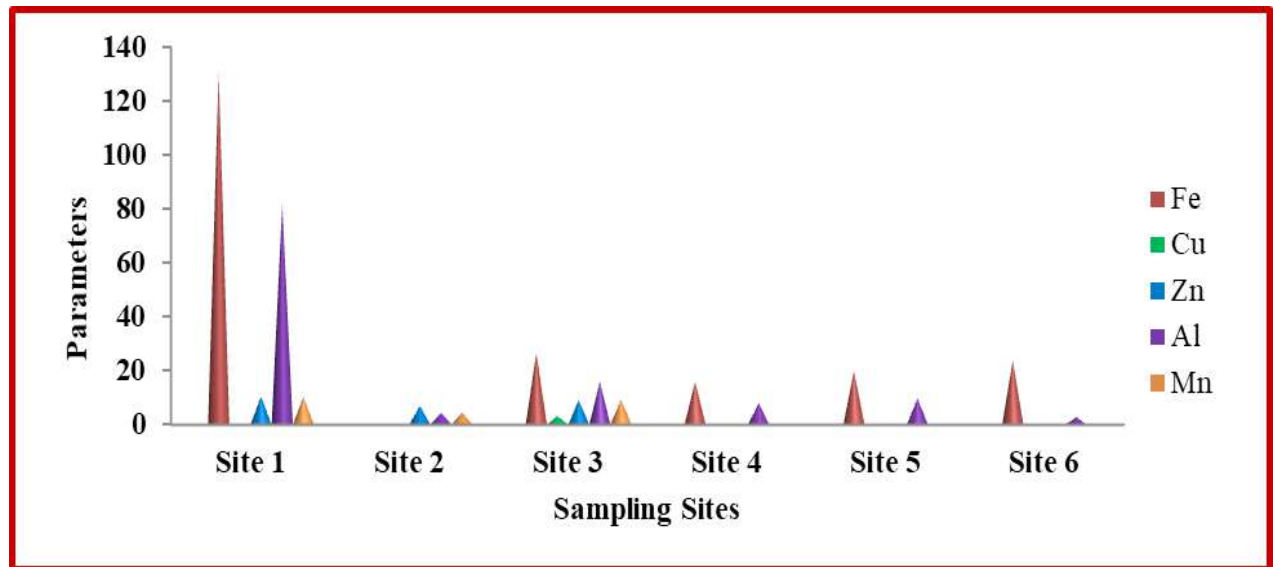


**Table 2. Correlation co- efficient for the heavy metals deposited on species at selected sites**

Parameters	Correlations - Saraca Asoca					Correlations - Terminalla Catappa				
	Fe	Cu	Zn	Al	Mn	Fe	Cu	Zn	Al	Mn
Fe	1					1				
Cu	.661	1				-.099	1			
Zn	.145	.388	1			.557	.452	1		
Al	.730	.305	.394	1		.984	-.072	.651	1	
Mn	.145	.320	.995	.437	1	.635	.537	.978	.707	1



**Fig.1: Heavy metals concentrations at selected sites in Saraca Asoca**



**Fig.2 : Heavy metals concentrations at selected sites in Terminalla Cattappa**

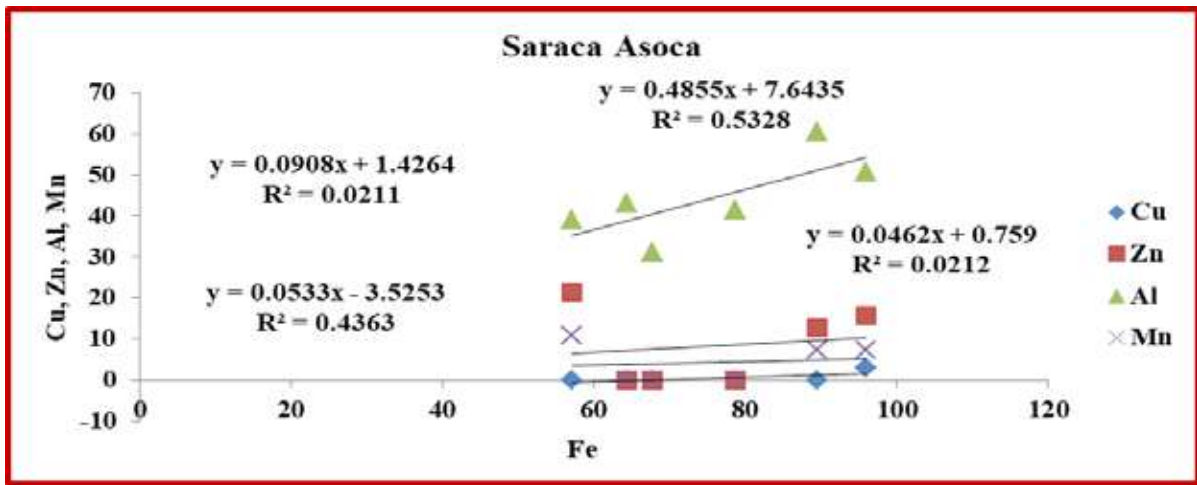


Fig. 3: Regression equation for Fe Vs Cu,Zn,Al and Mn in Saraca Asoca

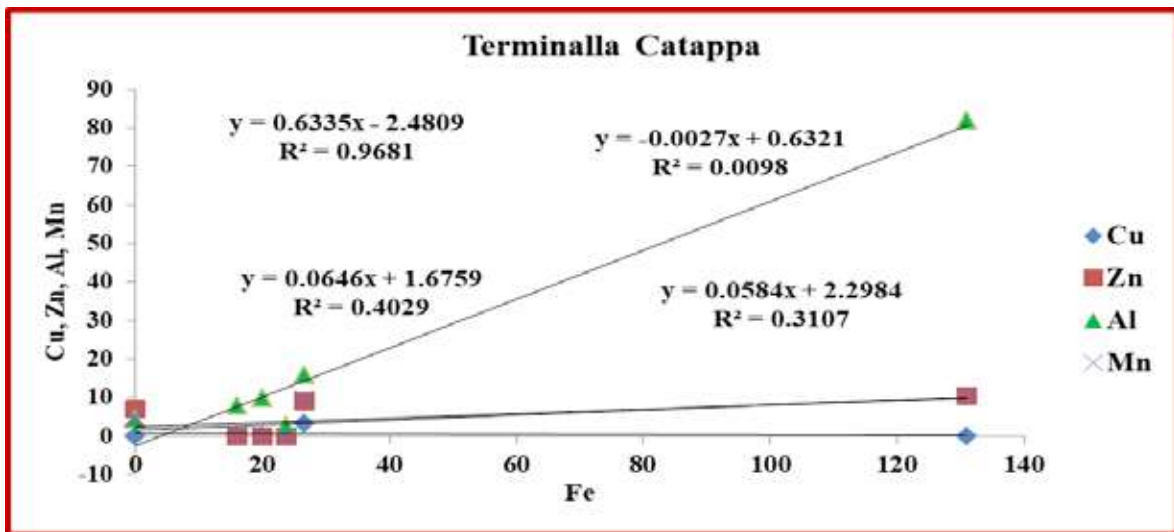


Fig. 4: Regression equation for Fe Vs Cu, Zn, Al and Mn in Terminalla Cattappa

### Results and Discussion

Heavy metals widespread in the ambient air were clearly proved in the present study. Metals deposited on the leaves varied from species to species and with sampling sites. The samples collected from the selected sites showed the different levels of pollution in the air. Few heavy metals were found with high concentration in the sensitive areas such as hospital and also near rice mill located along the highway. Most of the heavy metals were with lowest concentration and below their detectable limit. The results obtained from the study was not shown a significant difference in the concentration of heavy metals taken from various places but clearly indicated that it depends upon the type of species selected<sup>21</sup>.

Among the nine metals analyzed, Fe was found in all the selected six sites with highest concentration. This higher level of Fe was due to abrasion, wear and tear of any machines or obsolete equipments and vehicles. The test results clearly indicated that the absorbing capacity of heavy metals by *Saraca Asoca* was higher than *Terminalla Cattappa* in all the selected sites except near rice mill along the highway as shown in Fig.1. Concentration of Fe ranged between 57 and 96 and the highest value was identified near CSI hospital and lower value near the cancer institute. This results clearly indicated that the proper disposal method and widespread of trees near the institute were reduced the Fe level in the environment. From the correlation study Fe was positive correlation with Cu and Al and weak

relation with Zn and Mn in *Saraca Asoca*. In *Terminalla Cattappa* significant correlation with Al and positive relation with Zn and Mn. Fe was negatively correlated with Cu as shown in Table 2.

Alike Fe, Al was found in the selected species. Al enters the environment from a large industrial plant and through containers such as drum or bottle. The absorption capacity of Al by *Saraca Asoca* was comparatively higher than *Terminalla Cattappa* as shown in Fig.2. In *Saraca Asoca* the value ranged from 31.1 to 60.4 and in *Terminalla Cattappa* the concentration varied from 2.8 to 82.0.

The concentration of Al was found in higher figure near the rice mills located on the road side compared than other five sites. The results obtained from the analysis showed that the more usage of Al leads to increase their content in the atmosphere. From the correlation study Al was positively correlated with Mn in *Saraca Asoca* and in *Terminalla Cattappa*.

Zinc is also an important metal released from the use of pesticides, insecticides and due to the combustion of fossil fuel and the use of brake shoes used in all types of vehicles. Zn concentration was absorbed by both *Saraca Asoca* and *Terminalla Cattappa* was below their detectable limit in three sites. Lower results were found in sensitive areas and near rice mill both in *Saraca Asoca* and *Terminalla Cattappa*. Zn values ranged between below detectable limit and 21.3 in *Saraca Asoca* and 10.5 in *Terminalla Cattappa*. The correlation study showed that Zn was highly related with Mn and weakly correlated with Al in *Saraca Asoca*. In *Terminalla Cattappa* Zn had significantly correlated with Mn and positive relation with Al as shown in Fig. 3 and Fig.4.

Mn was identified only near the hospital sites and rice mill site with lower concentration due to the usage of more pesticides, insecticides. The response to the absorption of Mn by *Saraca Asoca* and *Terminalla Cattappa* were nearly same. The concentration of Mn was below their detectable limit in other three sites where the usage of pesticides was negligible.

Pb was not found in any samples collected from all the sites. This is due to the continuous improvement in automotive technologies, usage of unleaded fuel and stringent rules and regulations made on the emission of Pb. The level of Pb in the air was decreased 89 percentage by the regulatory efforts taken by Environmental Protection Agency<sup>22</sup>.

Cr, Cd and As also not detected in any collected samples. The concentration of Cu was below their detectable limits in all the selected sites except near CSI hospital. Cu absorbed by both the species were in lower concentrations.

In the present study concentration of Fe and Al were on the higher side and the values were exceeded their threshold limits. Zn, Mn were with lowest concentrations and the other metals such as Cu, Cd, Pb, As and Cr were below their detectable limits.

Vehicular emission is not only the source for pollution, usage of pesticides and combustion process also plays a vital role the distribution of heavy metals in the atmosphere. The present study was used to prove the species selected such as *Saraca Asoca* and *Terminalla Cattappa* are the best indicator of heavy metal pollution. The results obtained from the study clearly indicated that the concentration of Fe and Al were higher level in air compared to other metals as Pb, Cu, Zn, Cd, As, Cr and Mn. The species responded to the absorption of heavy metals were varied with different locations. From this study, *Saraca Asoca* can be effectively used than *Terminalla Cattappa* for the bio monitoring of heavy metal pollution.

**Ethical Clearance:** I got ethical clearance for my paper from my University ethical Clearance committee and from the Guide.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Unmet Need of Objective Monitor to Evaluate Performance Status in Lung Cancer Patients

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## Abstract

Quality of life (QOL) of lung cancer patients can be improved by using modern technical tools. There is a necessity to develop a system, which incorporates all the functions to evaluate severity of the disease and critical condition of the patients. There exists a need of an objective monitor for monitoring performance of lung cancer patients with parameters of heart rate variability (HRV), saturation of peripheral oxygen (SpO<sub>2</sub>) and peak expiratory flow rate (PEFR). A questionnaire-based survey was carried out in cancer physicians, surgeons and radiotherapists. Total 100 clinicians participated in this questionnaire, 31 medical oncologists, 32 oncosurgeons and 37 radiation oncologists. The analysis of this survey showed that presently ECOG (Eastern Cooperative Oncology Group) scale was preferred to KPS (Karnofsky Performance Status) scale (70% versus 30%) because of simplicity to remember. The popular tests to assess patient status were Computed Tomography scan (68%), Positron Emission Tomography scan (32%) and bone scan (68%). Other tests preferred among clinicians were SpO<sub>2</sub> (45%), 2D Echocardiography (30%) and chest X-ray (42%). But for evaluation of autonomic nervous system (ANS), e.g. HRV test, all the clinicians (100%) showed interest but rejected the availability of test facilities. SpO<sub>2</sub> and pulmonary function test (PFT/PEFR) were also rated as mobile tools for assessing the performance. It is suggested that HRV, SpO<sub>2</sub> and PFT/PEFR could be an added value to improve the QOL in cancer patients.

**Keywords:** KPS, ECOG, Monitor, Questionnaire, PEFR, SpO<sub>2</sub>.

## Introduction

Karnofsky performance status (KPS) scale scoring was initiated by Dr. David A. Karnofsky and Dr. Joseph H. Burchenal in 1949. The KPS rating varies from 0 with dead to 100 with perfect health.<sup>1</sup> It was designed to evaluate the degree of cancer patient activity and medical care necessities. Eastern Cooperative Oncology Group (ECOG) score or Zubrod score was initiated by

C. Gordon Zubrod, rated as 0 with perfect health to 5 with death. It is simpler and preferred over KPS. The ECOG is used to decide the treatment and prognosis for the patient and assess the progress of the disease.<sup>2</sup> The degree of patient activity and medical care requisites can be measured by the KPS.<sup>3</sup> KPS and ECOG scaling factor has been explained in detail in our previous work.<sup>4,5</sup>

Langley recognized the different components of the autonomic nervous system (ANS), with the term “sympathetic” limited to the thoracic outflow of the autonomic system; he suggested the term “parasympathetic” to assign its cranial and sacral outflows.<sup>6</sup> Brain haemodynamics can be studied in response to sensory stimulations by measuring haemoglobin oxygen saturation (SpO<sub>2</sub>). It can be used to evaluate the effects of chemotherapy and radiotherapy on tumors.<sup>7</sup> Heart rate variability (HRV) along with

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pulmonary function test (PFT) can be an aid for prognosis of cardiac disease.<sup>8</sup>

It is hypothesized that health quality of cancer patients can be improved by determining the performance status (PS) through various parameters. HRV would help us understand the severity of the disease and the ANS dysfunction. SpO<sub>2</sub>, heart rate (HR) and PFT would add an aid to the quality evaluation process. Therefore, a single multiparameter monitor exhibiting HR, HRV, SpO<sub>2</sub> and PFT would make the clinician’s task simple to evaluate the PS using ECOG Scale in lung cancer patients.

Method: The questionnaire used for clinicians are as mentioned in Table 1 in order to assess the patients’ performance. The questionnaire includes a survey on the selectivity of PS of ECOG or KPS by different clinicians, correlation of symptoms of cancer patients with the scale, tests for evaluation of patients’ PS, correlation of PS with autonomic nervous system or any expected tests to be conducted. Total 100 clinicians had participated in this questionnaire (31 medical oncologists, 32 oncosurgeons and 37 radiation oncologists).

**Table 1. Questionnaire for clinicians**

Q 1.	Which scores do you use to assess performance status of cancer patients, KPS, ECOG or any other score?
Q 2.	Why do you prefer it?
Q 3.	Do you feel if there is any variation in labelling the score taken by different clinicians?
Q 4.	How would you rate the variation in labelling the scores by different clinician; minute, minimal, considerable or gross?
Q 5.	Do you feel there is any scope in improvising the labelling of performance status of patient (Y/N)?
Q 6.	Do you think improvement in the labelling of scores would alter the management of the patient (Y/N)?
Q 7.	How would improvement in the labelling of scores would alter the management of the patient?
Q 8.	What are the symptoms associated with the cancer patients when he complains about the deterioration of his performance (dyspnea, palpitation, fatigue or any other symptom)?
Q 9.	Which system do you give priority for evaluation when the cancer patient complains there is deterioration of his performance (cardiovascular, pulmonary, neurological, Gastrointestinal or any other system)?
Q 10.	Do you think there is any need of objective monitor for monitoring the cancer patients (Y/N)?
Q 11.	What tests do you routinely prescribe in your practice to periodically assess the patients status?
Q 12.	Which other supportive parameters/tests are routinely available or can be made accessible to assess the performance status of cancer patients excluding the tests in point 11?
Q 13.	Can graphical representation of vital parameters versus time help in understanding the improvement or deterioration of performance status of cancer patients (Y/N)?
Q 14.	Would you like to test the ANS to assess the performance of cancer patients (Y/N)?
Q 15.	What test would you prefer for easy assessment of ANS dysfunction?

**Duration:** The questionnaire-based survey was conducted by clinicians for advanced cancer patients from 01/03/2015 to 01/02/2016.

**Results**

All the clinicians were familiar with both KPS and ECOG scores. However, in practice there was a high preference to ECOG score than KPS score (70% versus 30%). The only reason for this was simplicity and ability to remember the score.

Eighty four percent doctors agreed that there is interclinician variation in labeling the patient PS. This

difference was rated as “considerable” by 35% doctors and as “gross” by 65% doctors. All the doctors agreed that there is a scope of improvement in the evaluation of PS. Sixty two percent doctors agreed that there will be alteration in management of the patient with respect to change in performance and it may prevent unnecessary hospitalizations and investigations.

Fatigue (56%) was the most common symptom with deterioration of performance of cancer patients followed by dyspnea (32%) and vague complaints (23%). Regarding the preferences of different systems for clinical evaluation of deteriorating performance,

37% doctors gave foremost importance to cardiac, 33% doctor to pulmonary system, while 21% doctors gave importance to metabolic parameters, *i.e.*, blood investigations. Neurological and gastrointestinal systems were evaluated only when there were localizing symptoms rather than in general deterioration of performance.

In general, there was consensus (73%) that objective tool for monitoring performance is necessary. The tests preferred for assessing patient status were Computed Tomography Scan 68%, Positron Emission Tomography 32%, Bone Scan 68%. Other supportive tests were SPO<sub>2</sub>: 45%, 2D Echocardiography: 30%, Chest X-Ray: 42%, PFT/PEFR: 13%. However, for HRV test, all the clinicians (100%) rejected the availability of test facilities. Conversely, 74% of clinicians underlined its need as one of the tests to evaluate ANS dysfunction and probable deterioration in cancer associated performance. The PFT parameters such as SpO<sub>2</sub> and peak expiratory flow rate (PEFR) were also rated as mobile tools for assessing performance, *i.e.*, home based monitoring. Correlation of various parameters plotted against time in days/months was a need for 58% clinicians. Moreover, 66% clinicians also wanted some parameter to evaluate the recent short term performance (For example. Hemoglobin A 1C predicts blood glucose control in recent past few months).

Thus, detection of subclinical deterioration of performance was a felt need by most (77%) of the clinicians. Sixty five percent doctors pointed to the ANS evaluation for this subclinical progression.

## Discussion

Patient PS is extremely vital in the area of cancer care in directing prognosis thereby planning of the best treatment for cancer patients.<sup>9</sup> PS in cancer patients determines the severity of the disease. Further, using ECOG scale of performance status, clinical stage and surgical treatment provided to the lung cancer patients can determine their survival rate.<sup>10</sup> KPS was less capable than ECOG PS to distinguish patients with varied prognosis. ECOG can predict the functional status better and therefore is preferred to KPS.<sup>11</sup>

It is essential to examine the cancer patient's tolerance levels, health and their PS before subjecting them with chemotherapy, surgery or radiation therapy. It is essential to analyze the weightage of benefits over risks since chemotherapy could diminish rather enhance

life expectancy.<sup>12</sup> PS score helps clinicians to understand patients' response and their progress to treatment. It also helps clinicians to plan appropriate referrals in order to enhance their quality of life.<sup>13</sup>

It is very important for clinicians to know if patients are with poor or good PS. Lung cancer patients with poor PS cannot tolerate chemotherapy but need targeted therapy.<sup>14</sup> The clinicians plan for the mono or combination chemotherapy treatment of cancer patients as per their performance status.<sup>15-16</sup>

Palliative chemotherapy can be harmful for patients even with good PS. It is not necessary that chemotherapy would improve their quality of life (QOL). It may worsen the PS of end stage cancer patients.<sup>20</sup> PS evaluation has a strong correlation with survival rate in cancer patients. The poor PS score indicates the declination in quality of life in stage IV lung cancer patients.<sup>21</sup> Patient rated PS (Pt-PS) was compared with physician rated PS (MD-PS), where it was found that Pt-PS was poor in comparison with clinicians' score.<sup>22</sup>

Pulse oximeter is a noninvasive method of measuring SpO<sub>2</sub>, which is a routine test after lung resection in lung cancer patients. Patients with <90% SpO<sub>2</sub> indicates increased possibility of death.<sup>23</sup> It was found that SpO<sub>2</sub> > 90% and PS score in lung cancer were independent predictors of survival. LCSS fatigue, appetite score, and pulse oximetry are prognostic factors in lung cancer patients.<sup>24</sup>

PFT is another vital test to be performed after thoracotomy in lung cancer patients with information of lung volume and capacity is essential.<sup>25</sup> Forced expiratory volume (FEV) is a vital parameter to study. If it is >60% in a second, then lung resection cannot be performed since there exists an advanced risk of death after operation.<sup>26</sup> Since there is a correlation between PFT parameters (PEFR and FEV<sub>1</sub>) and HRV parameters, low frequency (LF) and high frequency (HF), this can help us in predicting cardiac morbidity in chronic smokers. So HRV should be included as a routine test along with PFT in chronic smokers for early diagnosis of cardiac involvement. Smoking affects all the parameters of PFT and HRV.<sup>27</sup>

Lowered value of HRV indicates autonomic dysfunction. ECOG4 has decreased HRV values in comparison with ECOG1. In lung cancer, time domain, frequency domain and nonlinear domain measures were evaluated. It was found that HRV measures

decreased in cancer patients as compared to healthy controls. Amongst all the tests, HRV is a noninvasive method, which can be conducted at room temperature by acquiring Electrocardiogram for 5 minutes. It was found that the HRV measures in lung cancer were lower than controls and highly decreased values were found in ECOG4 scale. Hence, HRV is preferable test to study ANS and easy to acquire and interpret.<sup>17-19</sup>

Thus, HRV, SpO<sub>2</sub> and PEFR can be combined in a single monitor, which would help the clinicians to understand the PS of lung cancer patients and plan their treatment appropriately. PS monitor for lung cancer does not exist in the market, however, it can be devised as a monitor in future for the lung cancer assessment.

### Conclusion

The present subjective performance scales in lung cancer patients are vague and subjected to interpersonal difference of opinions. Clinicians need a better objective monitor of performance score. Further, noninvasive monitors are preferred over invasive monitors. Cardiac and pulmonary systems are more focused for evaluation whenever deterioration of performance is complained by patient and their relatives. Moreover, ECOG scale is preferred over KPS scale to determine the performance status. HRV analysis may be helpful for studying autonomic system dysfunction. The SpO<sub>2</sub> and PEFR parameters can further add to scope of improving the QOL of patients.

**Conflict of Interest:** No conflict of interest.

**Informed Consent:** As this study was questionnaire based survey thus, informed consent was obtained from all individual participated in the study.

**Ethical Clearance:** Not Applicable

**Source of Funding:** Self

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# The Drug Compliance and Factors Influencing Therapeutic Regimen among Senior Citizen

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## Abstract

**Background of the Study:** One of the serious consequences in older patients is drug noncompliance. Nearly 40% to a high of 75% is estimated as the extend of noncompliance in the elderly .The aim of present study is to determine the compliance level and to identify the factors influencing the therapeutic regimen among senior citizen.

**Materials and Method:** Quantitative approach with non-experimental descriptive design was used. A modified Morisky Medication Adherence Scale (MMAS) and modified WHO's Adherence Model tool was used to assess the level of compliance and to identify the factors influencing the therapeutic regimen among the 409 subjects in Amrita Institute of Medical Sciences, Kochi (AIMS).

**Result:** The study results showed that among 409 subjects,all were on medications and were between the age group from 60 – 76 yrs and above, 210 (51.3%) subjects were male and 199(48.7%) subjects were female,majority of the subjects 338(82.8%) were married the educational status of the subjects were 113(27.6%) had primary education and 160(39.1%) subjects had secondary education, nearly 228(55.7%) subjects were unemployed and 119(29.1%) subjects were retired 65(15.9%) subjects had good compliance however, 295(72.1%) subjects had moderate compliance and 49 subjects (12%) were identified with poor compliance to therapeutic regimen. There was significantly high association between education(0.002), income (0.043) and level of compliance ( $p<0.05$ ), but there was no significant association between level of compliance and other demographic variables.

**Conclusion:** The level of compliance among the elderly were good among highly educated elderly and of high economic status.

**Keywords:** Drug compliance, Therapeutic regimen, Senior citizen.

## Introduction

Aging is inevitable and universal. According to Indian Maintenance and Welfare of Parents and Senior

Citizen Act, “a senior citizen” is defined as any person being a citizen of India who has attained the age of 60 ages or above <sup>[1]</sup>. According to Population Census 2011 there are nearly 104 million elderly persons in India.53 million females and 51 million males. A report released by the United Nations Population Fund and Help Age India suggests that the number of elderly persons is expected to grow to 173 million by 2026. Both the share and size of elderly population is increasing over time. From 5.6% in 1961 the proportion has increased to 8.6% in 2011. For males it was marginally lower at 8.2% while for females it was 9.0%. As regard to rural

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and urban areas, 71% of elderly population resides in rural areas while 29% in urban areas<sup>[2]</sup>. Health problems are supposed to be major concern of this section of the society and it is estimated that one out of two elderly in India suffers from at least one chronic disease which requires lifelong medication<sup>[3]</sup>.

Patient compliance with medical regimen is a behavioral problem of interest because it affects the patient's health. Noncompliance in some instances could result in serious complication requiring the individual to be hospitalized. Thus not only adds considerable physical strain and mental agony to the individual and the family but results in economic burden as well <sup>[4]</sup>.

R Shruthi, R Joythi H P Pundarikaksh, GN Nagesh and T G Tushar conducted a descriptive study regarding medication compliance in geriatric patients with chronic illness at tertiary care hospitals (2016) among 251 geriatric patients at Kempegowda Institute of Medical Science Hospital and Research Centre, Bangalore. The study findings revealed that the average number of medications  $2.96 \pm 1.42$  per subject and most of the subject were receiving Fixed Drug Combination's (FDC's). The compliance level was assessed by way of interview using a 20 item structured pretest questionnaire as per modified MMAS (Morisky Medication Adherence Scale)<sup>[5]</sup>. The factors identified from the studies and reviews are into several categories, namely, patient centered factors (such as age and gender), therapy related factors (e g: the complexity of regimen), health care system factors (such as the number of contacts with a health care provider), social and economical factors, and disease factors. Elderly patients may also have problems in vision, hearing, and memory. In addition they may have more difficulties in following therapy instruction tablets, distinguishing color or identifying marking on drugs, side effects or reactions from the drugs <sup>[6]</sup>. The growth of the aging population poses various health-related issues. Among them, non-compliance with drug prescription is identified as a potentially life-threatening problem (Stewart & Cluff, 1972). In addition, physiological, pharmacological, and pharmacokinetic changes in old age (Gainsborough & Powell-Jackson, 1990; Williams & Lowenthal, 1992; Offerhaus, 1997) contribute to an increase in the incidence of adverse reactions (Gryfe & Gryfe, 1984; Frattura et al., 1989; Lee, 1996) associated with the absence of both a health education process (OMS, 1994) and a pharmacotherapeutic follow-up, with potentially

serious consequences for the patient. This is a complex and multidimensional problem that merits participation by all segments of society involved with drugs<sup>[7]</sup>.

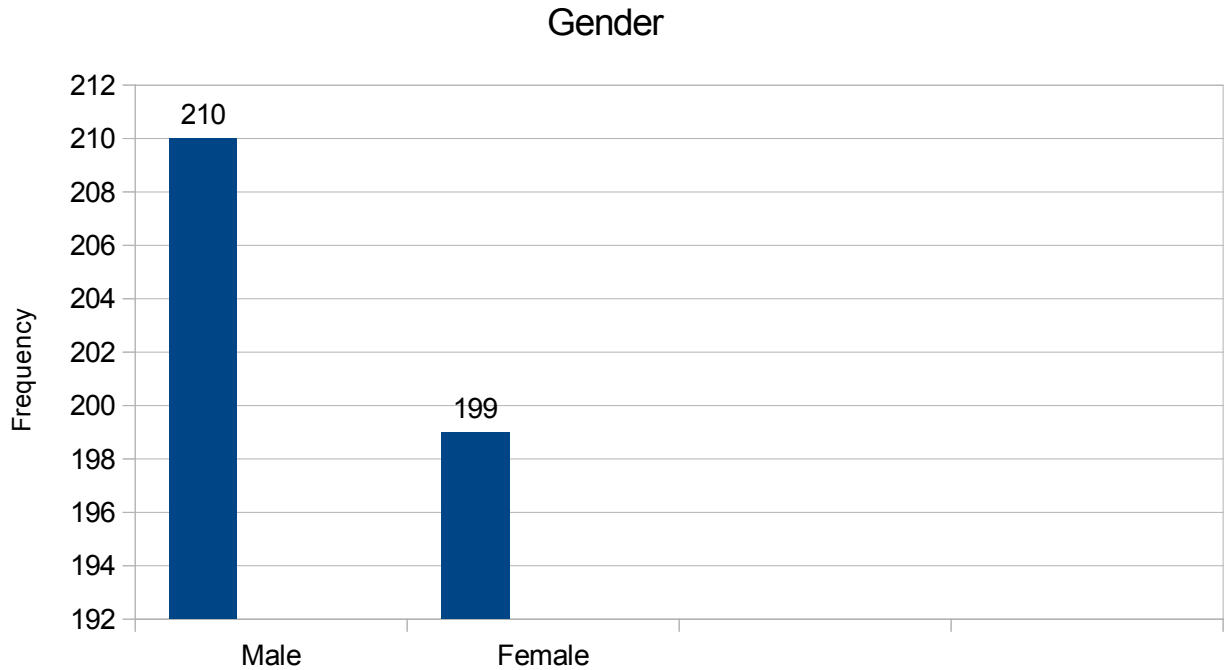
Drug compliance and its determinants is complex and are often poorly understood. There is not much published Indian/Kerala studies that have estimated the prevalence of antihypertensive drug compliance in the community setting<sup>[8]</sup>.

## Materials and Method

A quantitative approach and a non-experimental descriptive design was used for the study conducted in Geriatric OPD and General Medicine ward of Amrita Institute of Medical Sciences and Research Centre, a tertiary care centre hospital, Kochi among 409 subjects using convenient sampling technique. The patient selected according to the inclusion criteria for study were senior citizen on medication, who were able to read and write English or Malayalam. All the patients' were informed about the aim of the study and an informed consent was obtained from each subject. Data was collected by using Tool I - Semi-structured Questionnaire consists of two sections. Section I :- Socio-demographic data and Section II :- modified Morisky Medication Adherence Scale, to assess the subject's compliance and Tool II - WHO's Adherence Model, to assess the factors affecting compliance. The MMAS has 8 item with 2 response format yes-1, no-0 Scoring was categorized into 3, good compliance = 0-2, moderate compliance = 3-5, low compliance = 6-8 Adherence Model consist of 41 yes/no type questions organized under 7 domains. Data analysis was done by using descriptive and inferential statistics.

## Result

**Section I: Description of sociodemographic variables of the subjects:** The demographic characteristics showed that among the 409 subjects, 129 (31.5%) subjects belonged to the age group of 60-65 years, 210 (51.3%) subjects were male and 199 (48.7%) subjects were female, majority of the subjects 338 (82.8%) were married, the educational status of the subjects were 113 (27.6%) had primary education and 160 (39.1%) subjects had secondary education, nearly 228 (55.7%) subjects were unemployed and 119 (29.1%) subjects were retired, 150 (36.7%) subjects had income between Rs 5001-15000/month and 121 (29.6%) subjects had income between Rs 15001-25000/-, nearly 98.5% subjects used to take their medicine regularly.



**Figure 1: Bar diagram showing frequency distribution of subject based on gender**

The data illustrated in Figure 1 shows that among 409 subjects, majority of the elderly 210 were males and 199 were females

**Section II: Level of compliance among Geriatric subjects:** The data findings shows that 161 (39.4%) subjects forget to take medicine, 65 (15.9%) subjects used to skip their medications in the last 2 weeks, 59 (14.4%) subjects stopped their medications without the physician's consultation, 112 (27.4%) subjects on travel or when not at home used to skip their medications, 21 (5.1%) subjects forgot to take medicine the previous day, more than half of the subjects i.e 237 (57.9%) believed that health well-being depends on medications, however 55 (13.4%) subjects reported that they stopped taking medications when their symptoms were under control, whereas 88 (21.5%) mentioned hassled in sticking to the treatment plan.

**Section III: Factors influencing with drug compliance:** The data findings enumerate, regarding the patient related factor influencing the drug compliance among the elderly subjects, majority of the subjects had

knowledge of their disease and their management i.e 86.6% & 85.3%, however 313 (76.7%) subjects reported visual impairment and 145 (35.5%) subjects mentioned of hearing impairment. In relation with therapy related factor influencing the drug compliance among the elderly subjects 119 (29.1%) subjects complained that they found their therapy complex, nearly 25.7% subjects mentioned difficulty in polypharmacy. With respect to sociocultural factor, 351 (85.8%) subjects reported that they are having family support. Regarding the economical factors 136 (33.3%) subjects are not able to afford the cost of the therapy, and 322 (78.8%) subjects reported they do not have insurance coverage. Disease related factors 27 (6.6%) subjects find difficulty to follow the treatment due to the exacerbations of symptoms. The psychological factors affecting the drug compliance among elderly are 99 (24.2%) subjects are feeling depressed of their condition, hospitalized factors causing stress were reported by 146 (35.7%) subjects, whereas 302 (73.2%) subjects are not able to cope with illness.

## Section IV: Association of Level of Compliance and Selected Variables

Table 1: Association between Level of Compliance and selected demographic variables N=4

Demographic Variables	High Adherence		Moderate Adherence		Low Adherence		$\chi^2$	df	p value
	f	%	f	%	f	%			
<b>Gender</b>									
Male	28	43.1	155	52.5	27	55.1	2.225	2	0.329ns
Female	37	56.9	140	47.5	22	44.9			
<b>Education</b>									
Illiterate	1	1.5	1	0.3	3	6.1	31.37	12	0.002**
Primary	14	21.5	80	27.1	19	38.8			
Secondary	18	27.7	122	41.4	20	40.8			
Higher Secondary	9	13.8	17	5.8	2	4.1			
Diploma	10	15.4	36	12.2	1	2			
Graduate	10	15.4	33	11.2	3	6.1			
Post graduate	3	4.6	6	2	1	2			
<b>Income per month (Rs)</b>									
< 5000	12	18.5	71	24.1	22	44.9	15.95	8	0.043*
5001 to 15000	23	35.4	112	38	15	30.6			
15001 to 25000	26	4	87	19	8	3			
25001 to 50000	4	6.2	19	6.4	3	6.1			
> 50001	0	0	6	2	1	2			

\* Significant (P<0.05), ns =No significant

The association computed using chi-square between the level of compliance and selected demographic variables is presented in table 3 and the data presented depicts that, there was significantly high association between education(0.002), income (0.043) and level of compliance (p<0.05), but there was no significant association between level of compliance and other demographic variable.

### Discussion

In the present study, level of compliance to therapeutic regimen among geriatric age group on medication was assessed by using modified MMAS .Total level of compliance was categorized as high, moderate and low compliance.The result of the study showed that most of the subjects 295 (72.1%) have moderate compliance, 65(15.9%) subject exhibited high compliance and 49 (12%) identified with low compliance to therapeutic regimen.

In the light of literature it is found that few study were showing consistent finding with the present study findings. R.Shruthi,R.Joythi,H.P.Pundarikaksh, G .N. Nagesh and T.G Tushar conducted a descriptive

study regarding medication compliance in geriatric patients with chronic illness at tertiary care hospitals (2016) among 251 geriatric patients at Kempegowda Institute of Medical Science Hospital and Research Centre, Bangalore . The study findings revealed that the average number of medications 2.96 +\_ 1.42 per subject and most of the subject were receiving Fixed Drug Combination's (FDC's). The compliance level was assessed by way of interview using a 20 item structured pretest questionnaire as per modified MMAS (Morisky Medication Adherence Scale). The level of compliance was good in 45.4%, moderate in 35.45% and poor in 19.12% of study subject [6].

To summaries the discussion based on first objective is markedly clear that level of compliance of the participants were moderately to high.

There are seven set of factors such as patient related factors, therapy related factors, health care system related factor, sociocultural factor, economic factor, disease condition related factor and psychological factor. Among the seven factors therapy related factor is the highest factor influencing compliance (79.5%), followed by health care system related factors (75.4%), patient related

factors (72.5%), sociocultural factors (72.5%), disease condition related factors (71.8%), psychological factors (62.7%), and economical factors (49.3%). In the present study it is identified that economic factors play the pivotal role in hindering compliance with treatment. Hyekyung Jin, Yeomen Kim and Sandy Jeonghie the study findings revealed that the mean score of total FHL (Functional Health Literacy) test was 7.72+<sub>-</sub>3.51 (range 0-15). The percentage of total number of correct answers for the reading comprehension subtest and numeracy subtest medications. The study finding shows the factors affecting medication adherence included the patient degree of satisfaction with service sufficient explanation of medication counselling, educational level, health related problem and dosing frequency<sup>[8]</sup>. The supporting studies also mentions the impact of multifactorial influence in the adherence of medication in elderly. There is a significant association between the level of compliance and factors influencing compliance to therapeutic regimen. The study revealed that there is a high significant association between education(0.002), income (0.043) and level of compliance (p<0.05). In R. Shruthi, R. Joythi, H. P. Pundarikaksh, G. N. Nagesh and T. G. Tushar study findings revealed that the level of compliance positively correlated with the educational status of the study subjects and their awareness about the diseases and prescribed medications. The overall level of compliance was higher in subjects living with spouse or families, subjects without any functional impairment, subjects who were regular for the follow-up visits and also in subjects who did not experience any adverse events<sup>[6]</sup>.

The supportive studies and the present study findings are similar.

### Conclusion

Common trends in health care that affect medication in elderly are increased consumer awareness, fragmentation of care, polypharmacy and related problems, high cost of medicine & noncompliance.

**Conflicts of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Research proposal was presented before the research committee of Amrita College of nursing and obtained approval. Later ethical clearance obtained from the ethical committee of AIMS, Kochi.

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# Competency on Breast Feeding among Mothers of High Risk Babies and Practice of Nurses in Assisting the Mothers with a View to Develop A Protocol

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## Abstract

**Introduction:** The mother of a high risk neonate is confronted with numerous parenting challenges, not the least of which is the decision about how to nourish her vulnerable newborn. Successful breastfeeding depends on overcoming obstacles posed by neonate's condition, maternal health, and intensive care unit environment.

**Objective:** to assess the competency on breastfeeding among mothers of high risk babies and practice of nurses in assisting the mothers in selected Intensive Care Unit, AIMS, Kochi, with a view to develop a nursing care protocol.

**Methodology:** The descriptive research design was adopted and non-probability convenience sampling technique was used to collect data from 40 mothers by using structured questionnaire and observational checklists to assess the practice of mothers and staff nurses in NICU.

**Results:** The study reveals that 22 (55%) mothers were having average knowledge and most of the mothers 23 (57.5%) had poor practice regarding the breastfeeding of the high risk neonate in NICU. Most of the staff nurses (50%) had average level of practice while assisting the mothers during breastfeeding in NICU. There is significant association between knowledge and demographic variables like education of the mother, order of pregnancy and source of knowledge.

**Conclusion:** The nursing protocol was implemented and established a comprehensive improvement in the knowledge, care, support and management. Thus, the health care professional ultimately work towards providing a positive impact on the lives of high risk neonate.

**Keywords:** Breastfeeding, High risk neonates, Mother.

## Introduction

Breastfeeding is the art of motherhood and it is the

ideal form of feeding to a neonate. Artificial feeding exposes the neonates to infection and results over millions of death annually worldwide due to ill effects. Infant Mortality Rate (IMR) is regarded as an important sensitive indicator of health status of a community. It reflects the effectiveness of intervention for improving maternal and child health in a country. Mothers' milk is the best milk for neonates to improve the health and prevention of infection. In India, 25 million babies born every year, Sample registration System (SRS)-2018 reports that current neonatal mortality in India of 25.4 per 1000 live birth.<sup>1</sup>

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Every family look forward to the birth of a healthy newborn. It is an exciting time with so much enjoy. In some cases though, unexpected deliveries and challenges occur along the way. Some newborns are considered as high risk. This means that a newborn has a greater chance of complications because of condition that occur during fetal development, pregnancy condition of mother or problem that occur during or after birth.<sup>2</sup>

Giving birth to a premature or other high risk neonates (or babies) does not mean cannot breastfeed. Actually there is even more reason to provide mothers' milk, and eventually breastfeed, to sick newborns. Providing breastfeeding to baby lets mothers to participate in baby's healthcare in a very crucial way. The breastfeeding to a high risk neonate is entirely different from the breastfeeding of a full term neonate, needs some more practice, patience and persistence.

The mother of a high risk neonate is confronted with numerous parenting challenges, not the least of which is the decision about how to nourish her vulnerable newborn. Successful breastfeeding depends on overcoming obstacles posed by neonate's condition, maternal health, and intensive care unit environment. These obstacles include maternal separation from nursing infant during hospitalization, delayed initiation of expression of breastmilk due to maternal illness and or surgery, the inability to suckle or feed on demand and the lack of sufficient maternal follow up after discharge.<sup>3</sup>

## Materials and Method

A descriptive research study was conducted among 40 mothers of highrisk babies admitted and the registered staff nurses working in NICU at AIMS, Kochi. Before starting data collection, Ethical Clearance certificate was obtained from the Ethics Committee and Scientific committee of Amrita Institute of Medical Sciences and Research Centre (AIMS), Kochi. The sample was selected by non-probability convenience sampling technique based on inclusion criteria. Total 60 sample were selected among 40 mothers whose babies are admitted and 20 staff nurses working in NICU. Data had been collected by structured questionnaire for collection of demographic data and to assess the knowledge of mothers on breastfeeding of a highrisk neonates. An observational checklist for assessment of the practice of mothers and staff nurses in assisting mothers during breast feeding of a highrisk neonates in NICU. After

building rapport with the mothers, the investigator explained the importance of the study and significance. Written informed consent was obtained from each sample. The socio-demographic data and knowledge were assessed using a structured questionnaire. After the knowledge assessment, the mothers were assessed the practice while they were feeding their neonates in the nursery, at the same time the practice of staff nurses were also assessed without their awareness while they were assisting the mothers to feed their neonates. Observation without concealment technique was used during the assessment of practice of both mothers and staff nurses. The collected data were analyzed using descriptive statistics and inferential statistics. Frequency and percentage distribution was used to distribute sample according to socio-demographic variables. Chi-square test was used to find the association of knowledge and practice on breastfeeding among mothers of high risk babies with demographic variables. Pearson Correlation method was used to find the correlation between knowledge and practice of mothers of the high risk babies regarding breastfeeding.

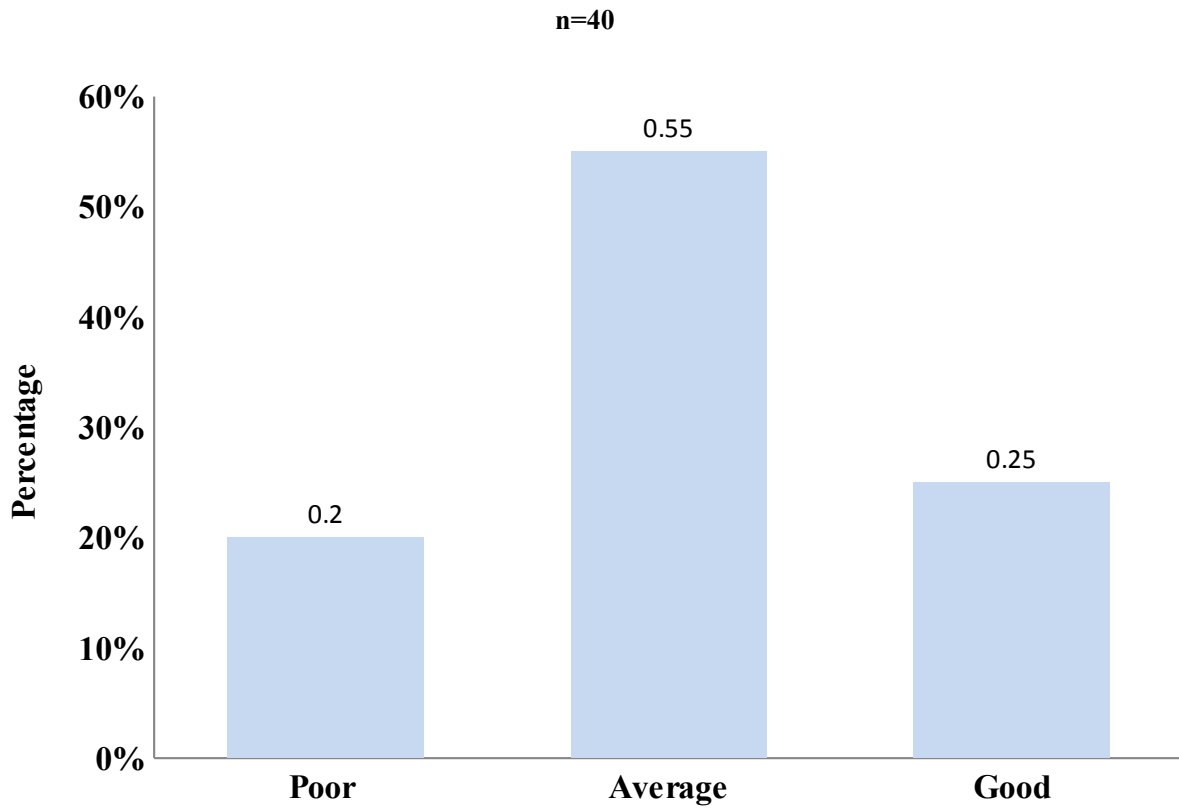
## Results

In the data, age wise distribution showed that 15(37.5%) mothers belongs to 25 -30 years of age group. Majority of the mothers were non-health professionals, 28(70%) and 26(65%) belongs to nuclear family.

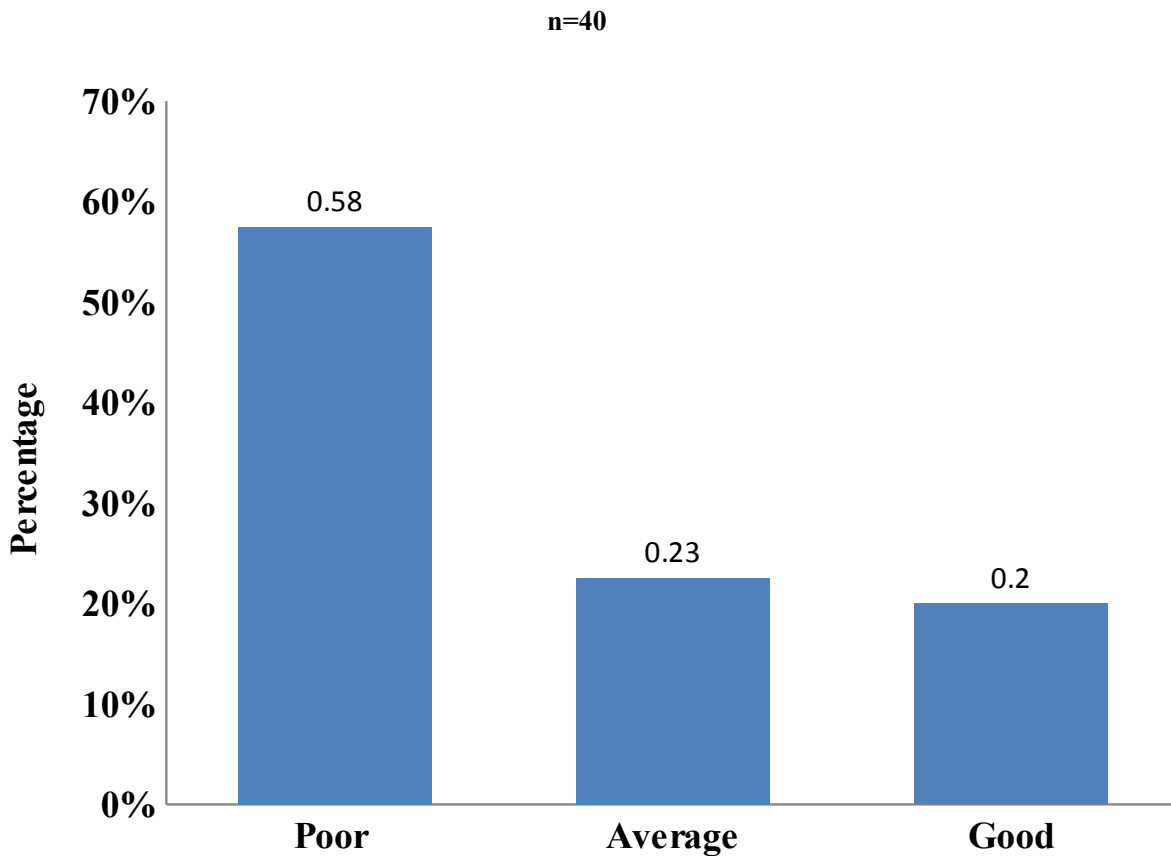
Figure 1 depicts that knowledge level of the mothers regarding the breastfeeding of a high risk neonate in Neonatal Intensive Care Unit. The figure shows that most of the mother had an average 22(55%), 10(25%) had good knowledge and only 8(20%) had poor knowledge regarding the breast feeding and its importance among high risk neonates.

Based on the level of practice of the mothers, regarding the breastfeeding of high risk neonate, this figure shows that mothers of high risk neonate had 23(57.5%) poor practice, 9(22.5%) had average practice and only 8(20%) had good practice during breastfeeding of high risk neonates in NICU. Only 6% mothers were continually observing for regurgitation and monitoring for any complications during breastfeeding their neonates. Very few mothers (5%) were practicing the infection control measures like using of hand rub before breastfeeding their neonates.

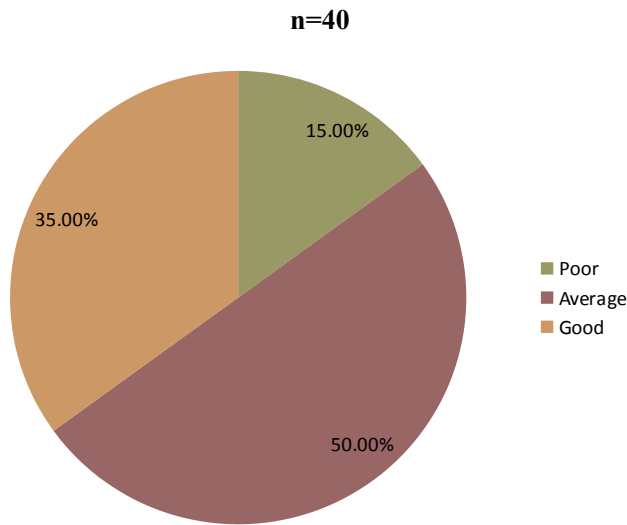




**Figure 1: Knowledge level of the mothers on breastfeeding of high risk neonates.**



**Figure 2: Level of practice of the mothers regarding the breastfeeding of high risk neonate.**



**Figure 3: Practice level of staff nurses in assisting mothers of high risk neonate during breastfeeding.**

Based on the level of Practice of staff nurses in assisting mothers of high risk neonate during breastfeeding, the diagram shows that 10(50%) staff nurses had average level of practice, 7(35%) of staff nurses had good practice, and only 3(15%) of staff nurses had poor practice while assisting the mothers during breastfeeding of high risk neonate in NICU.

There is significant association between the order of pregnancy, source of knowledge of the mothers and level of knowledge of mothers regarding breastfeeding.

**Table 1: Correlation of Knowledge and practice of mothers of high risk neonate n=40**

Knowledge	r- value	p-value
Practice	-0.244	0.05

Correlation is not significant at the 0.05 level (p=0.05)

The Correlation had found using Pearson correlation coefficient method. It was found that there is negative correlation between knowledge and practice score of mothers of high risk neonate. But statistically it is not significant.

**Table 2: Practice scores of mothers after implementation of protocol n=5**

Practice of Mothers	Frequency (f)	Percentage (%)
Average	2	40
Good	3	60

The data shows that 60% of mothers had good practice during breastfeeding of high risk neonate in

NICU after the implementation of the protocol. There is a marked level of increase in the practice of mothers after the implementation of the nursing care protocol.

**Table 3: Practice scores of staff nurses after implementation of protocol n=5**

Practice of Staff Nurses	Frequency (f)	Percentage (%)
Average	1	20
Good	4	80

The data shows that 80% of staff nurses have good level of assistance of mothers during breast feeding of a high risk neonate in NICU. There is a marked level of increase in the practice of the staff nurses after the implementation of nursing care protocol.

### Discussion

Mothers of neonates admitted into NICU not able to function in traditional role of mother. They are separated from their neonate and the role of a caregiver shifts to the health care professionals.

The present study result shows that most of the mothers 22(55%) had an average knowledge, 10(25%) had good knowledge and only 8(20%) showed poor knowledge regarding the breastfeeding and its importance among high risk neonates. Nathaine Subhash conducted a descriptive study which revealed that 65% mothers had inadequate knowledge and practice regarding breast feeding and concluded that supportive groups are necessary for improving the knowledge of the mothers regarding breast feeding<sup>4</sup>

The present study result showed that majority of the mothers 23(57.5%) had poor practice during the breastfeeding of high risk neonate and 9(22.5%) had average practice and 8(20%) had good practice during breastfeeding of high risk neonate in NICU. The result showed that the majority of the mothers had poor practice during breastfeeding of high risk neonate in NICU.

Another study, quoted the mothers of high risk infant is confronted with numerous parenting challenges, not the least of which is the decision about how to nourish the vulnerable newborn.<sup>3</sup>

Another community based study was conducted by M. Sai Sunil Kishore, Praveen Kumar and Arun K Agarwal, 2008 on breastfeeding knowledge and practices amongst mother in a rural population of north India and revealed that 30% and 10% exclusively breastfed

their infants till 4 months and six months of age. They concluded that practice and breastfeeding knowledge and suboptimal among the rural north Indians mothers and breastfeeding counseling can improve the breastfeeding practices.<sup>5</sup>

The result of the present study and the literature reviewed the fact that near half of the mothers had inadequate practice on breastfeeding of the high risk neonates in NICU. The mothers of the vulnerable neonates had several barriers to breastfeed in NICU. Most of the mothers had average level of knowledge regarding the breastfeeding but they cannot properly practice feeding due to the psychological or emotional conflicts occur during the visit. Most of the mothers were lacking knowledge in areas like proper positioning of the baby, cleaning of the breast, proper skin to skin contact, holding and support the baby, attachment to the breast, proper stimulation of the high risk neonates, proper eye contact, monitoring for regurgitation in high risk neonates and keeping in proper position. Only 6% of mothers were continually observing for regurgitation and monitoring for any complication during breastfeeding their neonates. Very few mothers (5%) were practicing the infection control measures like using of hand rub before breastfeeding their neonates. So, health care professionals' support is very essential in predictive of success with breastfeeding in NICU.

Anderson and Geden conducted a survey programme and result showed that nurses received insufficient education and training to effectively support the breastfeeding of a vulnerable neonates.<sup>6</sup>

Based on the assessment of knowledge and practice of mothers and staff nurses during breastfeeding of high risk neonate, a nursing care protocol was prepared, addressing the need of breastfeeding, nurse's role, assessment, implementation of care, problem solving and discharge planning. A study conducted by Siddell on effectiveness of an education plan in NICU to foster the breastfeeding, showed that increased knowledge acquisition by health care professionals following an education plan and training can affect the attitudes and knowledge about breastfeeding.<sup>7</sup>

Studies have found that education and training to mothers, influences the attitude and increase the knowledge about breastfeeding (Bernaix, Marinelli, Froman and Burke).<sup>8</sup>

Newborn care practices in deliveries conducted at

home are far from ideal, it is of paramount importance that practical strategies involving behavioral change communication should be adopted in order to realistically reduce neonatal mortality in India.<sup>9</sup>

## Conclusion

The study findings strongly suggest that the mothers of high risk neonates had average knowledge regarding the breastfeeding and importance. It was found that the staff nurses' assistance were average in the NICU during breastfeeding. The protocol was implemented in the setting to improve the practice of staff nurses in assisting the mothers during breastfeeding to improve the breastfeeding practice of the mothers. The practice level of the mothers and staff nurses was improved after the implementation of the nursing care protocol.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Taken from Ethics Committee of Amrita Institute of Medical Sciences and Research Centre.

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# Nutritional Status of Adolescent Girls Residing in the Urban Field Practice Area of S.N. Medical College, Bagalkot

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## Abstract

**Background:** Adolescence is a very crucial period in life characterized by rapid growth and development, physiologically, psychologically and socially Objective: to study the nutritional status of adolescent girls residing in the urban field practice area of S.N. Medical College, Bagalkot.

**Study Design:** A Community based cross sectional study. Setting: field practice areas of the urban health training centers, Department of Community Medicine, S. Nijalingappa Medical College in Bagalkot. Participants: 400 unmarried adolescent girls. Sampling: Systematic random sampling.

**Statistical Analysis:** Data was tabulated in Microsoft Excel 2010 and analyzed by using Open Epi software. P-value was calculated using chi-square test and difference was accepted significant at more than 95% (p-value <0.05).

**Results:** In the present study, the prevalence of thinness and stunting was found to be 25.8% and 29.3% respectively. Anemia was the predominant micronutrient disorder observed in this study (55.5%) followed by baldness of tongue (3.5%), goiter (2%), koilonychia (1.5%), angular stomatitis (0.3%) and none had Bitot spots.

**Conclusion:** The present study revealed high prevalence of thinness, stunting and anemia reflecting poor nutritional status among adolescent girls.

**Keywords:** Adolescent Girls, Anemia, Urban Area, Thinness, Stunting, Obese, Sahli's Method.

## Introduction

Adolescence is an opportunity period for interventions to address malnutrition. Nutrition is required not only for growth and preparation for pregnancy, but also needed for physical and academic excellence.<sup>1</sup> Today's healthy adolescent girls are tomorrow's healthy women, future of every society and a great resource of the nation.<sup>2</sup>

Globally, adolescent health and nutrition has gained importance in the last decade only.<sup>3</sup> Although, in India adolescent health has gained grounds since 1997 as a component of RCH programme, it did not receive the attention it deserved.<sup>4</sup> However, in the recently launched RMNCH plus A strategy (2013) emphasis is given on nutritional status of adolescent girls to improve maternal health and child survival.<sup>5</sup>

Continued assessment of nutritional status in adolescent girls is the need of the hour.<sup>6</sup> World Health Organization (WHO) recommends various anthropometric indices to evaluate nutritional status in children. BMI is the most appropriate tool for epidemiological studies on assessment of nutritional status among adolescents especially at the community level. New growth charts are recommended since 2006.<sup>7</sup>

More than half of the global population is urban and histories largest-ever urbanization wave will continue for many years to come. Urbanization brings enormous changes to landscapes and lifestyles. It offers many opportunities including increased access to jobs, education and essential services, but it can also see inequalities concentrated in slums and informal settlements.<sup>8</sup> The urban slum adolescent girl is subjected

to more physical and mental challenges on a day to day basis due to pressure of modernization and she needs to work hard to cope with future demands of life.<sup>9</sup>

So far most of the studies have been done in schools and rural areas. The findings of studies on school children cannot be extrapolated to adolescent girls, as their school enrollment is less. It is likely that girls not attending schools belong to disadvantaged segment of society and contribute significantly in domestic and peridomestic activities, there by jeopardizing their health.<sup>10</sup>

Bagalkot is a city affected by backwaters of irrigation dam, has seen large scale changes in bio-ecosystem in this decade. The Urban field practice area where the present study was conducted is designated as a resettlement area.<sup>11</sup>

So the present study was carried out to study the nutritional status of adolescent girls residing in the urban field practice area of S. N. Medical College, Bagalkot

**Materials and Method:** The present community based cross sectional study was conducted in the field practice areas of the urban health training centers, Department of Community Medicine, S. Nijalingappa Medical College in Bagalkot. The study period was from Jan 1<sup>st</sup> 2015 to Jun 31<sup>st</sup> 2016. The population of urban health training centre was 17,922 and there were 1784 adolescent girls as per data obtained from UHTC survey registers as on May 2014. Study protocol was approved by the Institutional Ethical committee.

Local cultural values and ideas were respected. Confidentiality was assured. Informed written consent was taken from individual adolescent girl and their parents before interview. The nature and purpose of the survey were explained in detail to them in their own language.

**Inclusion Criteria:** Unmarried Adolescent girls residing in the urban field practice area for more than a year and willing to participate in the study.

**Exclusion Criteria:** Those who could not be contacted even after 3 consecutive visits.

**Sample Size:** According to the study of Prashant K and Shaw C on “Nutrition Status of Adolescent Girls from an Urban Slum Area in South India”; the prevalence of malnutrition was 20.6%.<sup>9</sup>

Desired sample size (N) was obtained by formula-

$N = 4PQ/l^2$  where P is prevalence of positive factor (20.6%), Q =100-P, l is allowable error (20% of P) =  $4 \times 20.6 \times 79.4 / (4.12)^2 = 385.53 = 386$  approximately.

So, a total of 400 study subjects were taken.

**Sampling Procedure:** Systematic random sampling technique was used to enroll the study subjects. **Study Tools:** The preparatory phase was completed and necessary approval was obtained from the college authorities. Survey records of UHTC area were verified and a total number of adolescent girls were estimated and list was prepared. Predesigned, pre-tested, semi-structured questionnaire regarding socio-demographic variables, Dietary intake assessment by 24 hour recall method, Anthropometric Measurements. Hemoglobin estimation was done by using Sahli’s Hemoglobinometer and anemia grading was done based on WHO criteria

**Data Analysis:** Data was entered in Microsoft Excel 2007 spread sheet, and subsequently it was analyzed using SPSS (trial version 20) and Open Epi software. The various factors and their association with nutritional status were studied using Chi square test. P value of <0.05 was considered statistically significant and <0.001 as highly significant.

## Results

In this study, out of total 400 Study Subjects, most of them i.e. 203(50.7%) were in early adolescence (10-13 years) followed by 128 (32%) in middle adolescence (14-16years) and 69(17.3%) were in late adolescence phase (17-19years). Majority of study subjects belonged to Hindu religion (245, 61.2%) followed by 38.8% Muslims (154) and Christians (1). Majority of study participants belonged to Other Backward Classes (253, 59.8%) followed by General Category (105, 28%) and least were in SC/ST category (42, 12.2%). Majority of the girls belonged to nuclear families (235, 58.8%) followed by 72(18%) in joint families, 47(11.8%) in three-generation families and 46(11.4%) in broken families. Majority of the girls i.e. 280(70%) had 5 to 10 members in the family followed by 90(22.5%) girls who had <5 members and 30(7.5%) girls had >10 members. According to Modified B. G. Prasad Classification of Socio-economic status, 210(52.5%) belonged to Class IV followed by 120 (30%) to Class V, 42(10.5%) to Class III, 26(6.5%) to Class II and 2(0.5%) to Class I.

Out of 400 Study Subjects, 78 were found to be having thinness and 25 were having severe thinness. The

prevalence of thinness and severe thinness in the present study was found to be 19.5% and 6.3% respectively with overall prevalence of 25.8%. 17(4.3%) girls were overweight and 5(1.2%) girls were obese with overall prevalence of Overweight to be 5.5%. Rests of the 275 (68.7%) girls were found to be having normal BMI. Table 1.

**Table 1: Distribution of Study Subjects by BMI-for-age**

Body Mass Index (BMI)	No.	%
Normal	275	68.7
Thinness (> -3SD to < -2SD)	78	19.5
Severe thinness(< -3SD)	25	6.3
Overweight (> +1 SD)	17	4.3
Obese (> +2 SD)	5	1.2
Total	400	100

According to height for age, 99 girls were found to be having stunting and 18 were having severe stunting. The prevalence of stunting and severe stunting in the present study was found to be 24.8% and 4.5% respectively with overall prevalence of 29.3%. Rest of the 283(70.7%) girls had normal height for age. Table 2

**Table 2: Distribution of Study Subjects by Height for age**

Height for Age	No.	%
Normal	283	70.7
Stunting (< -2 SD)	99	24.8
Severe stunting (< -3SD)s	18	4.5
Total	400	100

Majority of the girls had pallor (222, 55.5%) followed by baldness of tongue in 3.5% girls, goiter in 2% girls, koilonychia in 1.5% girls, angular stomatitis in 0.3% girls. None of them had Bitot spots. Table 3

**Table 3: Distribution of Study Subjects by Clinical Signs of Nutritional Disorders**

Clinical Signs	Present		Absent		Total	
	No.	%	No.	%	No.	%
Pallor	222	55.5	178	44.5	400	100
Koilonychia	6	1.5	394	98.5	400	100
Baldness of tongue	14	3.5	386	96.5	400	100
Angular Stomatitis	1	0.3	399	99.7	400	100
Goiter	8	2	392	98	400	100
Bitot spots	0	0	400	100	400	100

Discussion: In this study, early adolescent girls (10-13 years) were almost equal in proportion to middle and late adolescents (14-19years) [50.7%, 49.3%]. Mean age was 13.71 + 2.525. In studies done in Hyderabad<sup>12</sup> and Muzaffarnagar, Uttar Pradesh<sup>13</sup>, majority were in late adolescence where as in studies done in Nalgonda, Andhra Pradesh<sup>9</sup> and Dibrugarh, Assam<sup>14</sup> majority were in early adolescent age group.

Majority of study participants belonged to Hindu religion (61.2%) and other backward classes (59.8%). Similar findings were observed in studies done in Varanasi<sup>15</sup>, Hyderabad<sup>12</sup>, rural areas of Kancheepuram, Tamil Nadu<sup>16</sup> and Dakshina kannada<sup>17</sup>.

Most of the girls belonged to nuclear family (58.8%) which was similar to studies done in rural areas of Kancheepuram, Tamil Nadu<sup>16</sup> and Raipur city, Chattisgarh<sup>18</sup>. But in a study done in Hyderabad<sup>12</sup> joint families were more.

Majority of the girls were living in families with > 5 members (77.5%) with mean family size of 6.37+3. Similar findings were observed in studies done in Nalgonda, Andhra Pradesh<sup>9</sup>, Dibrugarh, Assam<sup>14</sup> and rural areas of Kancheepuram, Tamil Nadu.<sup>16</sup>

According to Modified B. G. Prasad Classification of Socio-economic status, majority of the girls belonged to Class IV (52.5%) and Class V (30%) which was similar to studies done in Nalgonda, Andhra Pradesh<sup>9</sup>, Bhopal<sup>19</sup> and rural areas of Kancheepuram, Tamil Nadu.<sup>16</sup> But, in a study done in Dibrugarh, Assam<sup>14</sup> none of them were in Class V and majority were in class IV and III.

In the present study, the prevalence of thinness and stunting was found to be 25.8% and 29.3% respectively.

**Following studies found almost similar findings:** In a study done in 2007 among adolescent Girls of Urban Slum Area in Nalgonda, Andhra Pradesh, it was found that overall prevalence of stunting was 47% and 28.3% as per NCHS and Indian standards respectively. Prevalence of thinness was 20.6% as per Indian standards.<sup>9</sup>

In a study done in 2008 among adolescent Girls in Urban Slums of Dibrugarh, Assam found that prevalence of thinness and stunting was 25.7% and 31.33% respectively.<sup>14</sup>

Similarly in a study done in 2013 among urban adolescent girls of Khalapar, Muzaffarnagar, it was

observed that Prevalence of under-nutrition was 21% and over-nutrition was 7%.<sup>13</sup>

In a study done in 2005 among adolescent girls in an urban community of Gulbarga district, Karnataka revealed that 94% had anemia and 27.6% had chronic energy deficiency.<sup>20</sup>

In a study done in rural area of Dakshina Kannada, Karnataka during 2014 among 100 adolescents (12-18 years) of both the sexes revealed that among girls, 30% had chronic energy deficiency (CED) and 15% were underweight.<sup>17</sup>

However, following studies finding were in contrast to the present study:

In a study done in urban slum of Hyderabad during 2014 revealed a high proportion of underweight (48.5%) and overweight (21.5%) in adolescent girls.<sup>12</sup>

In a study done in 2009-10 among rural adolescent girls of Belgaum; Karnataka found that prevalence of thinness and stunting was 57% and 59.8% respectively.<sup>21</sup>

In a Study done in 2009 among 230 rural adolescent girls of Kolar district found that prevalence of stunting was 32.17% respectively as per Waterlows classification and prevalence of thinness was found to be 73.5% as per Indian standards.<sup>10</sup>

In a study done in 2011 among 237 adolescent girls aged 12-19 years residing in urban slum of Karad, Maharashtra found that prevalence of undernutrition was 40.86%.<sup>22</sup>

These similarities and differences could be due to the study setting, sample size, age group distribution of study population and Growth standards used for nutritional assessment.

The prevalence of thinness, stunting and anemia in the present study could be attributed to low socioeconomic status and poor environmental sanitation in the study population.

Anemia was the predominant micronutrient disorder observed in this study (55.5%) followed by baldness of tongue (3.5%), goiter (2%), koilonychia (1.5%), angular stomatitis (0.3%) and none had Bitot spots. These findings were in contrast to a study done in Dibrugarh, Assam where prevalence of various other micronutrient deficiencies was found to be more i.e. pallor (93.30%);

angular stomatitis (35.56%); glossitis (34.15%); Goitre (4.22%) and bitots spots (0.35%).<sup>14</sup> This could be due to regional differences in the food habits.

## Conclusion

The present study revealed high prevalence of thinness, stunting and anemia reflecting poor nutritional status among adolescent girls. The prevalence of anemia in adolescent girls was significantly high in those with low BMI. Anemia was also found more in late adolescent age group

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# A Comparative Study on Road Traffic Accident in Kerala and Tamil Nadu: A Secondary Data Analysis

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## Abstract

**Background:** Injuries are neglected significant public health problem worldwide which; requires organized efforts for prevention. The vehicle population of India constitutes only 1 percent of the world but accounts for nearly 10% of the total accidents in the world. Globalization has led to increased vehicular movements leading to unsafe roads.

**Materials and Method:** This study aims at providing, comparison between Tamil Nadu and Kerala on the basis of Injury rates, on type of vehicle involved, type of roads and causative factor leading to road traffic crashes. In order to understand the severity of accidents and trends over time, we have collected data from various state and national reports published on various forums regarding the accidents in India, Tamil Nadu and Kerala and analyzed the data to see the trends and number of injuries over the past 3years.

**Results:** Between the two states, Tamil Nadu has shown high injury rates comparatively to Kerala over the period of 3 years. Though there are measures in place, somewhere there is a lack in proactive measure to stop this modern epidemic of motor vehicle trauma which shows an increase in accidents in Tamil Nadu than in Kerala.

**Keywords:** Road Traffic Injuries, Kerala and Tamil Nadu, Injury rates, RTA Comparison.

## Introduction

Road traffic injuries manifest greater part of morbidity and mortality rates in India. There are not many studies done in Indian background about the realistic magnitude, risk factors and impact of road traffic injuries, and ways to prevent and reduce the impact of road crashes. Kerala and Tamil Nadu is one of the best states in the country which has taken the initiative to have a full-fledged road safety policy to protect the lives of its citizens<sup>(1)</sup>. This review aims at providing an

overview comparison in road traffic accidents between Tamil Nadu and Kerala based on type of roads, type of vehicle involved and cause wise comparison, also describes on the injury rates between two states. This review is written in the view of presenting the road traffic accident scenario which can help various stakeholders to frame policies. RTA involves high human suffering and socioeconomic prices in terms of premature deaths, injuries, loss of productivity<sup>(2)</sup>. Globally the foremost productive cohort of the community young adults aged between 15 and 44 years constitutes more than half of the people killed in traffic crashes.

**RTA-India Scenario:** In India, statistics over the years have shown, greater than 130,000 people have died on Indian roads, giving India a honor in topping the world's list of fatalities due to road traffic injuries. Poor enforcement and non-existent of injury prevention laws and programs have led to this exaggerated situation in Indian scenario. Majority of data portrays, drunk and

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driving is the major cause of death, which is responsible for almost 70 percent of death in cities like Delhi and Mumbai<sup>(3)</sup>. Total number of road accidents for the calendar year 2016 was reported to be 4,80,652 causing injuries to 4,94,624 and claiming 1,50,785 lives in India. Comparing 2015-16, the numbers of road accidents and injured victims have been declined in 2016 by 4.1 percent and 1.1 percent respectively. That is on an average 55 accidents and 17 deaths every hour have occurred on Indian roads<sup>(4)</sup>. The number of road accidents relative to population, registered vehicles and road length are on a general declining trend from 2010, but the number of persons killed per lakh population has not undergone similar decline in recent years, but hiked to 11.9 in 2016, after an initial decline from 11.8 in 2011 to 11.2 in 2013<sup>(5)</sup>. It is projected that road traffic related injuries will surge to the third position by the year 2020 among the leading cause of world's disease burden. In order to cope up with this growing issue, there have been actions taken by countries internationally to implement road safety rules by The Decade of Action for Road Safety (2011–2020). The Sustainable Developmental Goals targets, to reduce the road traffic crashes and its related injuries to half by the year 2020<sup>(6)(7)</sup>.

**RTA- Tamilnadu Scenario:** In Tamil Nadu, the number of road traffic accidents and its related death and injuries has been in a constant rise. According to road statistics data from the Tamil Nadu State Transport Department have shown that, road traffic accidents in State have been doubled in 2016 comparatively to the year 2000. The total number of accidents in 2000 was 48923 and in 2016 it raised up to 71431<sup>(8)</sup>.

**RTA - Kerala Scenario:** In Kerala, the number of road traffic related death and injuries have been in a constant rise. Out of 4, 34,814 road accidents in India for the year 2015, 39,014 road accidents have occurred in the state of Kerala (which was contributing 7.8 percent out of total share of 86.7 percent of road traffic accidents among the top 13 states in India)<sup>(4)(9)</sup>. Out of total persons injured in road traffic crash (44108), 43253 road traffic injuries have occurred due, to the fault of the driver while driving the vehicle. Among the vehicles, two-wheelers have been reported to be the major cause of road traffic accidents among all other vehicles. As many as 1474 fatal cases were reported in the year 2016 due to two-wheeler.<sup>(9)(10)</sup>

**Comparison between Kerala and Tamil Nadu- Overview:** Among, top thirteen states in India, Tamil

Nadu ranks first, with 71431 accidents (which was 14.9 percent out of 86.5 percent of total number of road accidents reported) and Kerala ranks fifth in the list with 39420 accidents (which was 8.2 percent out of 86.5 percent of total number of road accidents reported)<sup>(8)(9)</sup>. A comparison of states unfolds that, top 13 states accounted for 83.7 percent of share in road traffic fatalities in India during the year 2016, of which Kerala did not happen to appear in the top 13 list for road traffic fatalities accounting for 4287 out of 1,26,159 total fatal cases in India. But, Tamil Nadu ranked 2<sup>nd</sup> with 19320 fatal accidents among the total fatal accidents reported in India<sup>(8)(9)</sup>. According to the severity of accidents between the cities of Kerala and Tamil Nadu, Madurai is a district in Tamil Nadu, that has a high severity index of 23.5, followed by Thiruchrapalli with 21.9, Coimbatore with 21.3 and Chennai has severity index of 15.8. In Kerala the severity of accidents in almost all the districts were minimal compared to Tamil Nadu [with the maximum severity of accident being reported in Kollam, Kerala (12.3)]<sup>(8)(9)(4)</sup>

**Chart I Injury Rates (Per 10,00,000 Population) in Tamil Nadu and Kerala between 2014-2015 And 2015-2016:** If we look into the road accidents statistics data from state transport department, which consisted of data on total number of injured persons and number of vehicle population, we were able to derive at the injury rate for both Tamil Nadu and Kerala. With the data on injury rate for a period of two years, Tamil Nadu has almost a constant injury rate within a period of two years, whereas Kerala has a sudden hike in injury rate to 33.8 (2015 -16) although the number of registered vehicle for the state was less comparatively to the previous year (2014 – 2015).

**Type of Vehicle Involved in Road Traffic Accidents between two States - Comparison:** By comparing the two states on the basis of vehicular category, total no of accidents inclusive of all categories of vehicles, Tamil Nadu ranked first among the two states with a total number of 71,431 and Kerala with 44,108 and among which **two wheelers topping** the list in both the states<sup>(8)(9)</sup>. In Tamil Nadu the total no of accidents recorded by **two – wheelers** according to the calendar year 2016 was 27,815 which was nearly two times higher comparatively to the accidents caused by two-wheelers in Kerala, which was reported to be 14,849. Followed by two wheelers, car/jeeps/taxi led to road traffic crashes, with Tamil Nadu having 19,797 car/jeep/taxi crashes which was almost 9 times more

compared to Kerala, were in the number of accidents by car/jeep/taxi was recorded to be 10,975<sup>(8)(9)</sup>.

**Chart II Percentage Comparison on No of persons killed by two-wheeler (PER 100 Vehicles) during the year 2016:** From figure 2, the total number of persons killed in the accident per 100 two wheelers in India is 27.3 percent (40779), of which Tamil Nadu records 12 percent of person killed in accidents per 100 two wheelers (4961) and in Kerala per 100 two wheelers 3 percent were killed (1280). Compared to Kerala, persons killed per 100 two wheelers is 4 times more in Tamil Nadu.

**Type of Road Involved In Road Traffic Accidents between Two States - Comparison:** Over the years only marginal changes have happened in terms of percentage share in number of road accidents and number of persons killed within various categories of roads. The share of **National Highways** was always been high in all the three parameters (total no. of accidents, number of persons killed and in no of persons injured)<sup>(4)</sup>. The total number of accidents occurred in National Highway in India is reported to be 29.6 percent out of which Tamil Nadu accounted for 15.8 percent (i.e. 22,573) of total accidents in National highway which was almost 9 percent more when compared to Kerala which was reported to be 6.4 percent (i.e., 9,209)<sup>(8)(9)</sup>. The number of accidents reported in State highway in India was 25.3 percent, out of which Tamil Nadu accounted for 19.2 percent of accidents in State Highway, which was almost 4 times more when compared to accidents reported in Kerala (5.8 percent), 2016<sup>(8)(9)</sup>.

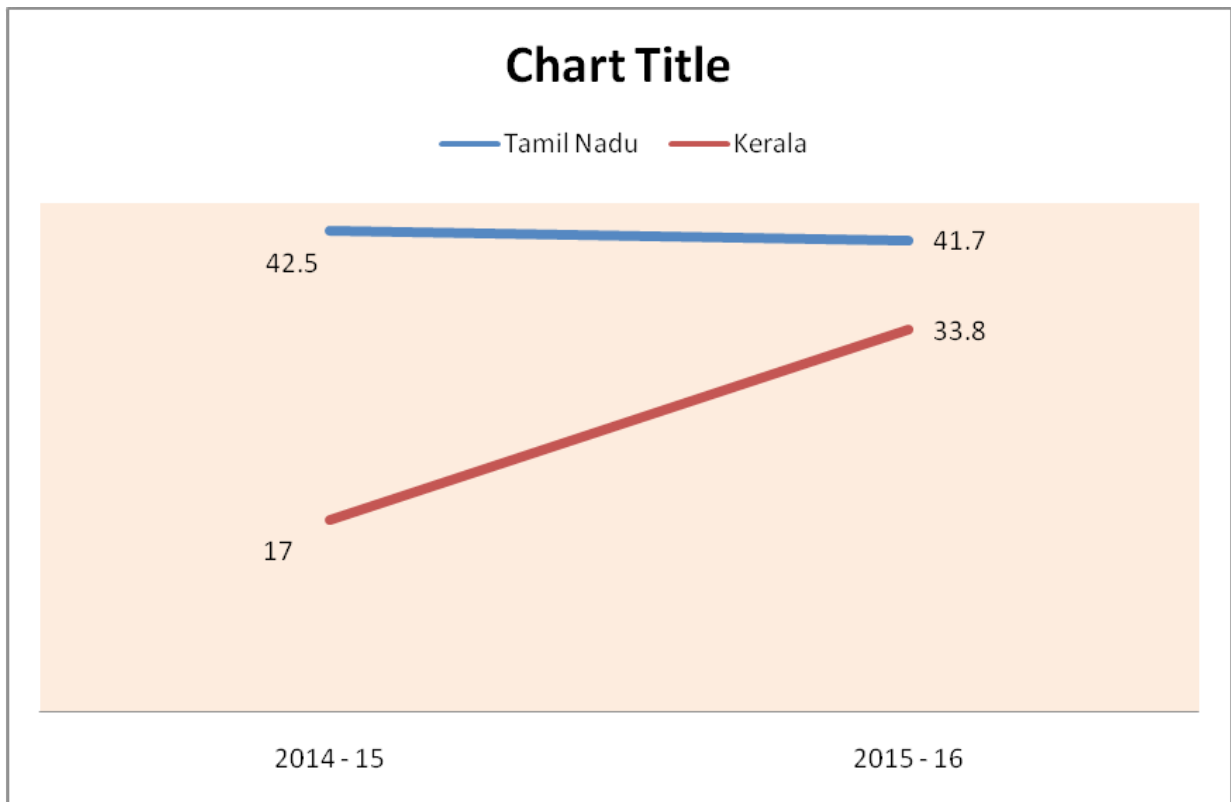
**Chart III Percentage Comparison on No of persons killed based on the road type during the year 2016:** From figure 3, Tamil Nadu has a surge in total persons killed in fatal accidents among all the three types of roads compared to Kerala for the year 2016. (These percentages are obtained by taking total number of persons killed in respective Indian roads in the denominator)

**Cause Wise Comparison between the States:** Road accidents are multi-causal<sup>(4)</sup>. Based on the data

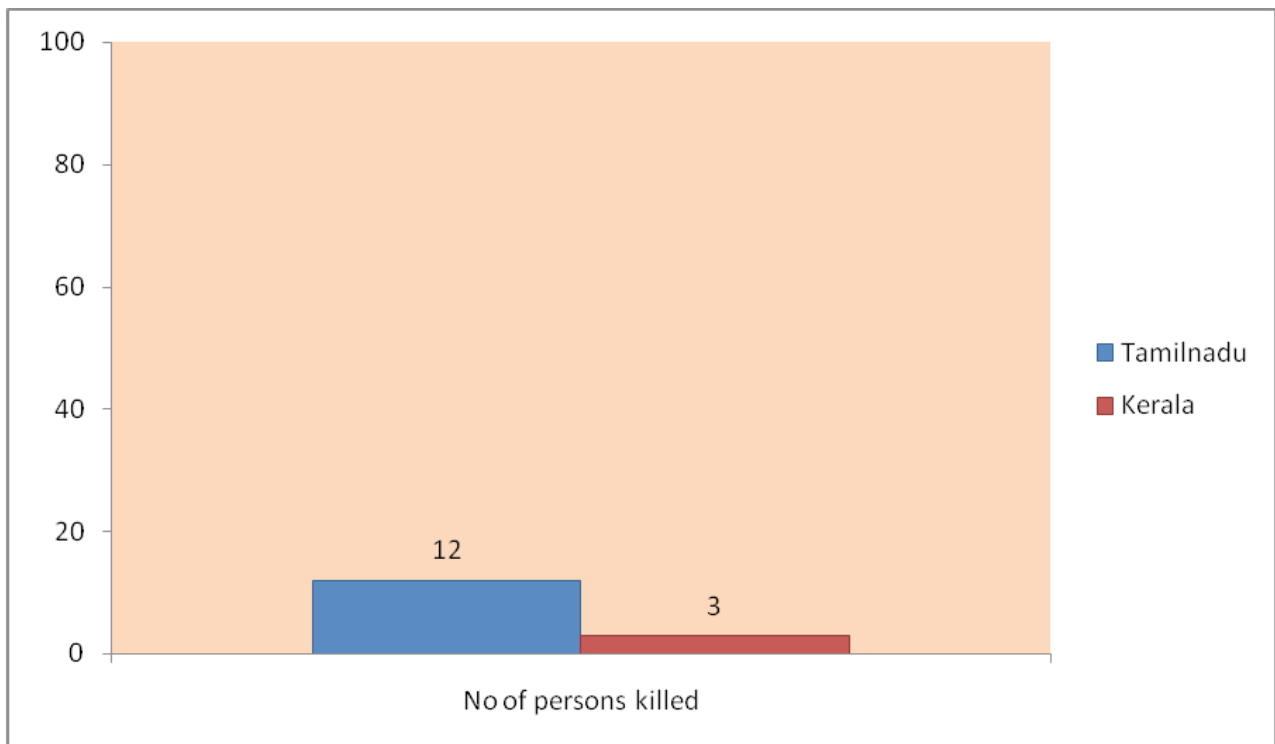
reporting system, the factors responsible for accident are reported on the basis of subjective judgment. The fatal accidents have been reported to be 84 percent (4,03,598) due to the fault of the driver driving the motor vehicle in India for the calendar year 2016. The major cause of accidents in Tamil Nadu and Kerala was due to the fault of the driver and in Tamil Nadu the second most cause of accident was due to fault of the passenger other than driver whereas in Kerala the second most cause was due to other conditions that has led to accidents<sup>(4)</sup>. Total number of accidents due to drivers fault in Tamil Nadu was reported to be 67,683 of which 15,031 were fatal accidents. Among fatal accident, 16,101 persons were killed. In Kerala, 38,189 total accidents were due to drivers fault, of which 3,457 was fatal accidents and 3,659 people were killed in fatal accident for the year 2016<sup>(4)(8)(9)</sup>. On comparison basis, 80.3 percent of people were reported to be killed in fatal accident due to drivers fault in 2016, in which Tamil Nadu had 13.2 percent of person killed, which was almost 4 percent more than Kerala for the year 2016<sup>(4)</sup>.

**Chart IV Percentage Comparison on total no of persons killed in Tamil Nadu and Kerala based on non-adherence of traffic rules:** From figure 4, Tamil Nadu has maximum number of total persons killed in accidents, exceeding lawful speed and in driving in wrong side compared to Kerala for the year 2016. (These percentages are obtained by taking total number of persons killed due to non-adherence of rules in India, has denominator).

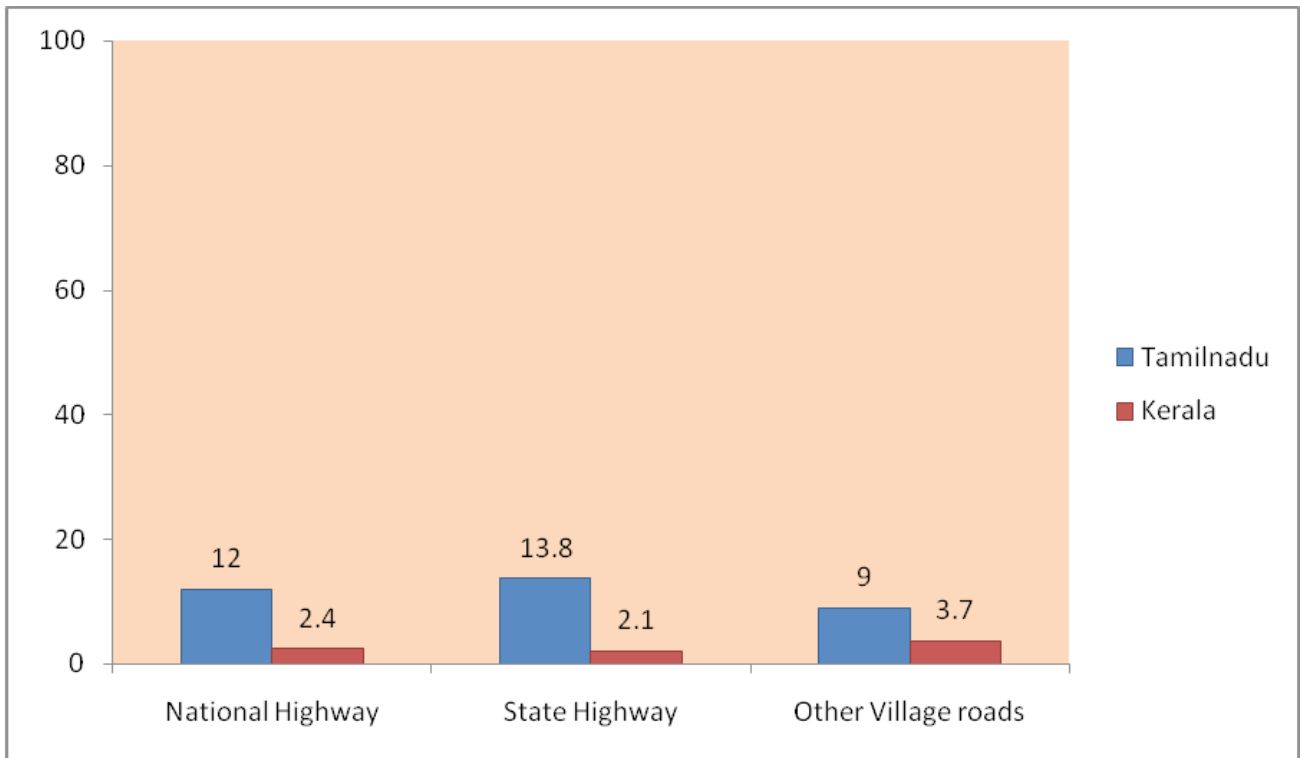
**Chart V Percentage Comparison on No. of persons killed due to Non – Use of Safety Device between two states in 2016:** From figure 5, Tamil Nadu has maximum persons killed in accidents among non-use of safety device compared to Kerala for the year 2016. Number of persons killed in Tamil Nadu due to non – wearing of helmet is 11 percent more than in Kerala and the number of persons killed in Tamil Nadu due to non – wearing of seatbelt is 5 percent more than in Kerala (These percentages are obtained by taking total number of persons killed due to non-use of safety device in India, has denominator).



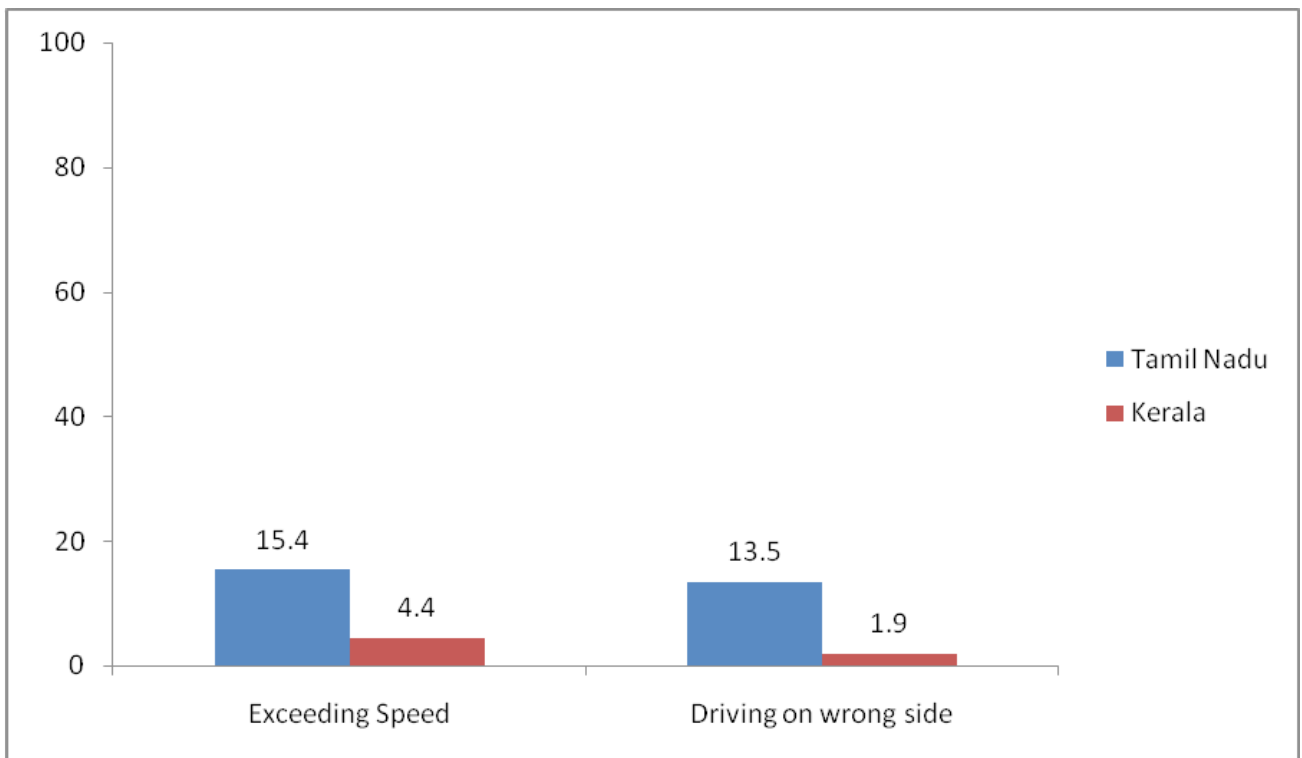
**Chart I: Injury Rates (Per 10,00,000 Population) in Tamil Nadu and Kerala between 2014-2015 and 2015-2016**



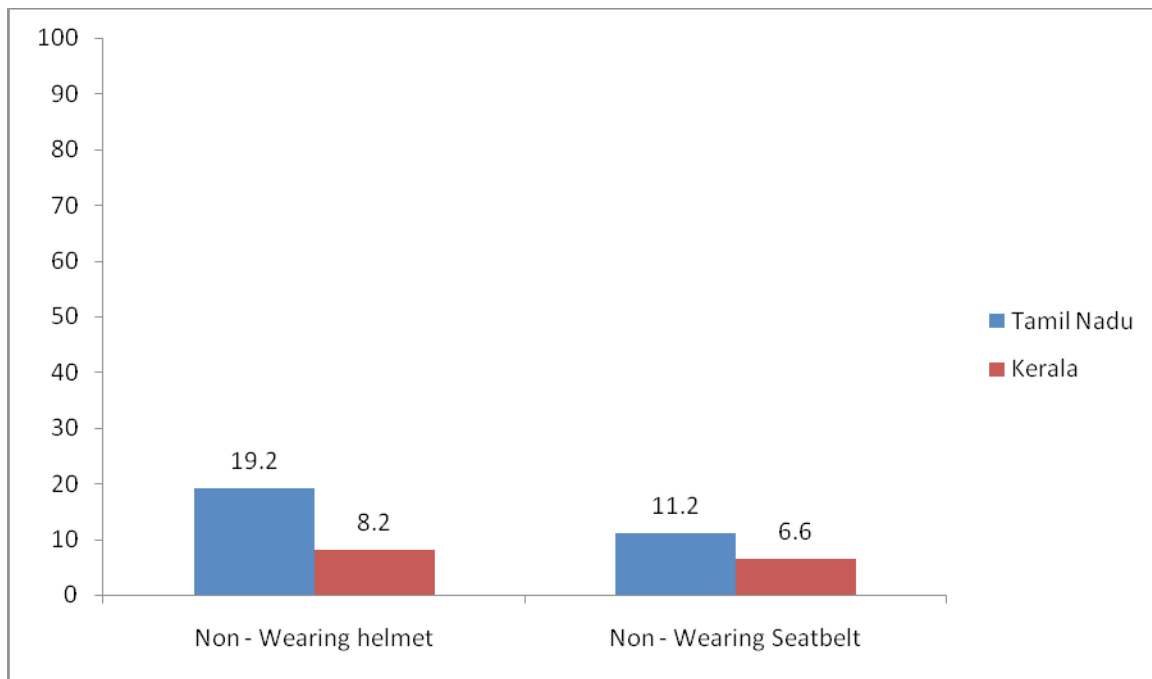
**Chart II: Percentage Comparison on No of persons killed by two-wheeler (Per 100 Vehicles) during the year 2016**



**Chart III: Percentage Comparison on No of persons killed based on the road type during the year 2016**



**Chart IV: Percentage Comparison on total no of persons killed in Tamil Nadu and Kerala based on non-adherence of traffic rules**



**Chart V: Percentage Comparison on No. of persons killed due to Non – Use of Safety Device between two states in 2016**

### Discussion

The mounting toll of road accidents, with increase in fatalities compared to previous years in India, especially in Tamil Nadu is in surge, which puts forth to continue the studies and research on road accidents and its preventive measures, which is an urgent matter. The global transport and road system will continue to develop and will undergo changes in the next 20 to 30 years, due to globalization, urbanization and declining natural resources<sup>(11)</sup>. Preventive measures are indeed a requirement to mitigate the growing incidence of accidents and also to condense the growing epidemic of mortalities and morbidities due to road traffic accidents.<sup>(12)</sup> The statistics projected in this study shows only the fatalities occurred at the scene of the accident and not the delayed mortality, since the data regarding the same is not available. In order to cut down these figures, care must be concentrated on the accident victim from the accident spot to the emergency ward and the ambulance must be provided with modern equipment for a better chance of survival. Regional services should also be made available. A study led by Dr.S.Krishnan et al, have portrayed that road users behavior has been found to be the primary reason for the accidents in 70 to 90 per cent of cases.<sup>(13)</sup> Another study conducted by Alagappan Meyyappan et al, in Chennai city, out of 1835 trauma

victims, 1806(98.4%) were due to road traffic accidents, of which two-wheelers accounted for 66.4 per cent and four-wheelers accounted for 21.6 per cent<sup>(14)</sup>. Education of public, regarding the road traffic rules and regulations has to be strictly enforced. Causative factor, that could be eliminated is poor road system and also the lack of yearly inspection of the vehicle, is another aspect that has to be given attention, as the old and the disused vehicles are more likely to cause injuries on their passengers. There cannot be enough emphasis placed immediately on the need for these measures to control and mitigate the mortality, morbidity and disability related to morbidity and damage to the property and the person(his/her family) who are indirectly getting affected due to the Road Traffic Accidents. Need for these actions becomes more apparent, when we realize the victims mostly affected are young age group, a fact that has to be stressed and given attention.

### Conclusion

Though India constitutes around 1 percent of the vehicle population in the world, the percentage of road traffic fatalities from India is nearly 10 percent. There have been many initiatives taken by the Government of India to save the precious life of citizens by creating “safer roads for everyone”, Tamil Nadu Government

with a vision to prevent and reverse the increasing trend in the number of accidents, number of deaths, number of injuries through adoption of comprehensive measures and by providing Road Safety policy covering Engineering, Education, Emergency care and execution of social control. On the other hand stern measures, intelligent enforcement and sustained efforts of law have quite helped the state of Kerala to reduce the road traffic accident related injuries and death comparatively to Tamil Nadu to an extent. From this it is indicated that, although there is Road traffic safety measures and funds, Emergency Accident Relief Centers and Compensations to Road Accident Victims, there is a lack of proactive measures to stop this modern epidemic of motor vehicle trauma amidst Globalization and thereby increased vehicular movements.

**Conflict of Interest:** No conflict of interest

**Source of Funding:** Self-funding

**Ethical Clearance:** Taken from Institutional ethical committee of SRM School of Public Health, Kattankulathur, Tamilnadu.

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# Evaluation of Effective Dose and Associated Radiation Risks in Common Computed Tomography Procedures

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## Abstract

**Background:** The radiation exposure associated with CT is known to be significantly higher compared to the conventional x-rays. The objective of this study was to estimate the radiation dose and related risks for five common CT procedures in clinical setting.

**Materials and Method:** The study included 150 patients referred for CT brain, cerebral angiography, neck, thorax, abdomen & pelvis. The scan was performed using a 64 slice Philips Brilliance. “Dose length product” was used to estimate “effective dose” using specific “conversion factors”. The lifetime attributable risk of cancer was determined using a formula adapted from the phase 2 BEIR VII report.

**Results:** The results depicted that the mean effective dose varied substantially for various CT procedures. The “effective dose” ranged from 2.19 mSv for CT brain to 11mSv for CT abdomen and pelvis. An estimated incidence of cancer due to each procedure was found to be 1 in 5618 for CT Brain, 1 in 4315 for CT Neck, 1 in 2.084 in CT Cerebral angiogram, 1 in 1773 patients for CT Chest and 1 in 1086 patients for CT Abdomen

**Conclusion:** Radiation doses for certain CT procedures were found to be higher than generally quoted thereby increasing the risk. Therefore there is a need for optimization of CT protocols.

**Keywords:** *Computed tomography, effective dose, Dose length product, Radiation risk.*

## Introduction

One of the most important advances in medicine is the invention of Computed tomography as it plays a significant role in diagnostic radiology. An estimate of more than 62 million CT scans takes place in a year in the United States<sup>(1)</sup>. However, the diagnostic power of computed tomography is always at the price of radiation dose to the patient. X-rays are low LET ionising

radiation and are considered a carcinogen according to the World Health Organization<sup>(2)</sup>. Depending on the length of time from the moment of irradiation to the first appearance of symptoms they are classified as early and late effects of radiation. Early effects of radiation are called non-stochastic or deterministic effect as their severity increases with increasing absorbed dose<sup>(3)</sup>. Stochastic effects of radiation are late effects of radiation that can cause somatic stochastic and genetic damage. Genetic effects are the biological damages to the future generations<sup>(4)</sup>. Although the individual radiation risk for adults are generally low for low LET radiation, the concern over CT risk is due to the greater usage of CT. These smaller individual risks if put in to an increasingly larger population can be a cause a potential public health issue in the near future<sup>(5)</sup>. The “national academy of sciences” have detailedly assessed the biological and epidemiological data to health risks from ionising radiation and published the “Biological effects of ionising

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radiation report VII (BEIR VII) for risk estimates for cancer and other health effects from exposure to low-level ionising radiation<sup>(6)</sup>. The BEIR VII focuses on health effects from low LET radiations including x-rays and gamma rays. The main objective of “BEIR VII” was to create various risk models for estimating the risk that an exposed individual will develop cancer. The “BEIR VII” risk model predicts that approximately one individual in 100 persons would develop cancer from a dose of 100mSv however; lower doses would produce proportionally lower risks. Although individual radiation risks are small, the increasingly large number of people exposed to high exposure per examination can lead to many cases of radiation induced cancer<sup>(7)</sup>. Therefore the study aims to estimate the effective dose among patients referred for common CT procedures and use this specifics to estimate the “lifetime attributable risk of cancer” related with these procedures.

### Method

On approval from the institutional ethics committee, the prospective study included 150 patients referred for CT brain, cerebral angiography, neck, thorax, abdomen & pelvis. Only patients within the normal BMI category of 18.5-24.9 were included for CT chest and abdomen. Patients with a history of trauma or any indications for testicular pathologies were excluded. CT scans were performed using a 64-slice, Philips Brilliance multi-detector computer tomography.

The scan was performed using the routine CT protocol as shown in Table 1. The “dose-length product” for each series was collected from the dose information displayed on CT monitor and the product of “DLP” and specific “conversion factors” was used to estimate the effective dose as given in Table 2.<sup>(8-9)</sup>

The “lifetime attributable risk of cancer” incidence was estimated from an equivalent dose of 0.1 Gy using a report on the health risks from exposure to ionising radiation adapted from the phase 2 Table 12D-1 of BEIR report VII<sup>(6, 10)</sup>. The formula for calculating the LAR is given in equation 1<sup>[10]</sup> as follows:

$$\text{“LAR” at an age} = \frac{\text{ED (mSv)} \times \text{LAR (cancer incidence) at the age} \times 100 \%}{D \times 100000} \quad (1)$$

Where D is equivalent 0.1 Gy.

The radiation risk estimates are based on a single radiation exposure and the age of the patient at the time of exposure. The cancer related risks for each procedure

was estimated and compared for males and females.

By using descriptive statistical analysis, the mean effective dose for each procedure was calculated for both males and females. All continuous variables were summarized using mean and standard deviation and is represented as Mean ± SD. “One –way annova” was used to compare effective doses for each procedure.

### Results

The results showed that there was a clinically significant difference in “mean effective dose” for various CT studies, however there was no statistical significant difference (p=0.3602). The “mean effective dose” ranged from 2.1 mSv for CT brain to 11mSv for CT abdomen and pelvis as shown in table 3. Although we included a single sequence for each procedure, studies like CT abdomen and chest showed a high effective dose within each anatomic area. For abdomen scans, the “effective dose” differed from 7.37 “mSv” to 15.75” mSv”, whereas for the scans of the chest the “effective dose” ranged from 5.48 “mSv” to 10.15 “mSv”. However, CT brain (2mSv -2.3mSv) did not show a wide variation in effective dose.

Among the various CT procedures, CT abdomen has the highest mean effective dose of 11.3±2.3 mSv, followed by CT Chest with a “mean effective dose” of 7.04±1.13 mSv. CT Cerebral angiogram and CT Neck reported “mean effective dose” of 5.21±0.72 mSv & 2.96±0.67 mSv. The least “mean effective dose” of 2.19±0.13 mSv was recorded in CT Brain [Figure 1].

The mean radiation risk indicates the probability of incidence of cancer due to one exposure to each procedure. The results showed that the highest contributor to the radiation induced risk was for CT Abdomen followed by CT chest where the possibility of developing cancer would be 1 in 1442 and 1 in 2675 respectively. CT Cerebral angiogram also showed a significant share in radiation induced cancer with an estimated risk of 1 in 4355. CT brain and CT neck showed the least probability for the incidence of cancer with an estimated risk of 1 in 9079 and 1 in 6451 respectively.

The study also showed a variation in associated risk among males and females for the same procedure. In the present study, CT Abdomen showed the highest probability of incidence of cancer with 6 in 10000 for males and 8.3 in 10000 for females whereas CT Brain showed the least probability of incidence of cancer with

1 in 10000 males and 1.3 in 10000 for females. The variation in associated risk was not only seen among gender but was found to be decreasing with age. Figure

2 depicts the radiation induced cancer risk for male and female for five common CT procedures.

**Table 1. Routine protocols for CT brain, neck and thorax, cerebral angiogram abdomen & pelvis**

Parameters	Brain	Neck	Thorax	Cerebral Angio	Abdomen & Pelvis
Field of view	250	250	350	220	350
Area coverage	Base of skull-vertex	Base of skull-Sterno clavicular joint	Apex of Lung – Domes of diaphragm	Arch of aorta - Vertex	Domes of diaphragm-Symphysis pubis
“kVp”	120	120	120	120	120
“mA”	135	400	360	280	390
“mAs”	300	250	250	300	250
Slice thickness	5mm	0.9mm	5mm	0.9mm	5mm
Increment	5mm	0.45mm	5mm	0.45mm	5mm
Rotation time	1.5 sec	“0.75 sec”	“0.75 sec”	“0.75 sec”	“0.75 sec”

**Table 2. Normalized values for effective dose per dose length product for various part of the body [8-9]**

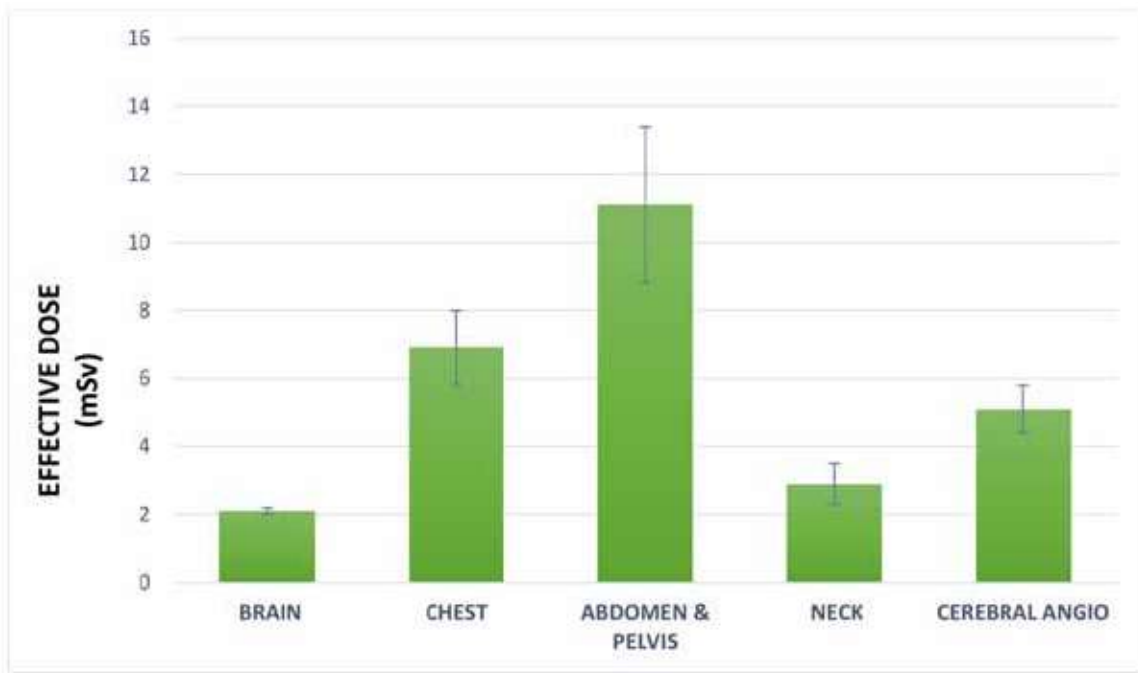
Region of the Body	Conversion Factor (k)
Brain	0.0022
Neck	0.0054
Thorax	0.018
Abdomen	0.018
Head and neck	0.00345

**Table 3. Mean effective dose, Mean dose length product along with mean scan length for various CT studies across gender**

Procedure	n	“Mean Scan length” (mm)	“Mean DLP” (mGy*cm)	“Mean Effective Dose (mSv)”
CT Brain	M 20	212.2 ± 21	988.5±45.5	2.1 ± 0.1
	F 10	217.0±17	993.7±91	2.1±0.2
CT Chest	M 19	379.3 ± 30	391.6±67	6.7±1.2
	F 11	375.6±28	378.8±59.7	6.3±1.0
CT Abdomen	M 15	432.2 ± 36	596.2±133.2	10.7±2.3
	F 15	475±31	646.5±122.6	11.6±2.2
CT Neck	M 19	321.8 ± 23.1	567.4±126.8	3.0±0.6
	F 11	306.7±22	524.9±117.4	2.8±0.6
CT Cerebral Angiogram	M 20	342 ± 18	1513.4±291.4	5.2±0.7
	F 10	331±15	1488.7 ±178	5.1±0.6

**Table 4. Comparison of “Mean DLP” [mGy.cm] and “mean effective dose” “[mSv]” for common procedures in the present study with various data reported in the literature.**

Studies	Brain		Neck		Chest		Abdomen & pelvis		Cerebral Angiogram	
	E D	DLP	E D	DLP	E D	DLP	E D	DLP	E D	DLP
Rebecca et al [11]	2.1	-	2.1	-	8.2	-	15	-	14	-
Rachel et al [12]	-	1207.8	-	521.6	-	418.6	-	564.5	-	734.5
Mc Collough [13]	2	-	-	-	7	-	-	-	-	-
ICRP103 [15]	1.7	-	3	-	7	-	-	-	-	-
Present study	2.19	995.4	2.96	584.1	7.04	391.1	11.29	627.2	5.21	1510



**Figure 1. Bar diagram showing the mean effective dose for five common CT procedures. Error bar represents the standard deviation**

### Discussion

The frequency of number of CTs has increased drastically over last two decades which points out towards the high radiation dose delivered and its associated risk<sup>(11)</sup>. It is therefore essential to know how such risks change with age, sex, physical characteristics, and “radiation exposure”.

The results of the present study were found to be similar to a study conducted by Rebecca Smith et al<sup>(11)</sup> as depicted in Table 4. However, the “effective dose” for CT cerebral angiography and Abdomen was found to be lower in the present study. Rachel et al. conducted a similar study for 34 CT protocols and reported a higher mean DLP for CT brain and thorax compared to the present study<sup>(12)</sup>. However, the current study also reported a higher dose for CT abdomen and cerebral angiogram. The variations observed in the DLPs of the procedure could be due to several factors such as differences in the pre-set technical factors and the area coverage for the scan. The body compositions of subjects in studies also determine the DLP and effective dose. The “effective dose” for diagnostic CT procedures are typically estimated to be in a range of 1-10 mSv according to U.S food and drug administration where CT brain and chest has an “effective dose” of 2 and 7

mSv respectively. These were found to be similar to the present study<sup>(13-14)</sup>. Similarly the ICRP also shows typical doses of 1.7 mSv, 3 mSv and 7 mSv for CT Brain, neck and thorax respectively<sup>(15)</sup> as shown in table 5. The present study agrees with the most of the study reported in the literature where CT brain showed the least effective dose and CT abdomen showed the highest effective dose

One similar study conducted by Amy Berrington et al.<sup>(7)</sup> also showed that CT abdomen had the highest risk with a 10 in 10000 probability for incidence of cancer for both males and females. On the other hand CT Brain showed the least risk where the likelihood of incidence of cancer was found to be 3 in 10000 for males and 2 in 10000 for females. Another study conducted by Rebecca et al<sup>(11)</sup> showed the least probability of radiation induced cancer for CT brain with 1 in 7350 for males and 1 in 8100 for females whereas CT Abdomen showed the highest probability of radiation induced cancer with 1 in 660 for males and 1 in 930 for females.

It was also observed that females had a higher risk of incidence of cancer compared to males. The difference was observed in Abdomen (0.04%), Chest (0.018%) and cerebral angiogram (0.015%).

For CT Chest and CT Cerebral angiogram additional risk of breast cancer can be the main reason for increased incidence of cancer in females. The higher lung cancer risk coefficients for females also contributes to this variation<sup>(7)</sup>. The radiation induced risk was also seen increasing as the age decreased. This could be due to the increased sensitivity of growing and developing tissues and organs. Second, the carcinogenic effect of radiation may have a long latent period according to the type of the malignancy. So as the lifetime increases the period for incidence of cancer also increases<sup>(16)</sup>. Therefore, there is a need for optimizing the protocols. Using age/weight and indication specific protocols can also help in reducing the radiation dose<sup>(17)</sup>.

The risk estimated in the present study was adapted from BEIR VII phase 2 report. However, this data focuses on estimating the radiation risk from low LET radiations assuming that the model for calculating risk is a linear no threshold model. Also, the statistics of risk estimated in the present study are merely averages as they do not take into consideration the previous history of radiation exposure and various predisposing factors. Therefore further epidemiological studies can be done to study the radiation effects from exposure to CT scans.

### Conclusion

The study concluded that the radiation doses for certain CT procedures like CT thorax and CT abdomen were found to be higher than generally quoted thereby increasing the risk. It was observed that among the various CT procedures, CT Abdomen showed the highest effective dose. Therefore there is a need for optimisation of CT protocols

**Conflict of Interest:** Nil

**Funding:** No external funds used. All resources required to do the research was provided by the institute itself.

**Ethical Clearance:**

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# A Correlative Study to Assess the Knowledge and Practice of Housewives Regarding Householdwaste Management in Selected Rural Community at Mangalore with a View to Provide an Information Pamphlet

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## Abstract

**Background:** Improper waste management deteriorates public health, degrades quality of life, and pollutes local air, water and land resources. It also causes global warming and climate change and impacts the entire planet. Environmental problem faced by communities living near garbage dumps and marshy lands include air pollution, fires, smoke, flooding etc. Long term health problems like asthma, bronchitis, hepatitis, jaundice, malaria, elephantiasis and typhoid too have been faced by communities. So waste which are considered to be hazardous need to be disposed off safely and adequately.

**Materials and Method:** A descriptive correlative research design was used for this study. The sample comprised of 60 housewives between 18-55 years of age. The sample was drawn through purposive sampling technique. The study was carried out in rural community at Mangalore. A structured knowledge questionnaire was used to determine the knowledge of the subjects and practice rating scale was administered to assess the practice scores of housewives regarding household waste management.

**Results:** Majority of the subjects (65%) were having only average knowledge with knowledge score ranging between 0-20 with median 18 and SD 3.01 and majority of the subjects were have moderate practice score on waste management with median 20 and SD 3.52. There was a significant relationship between knowledge score and practice score of the subjects on waste management ( $r=0.346$ ,  $df=59.000$ ,  $p<0.05$ ). **Conclusion:** The findings of this study suggest that there is a need for educating the mothers regarding the proper household waste management. Women take a key role in housekeeping and disposing domestic waste. So the Government and frontline health workers need to take special initiatives to curb this public issue.

**Keywords:** Knowledge; practice; waste management; housewives; information pamphlet.

## Introduction

Waste is a material that no longer serves a purpose and so is thrown away<sup>(1)</sup>. In somecases what one person discards may be re-used by someone else<sup>(2)</sup>. All wastes are particularly hazardous<sup>(3)</sup>. Improper disposal of wastes causes negative impact on the environment, whether it is unsightly litter in urban streets or contaminated air, soil or water<sup>(4)</sup>. This improper waste disposal can affect the life negatively by creating an

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environment that is potent for developing diseases in man as well as other living things. Toxic waste can seep into the ground and contaminate our water supplies, and sometimes cause widespread diseases. Due to uncollected waste and improper disposal techniques drains also get clogged which lead to mosquitoes by which various diseases like malaria, chikungunya, viral fever, dengue etc. arise and affect the health of people adversely<sup>(4,5)</sup>. The output of daily waste depends upon the dietary habits, lifestyles, living standards, and the degree of urbanization and industrialization<sup>(6)</sup>. In India we produce 300 to 400 Gms of solid waste per person per day in town of Normal size but exceptionally about 500 to 800gms of solid waste is generated per capita per day in metro cities like Delhi and Bombay<sup>(7)</sup>. The total population of Karnataka as per 2011 census is 5.273 core (52.73), Urban 33.98% and rural 66.01%. In Karnataka the waste quantities are estimated to increase from 46 million tons in 2001 to 65 million tons in 2015<sup>(7,6)</sup>. In a day-to-day life many people are unaware of the proper domestic waste disposal and its harmful effects on the health and environment<sup>(8)</sup>. Community based education, especially in women, on household waste management and hygiene is essential in order to improve the health of the community<sup>(9)</sup>.

**Aim:** The aim of this study is to assess the knowledge and practice of housewives regarding household waste management in a selected rural community at Mangalore with the view to provide an information pamphlet.

#### Objectives of the Study:

1. To determine the level of knowledge regarding household waste management among housewives as measured by a structured knowledge questionnaire.
2. To identify the practice of housewives on household waste management as measured by a practice rating scale.
3. To find the relationship of knowledge and practice scores of housewives on household waste management.
4. To find the association of knowledge scores of housewife on household waste management with the selected demographic variables.
5. To find the association of practice scores of housewife on household waste management with the selected demographic variables.

## Materials and Method

**Study setting and sample size:** A descriptive correlative research design was used for this study. The sample comprised of 60 housewives between 18-55 years of age. The samples were selected by purposive sampling technique. The study was carried out in rural community at Mangalore, India. A structured knowledge questionnaire was used to determine the knowledge of the subjects with 34 knowledge items with the maximum score of 34 to assess the knowledge of housewives regarding household waste management. and practice rating scale was administered to assess the practice scores of housewives regarding household waste management with 17 statements with three point scale i.e. always, sometimes and never. The statements were scored 2, 1, 0 respectively. The maximum possible score is 34. In order to educate the housewives on this regard the investigator has developed and distributed an information pamphlet to all subjects after collecting the data.

**Data Analysis:** The data was collected after obtaining prior permission from the concerned authority to conduct the study. The participants were assured about the confidentiality of their responses. The data was analyzed in terms of objectives of the study using both descriptive and inferential statistics. The data obtained was plotted in the master sheet.

#### Findings:

### Results

#### Section I. Description of baseline Proforma

- Maximum number of subjects (38.3%) were in the age group of 30-39 yrs.
- Maximum number of subjects (48.3%) were Muslims
- Most of the subjects (40%) have primary education
- Most of the subjects (45%) belong to nuclear family
- Majority of the subjects (40%) had monthly income of 4001-6000
- Most of the subjects (41.7%) received information from Magazines/Newspapers.



**Section II: Knowledge score obtained by the subjects regarding household waste management.**

- Majority of the subjects (65%) have average knowledge, 33.3% of subjects have good knowledge and only 1.7% of them have excellent knowledge regarding house hold waste management. This shows that majority of the subjects (65%) have only average knowledge regarding house hold waste management. (figure-1)

**Section III: Practice score of subjects regarding household waste management**

- Out of 60 housewives, 80% housewives had average disposal practices, 20% had good practices on disposal of house hold waste management. (Table-1).

**Section IV: Correlation relationship between knowledge and practice scores of subjects regarding household waste management**

- There is a moderate positive correlation between the knowledge and practice score ( $r = -0.346$ ,  $df=58$ , table value=0.236). (Table-2)

**Section V: Association between knowledge score and selected demographic variables.**

- There is no significant association between knowledge score with demographic variables except in religion and educational qualification.

**Section VI: Association between practice score and selected demographic variables**

- There is no association between practice score of subjects with demographic variables

**Discussion**

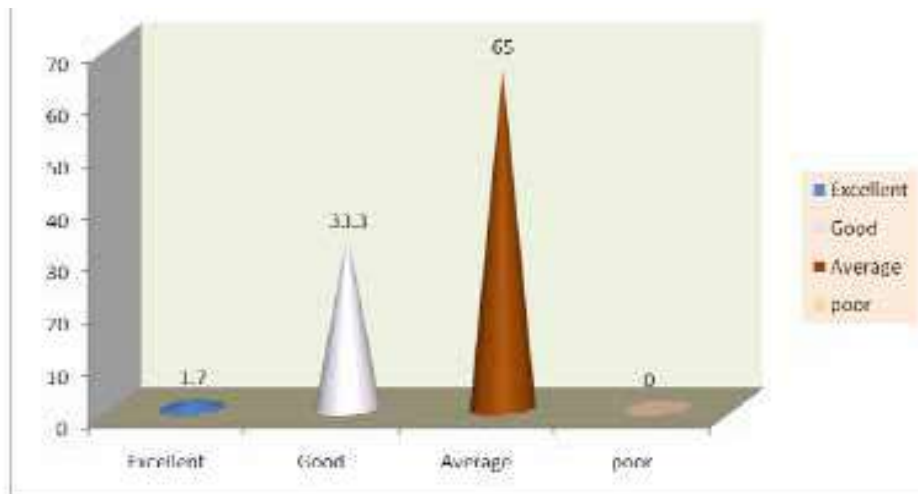
- The present study revealed that, majority of the subjects (65%) have average knowledge, 33.3% of subjects have good knowledge and only 1.7% of them have excellent knowledge regarding house hold waste management.
- Results obtained from this study consistent to the results reported in another study conducted by Arora L et al it was found that 162(54%) of the respondents could be classified as possessing low knowledge, whilst 138(46%) respondents were having medium level of knowledge regarding waste management <sup>(2)</sup>.
- In present study results revealed that out of 60 housewives, 80% housewives had average disposal practices, 20% had good practices on proper disposal of house hold waste management .

The findings of the study was similar the study conducted by John Jince V el al(2014) 75.1% had average practice, 24.9% had ppor practice and none of them had good practice regarding domestic waste management <sup>(13)</sup>.

There is moderate positive correlation between the knowledge and practice score ( $r = -0.346$ ,  $df=58$ , table value=0.236).

The findings of the study was similar the study conducted by John Jince V el al(2014) The study shows a positive correlation between knowledge and practice of housewives on management of domestic plastic waste ( $r=0.071$ )<sup>(13)</sup>

**Section II: Knowledge score obtained by the subjects regarding household waste management.**



**Figure 1: Cone diagram showing the distribution of subjects according to the grades of knowledge score.**

**Section III: Practice score of subjects regarding household waste management.**

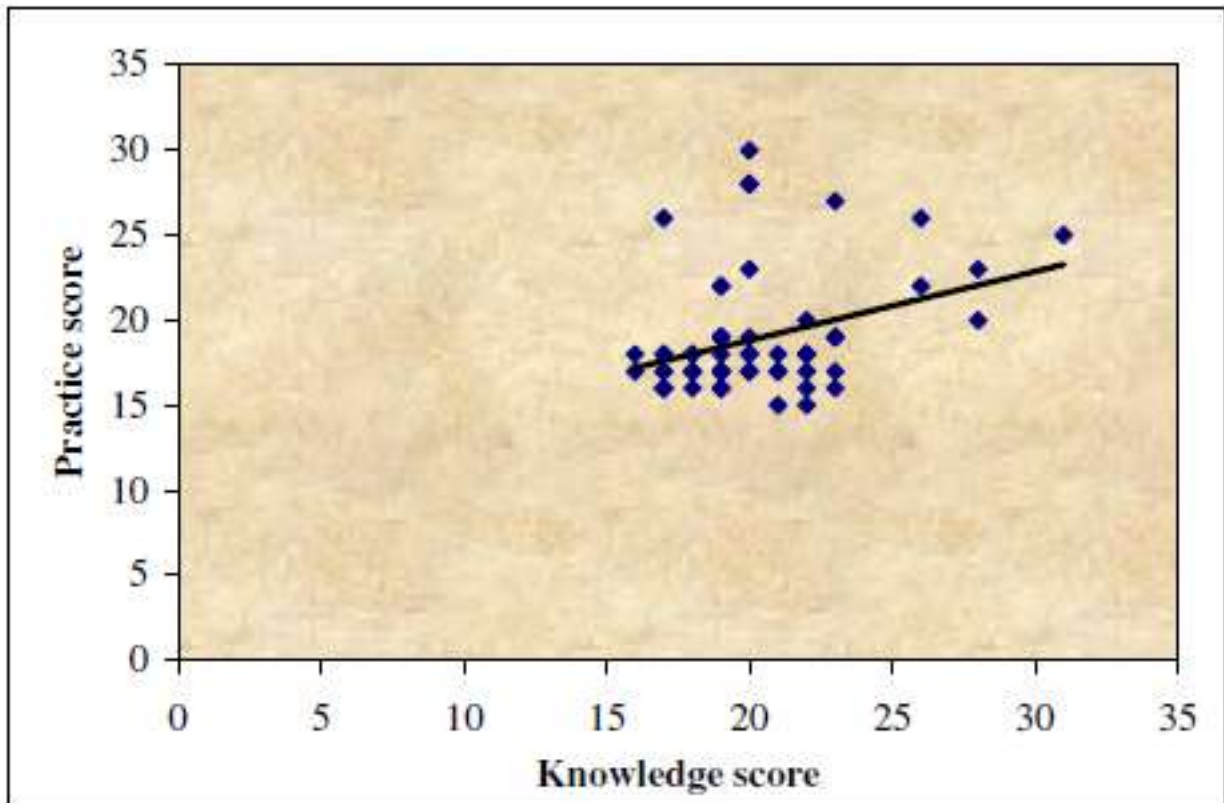
**Table 1: Distribution of practice score of subjects on household waste management in terms of frequency and percentage N-60**

Practice Score	Grade	Frequency	Percentage
23-34	Good	12	20
12 -20	Average	48	80
0-11	Poor	0	0

**Section IV: Table 2: Correlation between knowledge and practice of subjects on household waste management. N-60**

Variables	Max Score	Min Score	SD	r value	df	Inference
Knowledge	31	16	3.01	0.346	58	Significant
Practice	30	15	3.52			

r' = 0.346 at df = 58



**Figure 2: Scatter diagram showing the correlation between knowledge and practice scores of housewives regarding household waste management**

**Conclusion**

The findings of this study revealed that, majority of the subjects had only average knowledge regarding household waste management and the study suggest that there is a need for educating the mothers regarding the

proper waste disposal, since the women take a key role in housekeeping and disposing domestic waste. So the Government and frontline health workers need to take special initiatives to curb this public issue.

**Acknowledgement:** The investigator sincerely

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**Financial support and sponsorship:** Nil

**Conflicts of Interest:** There are no conflicts of interest

**Ethical Clearance:** Written informed consent was obtained from the housewives. Ethical clearance was obtained from institutional ethics committee of CHCT, Mangalore.

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# Role of the Internet in the Health-Seeking Behaviour of Parents of Children Under-Five During Fever

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## Abstract

**Introduction:** Internet has revolutionized the way the world accesses information and it is common for parents of young children to use the Internet to seek medical advice when their child is ill. There is very little data on how this influences the subsequent management of the illness. The aim of this study was to study the role of the Internet in the health-seeking behaviour of parents of under-five children during fever.

**Methodology:** 250 parents of children under five, with fever who presented to the Paediatric OPD were interviewed with a semi-structured questionnaire on their health-seeking behaviour and internet utilisation for health information. A semistructured questionnaire was used to interview the parents. Statistical analysis was done using SPSS version 16.0.

**Results:** 54.4% parents used the Internet for health information. 78.68% go through the first few sites shown by the search engine without knowing the name of the site or the credibility of the source. Internet-users were more likely to use a thermometer to record body temperature and know the temperature that denoted fever. There was no difference in the health seeking behaviour or initial action taken at home in the two groups. The positive health-care seeking behaviour of the mother was found to be related only to her education.

**Conclusion:** A large group of parents use the Internet for health information but do not know how to assess the credibility of the sources. Most parents used the information only to supplement the doctors' advice and not as a replacement.

**Keywords:** Health-seeking behaviour; Fever; Internet; Under-five.

## Introduction

Since its discovery in the early 1960s, the Internet has revolutionised the way the world accesses information<sup>[1]</sup>. 35% of India's population are Internet-users<sup>[2]</sup>. It is common for parents of young children to use the Internet to seek medical advice, before seeing a physician<sup>[3]</sup>. The Internet also helps parents collect additional information after a consultation, draw support from online forums and increase their awareness on alternative therapies<sup>[4]</sup>.

However, the Internet may act as both a facilitator and a barrier<sup>[3]</sup>. Health information found online may be misleading<sup>[3]</sup>, with little control over the timeliness of updates<sup>[5]</sup>. The aim of this study is to understand the role of the Internet in the health-seeking behaviour of caregivers of children under five years with fever.

## Method

Parents of children under five years who attended the Paediatrics Out-Patient Department of a tertiary care university teaching hospital with the chief complaint of fever were the subjects. After their written consent, they were interviewed with a semi-structured questionnaire using the 'funnel approach'<sup>[6]</sup>, by beginning discussions with open-ended, less-structured questions and moving to more focused questions and probes.

### The questionnaire contained four sections:

- Basic demographic details of the family
- Previous medical history of the child
- Questions pertaining to the current illness
- Details of Internet usage.

**Statistical analysis:** The data was analysed using SPSS software version 16.0 using frequencies for demographic details and percentages for categorical variables. Chi square test was done to determine the association between the various parameters and the association was considered significant if p value was  $\leq 0.05$ .

## Results

250 parents (239 mothers and 11 fathers) participated in this study. A younger age, higher educational level, being professionals and belonging to Socioeconomic class 3 or above were significantly associated with greater Internet utilization.

54.4% parents were Internet-users. 94.12% used mobiles and 5.8% of them used computers to access the Internet. It was observed that most parents used websites shown by the search engines (76.47%) over hospital (7.35%) and parenting websites (16.18%) and did not check the credentials of the author of the information (78.68%). None of the users knew which websites to access and how to judge the reliability of the sources. 27.21% parents asked their doctors about the accuracy of the information they read online but 13.97% parents believed whatever they read online. 8.82% parents used the Internet after consultation to check their doctor suggestions for reassurance.

Table 1 compares the knowledge and health-seeking patterns of Internet users and non-Internet users. In both the groups, 82.8% parents sought medical care for their child's fever within 24 hours and 89.2% parents gave their child paracetamol syrup/tablets, did tepid sponging or both before consulting a doctor. Although 62.4% parents used a thermometer to check the temperature of the fever, 40.4% did not know what the normal body temperature should be and what is considered fever. There was no association found between the education of the mother and the usage of a thermometer for measuring the fever of their child ( $p=0.141$ ).

Internet-users were more likely to use a thermometer for recording the body temperature ( $p<0.001$ ) of the child when he/she had fever, had more knowledge on the normal ranges ( $p=0.002$ ) and the temperature that denoted fever ( $p=0.001$ ). 50.74% parents had tried out home remedies suggested online before seeking medical help. There was however no difference in the promptness with which medical attention was sought ( $p=0.640$ ), the initial action taken at home ( $p=0.458$ ). Also, there was no relationship between gender of the child and health seeking behavior ( $p=0.306$ ) or the concerns ( $p=0.695$ ) the parents had amongst the Internet and non-Internet users.

**Table 1: Knowledge and Health seeking behaviour of internet users and non users**

Health Seeking Behaviour		Internet Users n(%) N=136	Non-Internet Users n(%) N=114	Total n(%) N=250	P value
Promptness of seeking care	$\leq 24$ h	114 (83.8%)	93 (81.6%)	207 (82.8%)	p=0.640
	$>24$ h - $\leq 48$ h	10 (7.4%)	17 (14.9%)	27 (10.8%)	
	$>48$ h - $\leq 72$ h	12 (8.8%)	4 (3.5%)	16 (6.4%)	
Use of thermometer	Yes	101 (74.3%)	55 (48.2%)	156 (62.4%)	p<0.001
	No	35 (25.7%)	59 (51.8%)	94 (37.6%)	
Knowledge of normal body temperature)	Don't know	42 (30.9%)	59 (51.8%)	101 (40.4%)	p=0.002
	Correct	76 (55.9%)	42 (36.8%)	118 (47.2%)	
	Incorrect	18 (13.2%)	13 (11.4%)	31 (12.4%)	
Definition of fever (according to parent)	Tactile perception	44 (32.4%)	59 (51.8%)	103 (41.2%)	p=0.001
	97-99 °F	25 (18.4%)	7 (6.1%)	32 (12.8%)	
	100 °F	63 (46.3%)	46 (40.4%)	109 (43.6%)	
	101-104 °F	4 (2.9%)	2 (1.8%)	6 (2.4%)	
Initial action by parent	Wait for medical consultation	13 (9.6%)	14 (12.3%)	27 (10.8%)	p=0.458
	Paracetamol	64 (47.1%)	47 (41.2%)	111 (44.4%)	
	Tepid sponging	8 (5.9%)	6 (5.3%)	14 (5.6%)	
	Both paracetamol & sponging	51 (37.5%)	47 (41.2%)	98 (39.2%)	

## Discussion

Of the 250 parents, 136 parents (54.4%) were Internet-users with the majority accessing the net through their mobile. This finding is similar to that of other studies in India and other countries<sup>[7,8]</sup>. It was observed that most parents used websites shown by the search engines (76.47%) over hospital (7.35%) and parenting websites (16.18%) and did not check the credentials of the author of the information (78.68%). None of the users knew which websites to access and how to judge the reliability of the sources. Other studies have also shown that people usually omit to check the origin of information found on the Internet<sup>[9]</sup>.

In our study, most parents used the Internet to get health-related information only to complement the doctors' advice and not as a replacement. Only 11.76% parents felt influenced by the Internet. Earlier studies have also reported that most parents considered their Paediatrician as their primary resource for information about fever<sup>[10]</sup>. This study showed that most parents sought medical help within 24 hours of the onset of fever in their child. The health-care seeking behavior of the parents found to be related to the mother's education ( $p=0.005$ ).

One limitation of this study is that it was done in the outpatient department of a university teaching hospital. A study in a community setting may throw more light on this important issue.

## Conclusion

A large group of parents use the Internet for health information but do not know how to assess the credibility of the sources. Most parents used the information only in addition to the doctors' advice and not as a substitute.

**Ethical Clearance:** Done with the approval of Institutional Ethics Committee of Sri Ramachandra Institute of Higher Education and Research, No. CSP/17/MAR/55/80

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**Conflict of Interest:** Nil

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# Poverty and Access to Medicine: A Medico Legal Study

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## Abstract

The right to health as a basic human right- and access to medicine as a part of it- have been a matter of attention for several decades. Also the responsibilities of different parties- particularly pharmaceutical companies- in realization of this right have been emphasized by World Health Organization. This is while many companies find no incentive for research and development of medicines related to rare diseases. Also some legal structures such as “patent agreements” clearly cause huge difficulties for access to medicine in many countries. High prices of brand medicine and no legal production of generics can increase the catastrophic costs- as well as morbidity-mortality of medication in lower income countries. Here we evidently review the current challenges in access to medicine and critically assess its legal roots. How societies/governors can make the pharmaceutical companies responsible is also discussed to have a look on possible future and actions that policy makers- in local or global level- can take.

**Keywords:** *Access to medicine, Pharmaceuticals, Pharmaceutical companies, Human rights.*

## Introduction

*“Poverty is the parent of revolution and crime” –*  
Aristotle

The above quoted couplet aptly summarises the concept of Poverty. Poverty is not having enough means, resources, material possessions or income for fulfilling a person’s needs. Poverty may be social poverty, economic poverty or political poverty. Absolute poverty is the complete lack of means necessary to meet basic needs which are strictly personal such as food, clothing and shelter. The threshold of absolute poverty always remains the same independent of the person’s permanent location or other corresponding factors. On the other hand relative poverty is when a person cannot meet a minimum level of living standards, compared to others in the same time and place. Accordingly the threshold or the benchmark of relative poverty varies from one country to another or from one society to another or from one system to another and so on.

Governments and non governmental organisations try to reduce poverty. The government’s ability to deliver services and provide basic needs to people who

are unable to earn a sufficient income can be held to ransom by the major bottlenecks and speed breakers in the form of corruption, tax avoidance, debt and loan conditions and by the brain drain of health care and educational professionals . Therefore, welfare solutions, economic freedoms and providing financial services must be included in various strategies of increasing income and providing succour to poor people. In contrast to *laissezfaire* era where the functions of the government primarily involved those of protecting the community against external attacks, maintaining internal law and order and guaranteeing contracts, the welfare state concept demands a much wider and more pervasive range of government activity. Not only should the government provide social services such as social security, medical treatment, education, welfare facilities and subsidised housing but these should go beyond the provision of a bare minimum towards ensuring that all have equal opportunity, so far as the country’s resources allow. There is difference of opinion as to how this can be most effectively done and what degree of public provision it should involve, relative to private, but the principle that this is a proper public concern is generally accepted . It is also generally accepted that

the government has an obligation to steer the working of the market economy in the directions considered to be socially desirable. Fiscal policy and monetary policy should be used to combat unemployment and inflation and promote steady growth. Encouragement must be given to types of investments thought to be desirable, by means of investment allowances and grants. Help should be given in developing new industries in those areas of the country which are lagging in growth and income. The concept of welfare states thus involves much more than social services. But social services are nevertheless its most characteristic element, since they are concerned with the positive provision of service to individuals of a type and on a scale that they would not obtain through the free market. In other words, the types of services most characteristic of the welfare states are those which meet what Musgrave<sup>1</sup> calls 'Merit Wants'. They are not concerned with pure public wants of a kind which cannot be satisfied through the market because the benefit from them is almost entirely social and there is little or no private benefit. Defence, law and order, general administration etc. are services of this kind. On the other hand, education, medical treatment and social security are not of this type as they provide distinct benefits to individuals and are provided through the market and for a price. But an element of social benefit, from an educated and healthy community or for ensuring that all members of the community are guaranteed a minimum income in the event of inability to earn is held to arise over and above the private benefits to the individuals. As per the report of World Day Lab, the effect of various govt. initiatives will result in a level of extreme poverty in India of 50 million people today which will come down to 40 million (a poverty rate of below 3%) by end 2019.<sup>2</sup> In July 2018, World Poverty Clock, Vienna based think tank reported that a minimal of 5.3% or 70.6 million Indians are living in extreme poverty compared to 44% or 87 million Nigerians. Till 2019, Nigeria and Congo surpassed India in terms of total population earning below dollar 1.9 a day.<sup>3</sup> Although India is expected to meet United Nations sustainable development goals on extreme poverty in due time, a very large share of its population lives on less than 3.2 dollar a day, putting country safely into category of lower middle income economies.

One third of deaths around- some 18 million people, a year or 50,000 per day are due to poverty related causes. People living in developing nations, among them women and children are over represented

among the global poor. Those living in poverty suffer disproportionately from hunger or even starvation and disease as well as lower life expectancy. According to World Health Organisation, hunger and malnutrition are the single gravest threats to the world's public health and malnutrition is by far the biggest contributor to child mortality, present in half of all cases.

Almost 90% of maternal deaths during childbirth occur in Asia and Sub-Saharan Africa, compared to less than 1% in the developed world. Those who live in poverty have also been shown to have a far greater likelihood of having or incurring a disability within their life. Infections, diseases such as malaria and tuberculosis can perpetuate poverty by diverting health and economic resources from investment and productivity; malaria decreases GDP growth by upto 1.3% in some developing nations and AIDS decreases African growth by 0.3-1.5% annually.<sup>4</sup> Poverty has been shown to impede cognitive function. One way in which this may happen is that financial worries put a severe burden on one's natural resources so that they are no longer fully available for solving complicated problems. The reduced capability for problem solving can lead to sub optimal decisions and further perpetuate poverty. Many other pathway from poverty to compromised cognitive capacities have been noted, from poor nutrition and environmental toxins to the effects of stress or parenting behaviour. All of which lead to sub optimal psychological development.<sup>5</sup> Neuroscientists have documented the impact of poverty on brain structure and function throughout the lifespan. Infections diseases continue to blight the lives of the poor across the world. An estimated 40 million people are living with HIV/AIDS, with 3 million deaths. Every year these are 350-500 million cases of malaria, with 1 million fatalities.

India doesn't have enough hospitals doctors, nurses and health workers and since health is a state subject, disparities and inequities in the quality of care and access to health varies widely not just between states but also between urban and rural areas. As per a W.H.O. Report 2018 on India's healthcare workforce, only one in five doctors in rural India are qualified to practice medicine. This leads to widespread problem of quackery. The WHO report said that 31.4% of those calling themselves allopathic doctors were educated only up to the class 12 and 57.3% doctors did not have a medical qualification. Doctors without formal training provide up to 75% of primary care visits. The new principal of BRD medical college, Dr. P.K. Singh lamented that the



hospital gets very sick babies because most parents seek local remedies and treatment from quacks before they bring their children to hospital. He also emphasized that the hospital can't turn anyone away and therefore two to three babies on one bed or two babies in one incubator was quite common. The author of the report 'Unqualified Medical Practitioners' opined that there are no large scale surveys on quackery by national statistical agencies such as the Census of India or National Sample Survey office which could form the basis for policy making in this area<sup>6</sup>. She further observed that the lack of Medical qualifications was particularly high in rural areas and whereas 58% of doctors in the urban areas had a medical degree, only 19% of these in rural areas had such a qualification.

The Indian scenario represents a bleak picture as India's spending on healthcare is even less than Nepal and Sri Lanka. Further 70 percent of overall household expenditure on health in the country is on medicines. Further an estimated 469 million people in India do not have regular access to essential medicines. Moreover 63% of primary health centres did not have an operation theatre and 29% lacked a labour room. The community health centres were short of 81.5% specialists. Various studies have shown the rising out of pocket expenditures on healthcare is pushing 32.39 millions below the poverty line annually<sup>7</sup>. Under national health mission the government has launched several schemes some of which are enumerated below:

- (a) **Reproductive, Maternal Newborn, Child and Adolescent health**—essentially to address the major cause of mortality among women and children as well as the delays in accessing and utilising health care and services.
- (b) **Rashtriya Balswasthyakavyakaran (RBSK)**—an important initiative aimed at early identification and early intervention for children from birth till 18 years to cover 4D's viz. Defects of birth, Deficiencies, Diseases, Development delays including Disability.
- (c) **Rashtriya Keshava Swasthya Kanyakumari**—an initiative to enable all adolescents in India to realise their full potential by making informed and responsible decisions related to their health.
- (d) **Shishu Suraksha Kanyakumari**—to encourage institutional deliveries and to pre-empt communicable and non-communicable diseases.
- (e) **National AIDS control organisation**—to ensure that

every person living with HIV has access to quality care and is treated with dignity.

- (f) **Revised National TB Control Programme is a State-run tuberculosis control initiative** of the govt. providing quality tuberculosis diagnosis and treatment through the Govt. Health system to ensure a TB free India.
- (g) **National leprosy Eradication Programme**—to ensure early detection and to provide appropriate medical rehabilitation and leprosy ulcer care services.
- (h) **Mission Indra Dhanush**—to improve coverage of immunization in the country

Apart from that Ayushman Bharat Yojana or Pradhan Mantri Jan Arogya Yojana or national health protection scheme is another major initiative of the central govt. This was launched on 23<sup>rd</sup> September 2018 by Hon'ble Prime minister in Jharkhand's capital Ranchi. It is also known as PM Jan Arogya Yojna. The scheme is targeted at poor and deprived rural families and identified occupational category of urban worker's families. The scheme aims to cover around 50 crore people whereby 8.03 crore families in rural and 2.33 crore in urban areas will be covered. It will have a defined benefit cover of Rs. 5 lakh per family (on a family float basis) per year for secondary and tertiary case hospitalization and will subsume the existing Rashtriya Swasthya Bima Yojana (RSBY) launched in 2008 by the UPA government. The scheme will be cashless and paperless at public hospitals and empanelled private hospitals. Each empanelled hospital will have an Ayushman Mitra to assist patients and will co-ordinate with beneficiaries and the hospital. The benefits of the scheme are portable across the country. PM Modi has predicted it to be a game changer.

#### **Mobile healthcare facility:**

“He who has health has hope and he who has hope has everything”.

#### **-Arabic Proverb**

Access to health care in rural India and for the poor in urban slum dwellers continues to be deplorable and has got less than 4% of Govt. Primary healthcare facilities. There are two primary reasons for the adverse health conditions of the urban slum dwellers; firstly the lack of education and awareness and secondly the unwillingness and impracticability to lose a day's wage in order to reach the nearest medical facility. Thus the healthcare

which is a desperate need remains unaddressed. A two pronged approach is therefore called for. The first one is to bring quality healthcare facilities and services to the door steps of the needy and second to promote healthcare awareness and contemporary healthcare seeking behaviour amongst the underprivileged. Some of the NGOs have taken a good initiative in this direction viz. Smile Foundation, Help Age India.

Another important aspect is the mobile based Primary healthcare management system CDAC. Electronics City Bangalore has initiated the development of 'mobile based Primary healthcare' management system for development in the PHCs for betterment of management of primary healthcare specifically in rural and urban slums of India. The system will capture complete information related to an individual patient treated by a PHC.

Another initiative SehatSaathi is being developed at Media Lab Asia research hub at IIT Kanpur. It involves front-end contact through a suitably trained non medical professional; back end support from doctors, pathologists and other health professionals for diagnosis and treatment; use of digital technology to achieve objects and dissemination of information on health and disease through digital means.

### Conclusions and Suggestions

The healthcare scenario in India and the access to medicine and other facilities are facing a bleak future and a catastrophe is bound to happen unless drastic measures are taken urgently. The abyss of despair through with this section is passing through requires a herculean task to bring it back on track of stability and growth with positive development. The reforms and changes required have a dual character. The initiatives are required in the medical field as well as legal field. On the legal front, it would be desirable that 'health care' is put on the concurrent list rather than on the state list. Entry 6 of the state list in schedule 7 of the Constitution provided 'Public health and sanitation; hospitals and dispensaries. This being a state subject, state govt. imposes fetters and bottlenecks on any major initiative by centre in this sector. The Ayushman Arogya Yojana initiated by PM Modi has met many such speed breakers by the hostile state govt. particularly in the national capital territory of Delhi and West Bengal albeit entirely on political factors. This has obviated a coordinated effort throughout the territory of India which could have yielded better results.

Putting it in the concurrent list will accelerate the implementation of such schemes and in cases of any contradiction in the central scheme and state scheme, the central scheme shall override. Besides it will not prevent the state government from bringing out any other beneficial health care initiative. Further the mobile health clinic facilities being undertaken at present through various NGOs and Social organisations may be developed and implemented on a large scale with prominent Public Health Care Hospitals in the Govt. Sector participating in it. This will lend credibility to the entire exercise and the faith of the public at large will be imbibed into this. The prominent hospitals in the Govt. sector in the vicinity of the area can fix a schedule and a day and time can be prefixed when the mobile health clinic shall visit the particular area. It would also be desirable that an Annual Health Appraisal of all the employees be conducted, be it in the private sector or in the public sector/Central Govt. Employees/State govt. Employees on the same lines as Annual Work and Performance appraisal. The employees be graded on both these appraisals and increments/promotions be linked to grades in these appraisals. A social audit of the same should be done annually and the report of the social audit should be part of the annual report of the organisation/company as is the corporate governance report. This is an essential requirement because it had been found that the medical facility at the workplace functions in a perfunctory manner.

These are some of the suggestions which I hope would go a long way in ensuring a better healthcare system in India and an easy access to medicine.

**Ethical Clearance** is taken from the Departmental Research Committee to Amity Law School, Amity University, Noida, U.P.

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# To Assess Cases of Trigeminal Neuralgia

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## Abstract

**Background:** Trigeminal neuralgia (TN) is a chronic, debilitating condition resulting in brief and intense episodes of facial pain. The present study was conducted to assess cases of trigeminal neuralgia.

**Materials and Method:** The present study was conducted on 74 patients of both gender diagnosed with trigeminal neuralgia. Age of onset, gender, site of involvement, and clinical presentations were recorded.

**Results:** Out of 74 patients, males were 40 and females were 34. Ophthalmic branch was involved in 5, maxillary in 32, mandibular in 27 and both maxillary+ mandibular in 10 cases. The difference was significant ( $P < 0.05$ ). Left side was involved in 25, right in 40 and both side in 9 cases. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Authors found that trigeminal neuralgia was mostly noticed in males and maxillary branch and right side cases were prevalent.

**Keywords:** Trigeminal Neuralgia, Maxillary, Mandibular.

## Introduction

Trigeminal neuralgia (TN) is a chronic, debilitating condition resulting in brief and intense episodes of facial pain in the distribution of one or more branches of the fifth cranial nerve. The episodes of facial pain are sporadic, sudden, and often like “electric shocks” lasting from a few seconds to several minutes. Etiology may be either idiopathic or secondary to intracranial lesions such as tumor, infarction, and multiple sclerosis. Among neuropathic pains, TN has a peculiar profile.<sup>1</sup>

Trigeminal neuralgia is rare and statistical data regarding it is limited. The estimated annual incidence of

trigeminal neuralgia is 12.6 per 100,000 persons per year and its incidence increases with age.<sup>2</sup> Although peak onset occurs between age 50 and 70 years, the disorder can also occur in children. Early literature suggested a strong preponderance in women; however, current data indicate that only approximately 60% of patients with trigeminal neuralgia are female. The annual incidence for women is approximately 5.9 cases per 100,000 women; for men, it is approximately 3.4 cases per 100,000 men.<sup>3</sup>

Spontaneous remissions are not unusual. With the exception of a few identified organic causes, its etiology for long remained uncertain, so it was called “idiopathic” neuralgia. Even now with the sound hypothesis of neurovascular conflict, the pathophysiology of this disease still has obscure corners. The International Headache Society differentiates between classical TN and atypical facial pain.<sup>4</sup> The present study was conducted to assess cases of trigeminal neuralgia.

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### Materials and Method

The present study comprised of 74 patients of both gender diagnosed with trigeminal neuralgia. Ethical clearance for the study was taken from institutional ethical committee. All patients were informed regarding the study and written consent was obtained.

Data related to patients such as name, age, gender etc. was recorded. Age of onset, gender, site of involvement, and clinical presentations were recorded. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

### Results

**Table I: Distribution of patients**

Total- 74		
Gender	Males	Females
Number	40	34

Table I shows that out of 74 patients, males were 40 and females were 34.

**Table II: Type of branch involved**

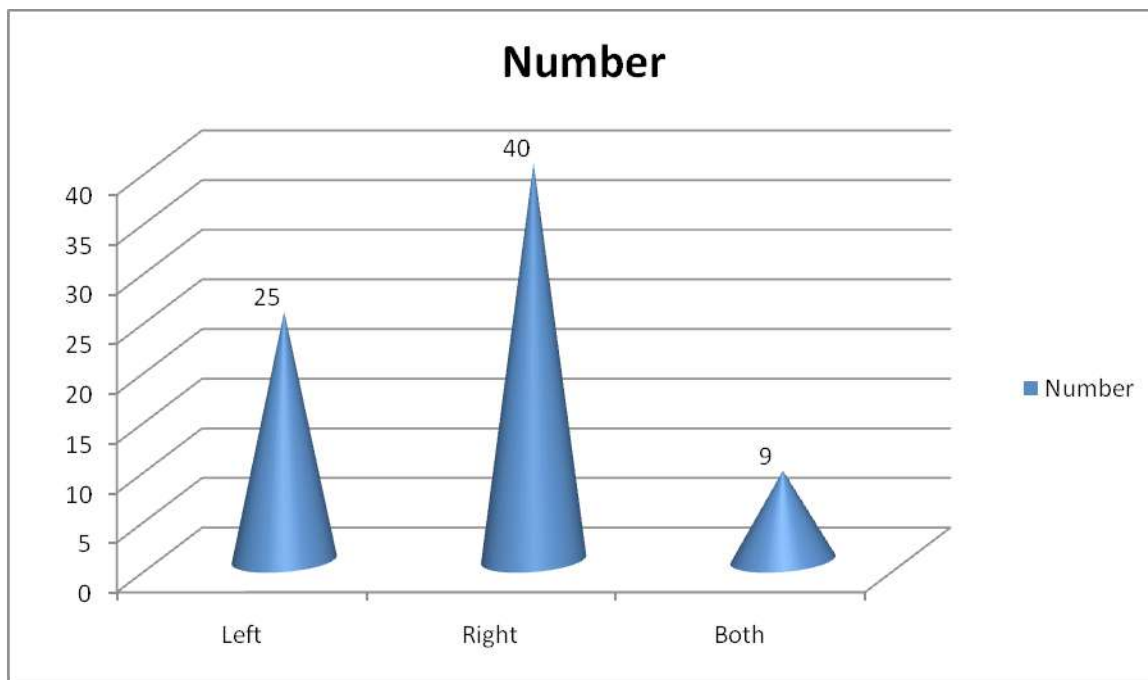
Branch	Number	P value
Ophthalmic	5	0.01
Maxillary	32	
Mandibular	27	
Maxillary + Mandibular	10	

Table II shows that ophthalmic branch was involved in 5, maxillary in 32, mandibular in 27 and both maxillary+ mandibular in 10 cases. The difference was significant (P< 0.05).

**Table III: Side involvement**

Side	Number	P value
Left	25	0.01
Right	40	
Both	9	

Table III, graph I shows that left side was involved in 25, right in 40 and both side in 9 cases. The difference was significant (P< 0.05).



**Graph I: Side involvement**

### Discussion

Classical TN is often caused by microvascular compression at the trigeminal root entry zone of the brain stem and symptomatic TN is caused by a structural

lesion other than vascular compression.<sup>5</sup> Persistent idiopathic facial pain previously termed atypical facial pain is a persistent, dull, poorly localizable, facial pain without sensory or other neurological deficits which

cannot be attributed to a different disorder. Therefore, investigations such as X-ray of the face and jaws, cranial computed tomography or magnetic resonance imaging are necessary to exclude any relevant abnormality.<sup>6</sup> The present study was conducted to assess cases of trigeminal neuralgia.

In present study, out of 74 patients, males were 40 and females were 34. Katusic et al<sup>7</sup> conducted a study on 1215 study participants with typical idiopathic TN. The mean age was  $50.62 \pm 15.872$  years. The mandibular nerve is involved in most of the cases (56.9%), followed by maxillary nerve (42%). The right side of the face (57.1%) is more involved than the left side (38.8%). TN was more prevalent (52.4%) in rural population than urban population (47.6%).

We found that ophthalmic branch was involved in 5, maxillary in 32, mandibular in 27 and both maxillary+mandibular in 10 cases. Left side was involved in 25, right in 40 and both side in 9 cases. Jankittivong et al<sup>8</sup> in retrospective study found that the mean age was 54.9 years; female to male ratio was 2.13:1; rural to urban ratio 1.76:1 with 62.5% suffered trigeminal neuralgic pain on the right side. Carbamazepine was found to be highly effective in 60.8% of the cases on long-term basis with maintenance doses. Other treatment modalities were employed in more refractory cases including add-on of gabapentin, which relieved the symptoms for an additional duration of  $13 \pm 3$  months. The neurolytic alcohol bloc was given in 30% of patients who stopped responding to combination of carbamazepine and gabapentin and relieved pain for a mean duration of  $17.25 \pm 2.95$  months. Twenty three percent of the patients (23%) required peripheral neurectomy. Carbamazepine was found to be highly effective in trigeminal neuralgia. Other treatment modality includes add-on of gabapentin, neurolytic alcohol blocs and peripheral surgical intervention in more refractory cases. Only limited cases needed further neurological consideration.

Urban et al<sup>9</sup> investigated the frequency of subclinical trigeminal and facial nerve involvement in 40 patients with diabetes mellitus (DM) and without clinical signs of cranial nerve lesions. Sixty percent of the patients had distal symmetric sensory polyneuropathy that was confirmed by nerve conduction studies. An electrophysiological study indicated that DM could often affect trigeminal nerve function.

Some authors suggest that the cause of the TN can be related to the compression syndrome, and the most popular is neurovascular compression hypothesis. Neurovascular compression at the root entry zone can be evoked by an arteriovenous malformation. A wide range of other compressive lesions can also cause TN. These include vestibular schwannomas, meningiomas, epidermoid cysts, tuberculomas and various other cysts and tumours. TN can be evoked also by presence of aneurysm, vessels aggregation and occlusion due to arachnoiditis. Compression of the trigeminal nerve root may be mediated by the tumour itself, by an interposed blood vessel or by distortion of the contents of the posterior fossa with displacement of the nerve root against a blood vessel or the skull base.<sup>10</sup>

## Conclusion

Authors found that trigeminal neuralgia was mostly noticed in males and maxillary branch and right side cases were prevalent.

**Conflicts of Interest:** The authors declare that there is no conflict of interest regarding the publication of this paper.

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**Ethical Clearance:** Ethical clearance has been taken from Institutional Ethical Committee

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# Early Postoperative Pain Intensity after Laparoscopic Cholecystectomy and Associated Risk Factors

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## Abstract

**Background:** The present study was undertaken to evaluate the incidence of pain with severity  $\geq 50$  VAS points within 24 hours of LC and explore various factors that influence the early postoperative pain intensity after LC.

**Method:** 148 eligible adult patients ( $\geq 18$  years) of ASA physical status I and II undergoing elective uncomplicated LC for symptomatic cholelithiasis during the year 2018 were recruited for the study.

**Results:** Postoperatively, pain was the most frequent postoperative symptom and 49 (33.1%) of patients experienced severe postoperative pain during first 24 hours after surgery and opioids were consumed by 20.3% of patients to relieve pain. Multivariate regression analysis revealed that preoperative anxiety (aOR: 2.47, 95% CI: 1.53-3.97) and sensitivity to cold pressor induced pain (aOR: 1.52, 95% CI: 1.12-2.08) were the significant predictors for the intense early postoperative pain.

**Conclusion:** Intense pain is experienced by one third of patients in the early postoperative period after LC which can be effectively managed by properly addressing the preoperative risk factors as revealed in our study.

**Keywords:** Laparoscopy, Cholecystectomy, Pain intensity, Preoperative anxiety, Cold pressor.

## Introduction

Worldwide, Laparoscopic Cholecystectomy (LC) has replaced open cholecystectomy as the gold standard surgical procedure for symptomatic cholelithiasis. LC is safe, more effective, causes less pain and rapid recovery.<sup>1,2</sup> However, LC frequently results in significant early postoperative pain which warrants the need for rescue analgesia in PostAnaesthesiaCare

Unit (PACU).<sup>3,4</sup> Early pain is the dominant complaint after LC, most intense on the day of surgery and the main reason for prolonged hospital stay and prolonged convalescence after surgery thereby increasing treatment cost and decreasing quality of life of patients.<sup>5</sup>

Research regarding pain intensity and associated risk factors among patients undergoing LC is scarce in India. With this background, the present study was undertaken to address the following objectives: (1) to evaluate the incidence of pain with severity  $\geq 50$  VAS points within 24 hours of LC; and (2) to explore various factors that influence the early postoperative pain intensity.

## Method

A pilot study involving 18 patients undergoing LC and fulfilling the eligible criteria needed for the study

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was conducted to test the feasibility of the study and calculation of the sample size. Assuming prevalence of high intensity ( $\geq 50$  VAS points) early postoperative pain was assumed as 28% (result of pilot study), sample size was determined as 138 at absolute precision 7.5% and 95% level of confidence.

We conducted an observational prospective study during the period January – December, 2018 involving 148 eligible adult inpatients aged  $\geq 18$  years of ASA physical status I and II undergoing elective uncomplicated laparoscopic cholecystectomy for symptomatic cholelithiasis. Exclusion criteria included patients with diabetes mellitus; cardiovascular or respiratory or hepatic or renal insufficiency; psychiatric diseases or disturbance of central nervous system; substance abuse, chronic use of analgesics or steroids. In total, 158 eligible patients were approached for the study and 151 agreed to participate (95.6%). Two patients who underwent relaparotomy were excluded, and one patient with difficult surgical dissection underwent open cholecystectomy and thus excluded from the study leaving 148 patients for further analysis.

Previous studies have shown that pain after surgery is influenced by various factors such as age, gender, preoperative pain, type of surgery, duration of surgery<sup>6-8</sup> and preoperative anxiety seems to be an important predictor for acute postoperative pain intensity.<sup>7,9,10</sup> Also, preoperative sensitivity to cold pressor induced pain was identified as an independent risk factor for early postoperative pain.<sup>5</sup> After obtaining the written informed consent, relevant data regarding demographic characteristics, preoperative anxiety level, preoperative sensitivity to cold pressor induced pain, pre and post operative pain intensity, duration of surgery etc. were collected.

The day before the operation, a cold pressor test<sup>5</sup> was conducted among the patients to assess the subjective sensation of discomfort by immersing hand into the ice water. Two containers were filled with mixture of one third crushed ice and two thirds tap water. The resulting ice water mix stirred to maintain a constant temperature of  $1.0 \pm 0.3^\circ\text{C}$  throughout the study. The patients were told that the test would be terminated after 4 minutes. They were instructed to immerse one bare arm into each container with the palms resting on the bottom of the containers. All the patients were instructed that they could remove their hands at any time prior to 4 minutes if pain intensity was unbearable. Subjective assessment

of cold pressor test was recorded by Visual Analogue Scale (VAS) after the procedure. Each patient rated the subjective pain experience on a 100 mm VAS (0 mm = no discomfort and 100 mm = worst possible discomfort).

To assess the anxiety level of patients before anaesthesia and surgery, a Visual Analogue Scale (VAS) consisting of 10 items<sup>11</sup> was used. The VAS was based on a 100 mm scale: ranging from 0 indicating no preoperative anxiety to 10 indicating the maximal preoperative anxiety.

All patients received similar general anaesthesia, surgical and prophylactic analgesic regimens. Routine premedication with glycopyrrolate (0.01 mg/kg) and midazolam (0.2 mg/kg) was done. Standard protocol for general anaesthesia consisted of administration of propofol (1-2 mg/kg) for induction, butorphanol (0.02 mg/kg) for intraoperative analgesia and vecuronium (0.08 mg/kg) intravenous to facilitate tracheal intubation and obtain intraoperative muscle relaxation. Maintenance of anaesthesia was done with oxygen and nitrous oxide in the ratio of 1:2 along with isoflurane (0.6 - 0.8%) and intermittent dose of vecuronium for muscle relaxation. At the end of surgery, neuromuscular blockade was reversed with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg). Prior to closure, ondansetron (0.08 mg/kg) and paracetamol (1 g) was administered. All the operations were conducted and supervised by the experienced laparoscopic surgeons using the standard 4-trocar technique of laparoscopic cholecystectomy. During laparoscopy, intra abdominal pressure was kept at 12 mm Hg and at the end of procedure CO<sub>2</sub> was evacuated by gentle abdominal pressure with open trocars. When VAS score was  $\geq 4$ , rescue analgesia was done with administration of tramadol (50 mg) or diclofenac (75 mg) as required by the patient. In surgery ward, pain was managed with combination of analgesics such as diclofenac (75 mg) + paracetamol (1 g) or tramadol (50 mg) + paracetamol (1 g) as needed by the patient. The pain assessment was done on the day before operation and the postoperative assessment was done at 6 hours, 12 hours, and 24 hours after the operation. Presence of high intensity pain, defined as VAS  $\geq 50$ , occurring at least once within the first 24 hours after arrival at the PACU was considered as the dependent variable of the study.

Data were analyzed by using SPSS version 21.0 software. Univariate analyses were done by the t test for continuous variables and the chi square test

for dichotomous variables. Variables significantly associated ( $p < 0.05$ ) with the dependent variable were tested with spearman rank correlation test. The variables found to have  $p < 0.2$  in univariate analyses were entered into the multivariate logistic regression model to identify the predictors for the early postoperative pain intensity. Values were expressed as mean  $\pm$  SD, absolute numbers, percentages with significance defined as  $p < 0.05$ .

**Results**

The mean age of the study population was  $43.2 \pm 14.3$  years and majority (63.5%) were females. Pre operatively, the mean intensity of pain was  $4.66 \pm 1.06$  VAS points and abdominal pain was the most frequent (139, 93.9%) symptom experienced by the patients. Pain was localized exclusively to the right upper abdomen in 93 (62.8%) patients and almost two third of patients (55.7%) reported that pain was radiating to back. Postoperatively, pain was the most frequent postoperative symptom and the mean intensity of post operative pain was  $4.34 \pm 1.33$  VAS points. Out of 148 patients, 73 (49.3%) localized pain to the incisional sites, 47 (31.7%) to the right upper abdomen, and 28 (18.9%) reported diffuse abdominal pain. Also, 23 (15.5%) patients reported that pain was radiating to the back and 34 (22.9%) experienced pain radiating to the shoulder area. However, when asked regarding the site of more intense pain, 55 (37.1%) indicated to the incisional sites, 34 (23%) to the right upper abdomen, 9 (6.1%) to the shoulder area, and 5 (3.4%) to the back.

The intensity of postoperative pain during first 24 hours after surgery was high ( $\geq 5$  VAS points) as experienced in one third of patients. In most of the

patients (79.7%), mild analgesics such as paracetamol or diclofenac or combination of both were used to relieve the pain whereas opioids were consumed by 30 (20.3%) patients (Table 1). Table 2 revealed the univariate analyses showing association between various factors and the outcome variable i.e. maximal VAS pain score during the first postoperative day. Multivariate regression analysis showed that preoperative anxiety and sensitivity to cold pressor induced pain were the significant predictors for severe postoperative pain during first 24 hours after LC (Table 3).

**Table 1: Postoperative symptoms, pain intensity, and analgesics used during first 24 hours after laparoscopic cholecystectomy (n = 148)**

Characteristics	Number	Percentage
<b>Symptoms</b>		
Pain	148	100
Feeling abdominal pressure	78	52.7
Loss of appetite	67	45.3
Nausea	47	31.7
Vomiting	15	10.1
<b>Intensity of Pain</b>		
< 50 VAS* points	99	66.9
$\geq 50$ VAS points	49	33.1
<b>Analgesic Used</b>		
Paracetamol	35	23.6
Diclofenac	78	52.7
Diclofenac + Paracetamol	05	3.4
Tramadol	19	12.8
Tramadol + Paracetamol	11	7.4

\*VAS – Visual Analogue Scale

**Table 2: Univariate analyses showing association of factors with postoperative pain intensity (n = 148)**

Characteristics	Postoperative Pain Intensity		p value	r <sub>s</sub>
	< 5 VAS points [M $\pm$ SD or n (%)]	$\geq 5$ VAS points [M $\pm$ SD or n (%)]		
Age (in years)	42.36 $\pm$ 13.66	44.86 $\pm$ 15.67	0.322	-
<b>Gender</b>				
Male	37 (68.5)	17 (31.5)	0.750	-
Female	62 (66.0)	32 (34.0)		
Weight (in kg)	58.19 $\pm$ 9.65	57.22 $\pm$ 10.79	0.582	-
Preoperative pain	4.75 $\pm$ 0.88	4.47 $\pm$ 1.36	0.186	-
Preoperative anxiety	4.58 $\pm$ 0.79	5.24 $\pm$ 0.95	0.000	0.33
Cold pressure discomfort	6.11 $\pm$ 1.29	6.78 $\pm$ 1.24	0.003	0.14
Duration of surgery (in minutes)	81.90 $\pm$ 23.58	86.7 $\pm$ 26.96	0.262	-

Note: M - Mean, SD - Standard Deviation; n – number,  $p < 0.05$  statistically significant; r<sub>s</sub> – Spearman correlation coefficient

**Table 3: Multivariate logistic regression analysis showing association of factors with postoperative pain intensity (n = 148)**

Characteristics	Postoperative pain intensity ( $\geq 5$ VAS points)*		p value
	aOR	95% CI	
Preoperative pain	0.81	0.57 – 1.16	0.259
Preoperative anxiety	2.47	1.53 – 3.97	0.000
Cold pressor discomfort	1.52	1.12 – 2.08	0.007

\*  $< 5$  VAS points is taken as reference

**Note:** aOR: adjusted Odds Ratio, CI: Confidence interval,  $p < 0.05$  statistically significant; Model  $\chi^2 = 27.406$ ,  $p < 0.001$  and Hosmer & Lemeshow  $p = 0.968$  indicates that the model fits the data. The classification table reports that overall expected model performance is 71.6%; that is 71.6% of the cases can be expected to be classified correctly by the model.

## Discussion

Our study demonstrated that pain was the most frequent complaint in patients during first 24 hours of LC and the mean intensity of postoperative pain was 43 VAS points. One third of patients reported severe pain ( $\geq 50$  mm VAS points) and nearly 20% of the patients needed opioids. This indicates the importance of addressing pain in the early postoperative period and thus designing effective strategies for better pain management. In accordance with our study, other studies have shown the pain scores in the range of 40 mm within 24 hours after surgery<sup>5,12</sup> and exceed 50 mm in up to one third of patients during early postoperative period.<sup>13</sup> Few studies have reported higher proportion (46–65%) of patients undergoing laparoscopic cholecystectomy experienced severe pain.<sup>4,6</sup> This might be due to methodological variation and difference in patient characteristics. In agreement with the findings of earlier studies,<sup>5,13</sup>

Our results showed that preoperative anxiety and preoperative sensitivity to cold pressor induced pain were found to be the significant independent predictors of early postoperative pain. However, the correlations were weak ( $r_s = 0.14 - 0.33$ ) indicating ( $r_s^2 = 0.02 - 0.11$ ) 2% and 11% of the variability of postoperative pain after LC could be predicted by sensitivity to cold pressor induced pain and preoperative anxiety respectively. It was observed that the odds of having high intensity early postoperative pain increases 2.5 times with one unit increase in preoperative anxiety score in the patients undergoing LC. Fear of postoperative pain or fear of poor outcome of operation/anaesthesia may act as a stressor

that stimulates increased anxiety response which in turn amplifies postoperative pain and thereby contributing to the continuity of cycle of pain and anxiety. Our result is in consistency with the findings of previous literatures which showed that fear of surgical procedure might increase in postoperative LC pain intensity.<sup>6,10</sup> Ali et al also reported that patients with high preoperative anxiety had higher postoperative VAS score.<sup>14</sup> In addition, Bakr et al revealed that the patients receiving preoperative anxiety intervention before surgery showed lower pain scores as compared to the patients who did not receive preoperative anxiety intervention.<sup>15</sup> This emphasizes the need of prior psychological preparation of patients undergoing LC which might be useful in reducing preoperative anxiety level thereby alleviating the intensity of postoperative pain.

In our study, the risk of experiencing high intensity postoperative pain among patients undergoing LC increases almost 1.5 times with one unit increase in sensitivity to cold pressor test. Although the relation between preoperative sensitivity to cold pressor induced pain and early postoperative pain intensity after LC reached statistical significance, the correlation was found to be weak. This suggests minor clinical importance of the cold pressor test in predicting the early postoperative pain intensity. In an earlier study, Bisgaard et al also observed similar result.<sup>5</sup> Further prospective research is needed to find the predictive power of the 4 minute cold pressor test.

The present study has few limitations that may affect the generalizability of the results. This study was a single center study and used cross-sectional design without a follow up. There might be introduction of bias as the data on pain and anxiety were based on the subjective perception of the patients. The strength of the study lies in the fact that all the patients were similarly prepared as per the institutional protocol and the type of surgery and anaesthesia was standardized which could eliminate the misleading effects.

## Conclusion

It was revealed in the study that pain was the most frequent complaint by the patients within 24 hours of LC and one third of patients experienced severe early postoperative pain. Our findings suggest that along with peri-operative multimodal analgesia approach, effective strategies can be planned to address the preoperative risk factors which could be beneficial in reducing the pain intensity in the early postoperative period.

**Ethical Clearance** was taken from the Institutional Ethics Committee of Kalinga Institute of Medical Sciences (No: KIMS/KIIT/IEC/09/2018)

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# Determination of Efficacy of Different Apex Locators

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## Abstract

**Background:** A correct working length is a critical factor for the endodontic success. The present study assessed efficacy of Root ZX, Apex ID apex locator and Sybron Endo's Mini Apex locator.

**Materials and Method:** The present study was conducted on 45 mandibular molar teeth. In all teeth working length was assessed with 10 K file. Samples were divided into three groups. In Group I Root ZX, in group II Apex ID apex locator and in group III Sybron Endo's Mini Apex Locator was used. Based on the position of the file tip to the radiographic apex on the IOPA radiograph, the samples were categorized using the following scoring criteria. Acceptable = 0–1 short, short = >1 mm short and Long/Beyond = Beyond the apex.

**Results:** Reading with root ZX was acceptable in 13, short in 1 and beyond in 1 case, ID apex locator was acceptable in 12, short in 3 and beyond in 0, Endo's Mini Apex Locator was acceptable in 11, short in 2 and beyond in 2 cases. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Authors found that Root ZX was more effective than ID apex locator and Sybron Endo's Mini Apex Locator in accessing working length.

**Keywords:** Apexlocator, electronic working length, Root ZX.

## Introduction

Working length is defined as the distance from a coronal reference point to the point at which canal preparation and filling should terminate. A correct working length is a critical factor for the endodontic success.<sup>1</sup> Failure to determine the proper root canal working length during root canal treatment may compromise the treatment result. The establishment of

appropriate working length is one of the most critical steps in endodontic therapy. Cleansing, shaping, and obturation of the root canal system cannot be accomplished perfectly unless the working length is determined precisely.<sup>2</sup>

To determine the working length, a number of techniques, including tactile sensation, radiographs, and electronic apex locators are routinely used in clinics. Electronic apex locators have been used clinically for over 30 years as an aid in deciding where canal preparation and obturation should terminate.<sup>3</sup> Accurate working length determination helps to decide the extent to which the instruments are placed and worked in the root canal system and this will determine how effectively the unwanted items are removed from it. This will also limit the depth to which the canal filling may be placed. Correct working length determination will also affect the

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degree of pain and discomfort that the patient would feel following the appointment. Thus it plays an important role in determining the success of the treatment. Accepted techniques for the determination of the working length include tactile, radiographic and electronic method.<sup>4</sup> The present study assessed efficacy of Root ZX, Apex ID apex locator and Sybron Endo’s Mini Apex locator.

**Materials and Method**

The present study was conducted in the department of Endodontics. It comprised of 45 mandibular molar teeth. The study protocol was approved from institutional ethical committee.

In all teeth working length was assessed with 10 K file. Samples were divided into three groups. In Group I Root ZX, in group II Apex ID apex locator and in group III Sybron Endo’s Mini Apex Locator was used. The file clip of apex locator was attached to the file and the file inserted until the “Apex” reading was reached in Root tip. This was the electronic working length (EWL). Differences between EWL and actual working length (AWL) were calculated.

Working length radiograph was taken using bisecting angle technique. Based on the position of the file tip to the radiographic apex on the IOPA radiograph, the samples were categorized using the following scoring criteria. Acceptable = 0–1 short, short = >1 mm short and Long/Beyond = Beyond the apex. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

**Results**

**Table I: Distribution of teeth**

Groups	Group I	Group II	Group III
Apex locator	Root ZX	ID apex locator	Sybron Endo’s Mini Apex Locator
Number	15	15	15

Table I shows that in group I, Root ZX, in group II ID apex locator and in group III Sybron Endo’s Mini Apex Locator was used. Each group had 15 teeth.

**Table II: Accuracy of different apex locators**

Groups	Acceptable	Short	Beyond
Group I	13	1	1
Group II	12	3	0
Group III	11	2	2
P value	0.91	0.05	0.01

Table II shows that reading with root ZX was acceptable in 13, short in 1 and beyond in 1 case, ID apex locator was acceptable in 12, short in 3 and beyond in 0, Endo’s Mini Apex Locator was acceptable in 11, short in 2 and beyond in 2 cases. The difference was significant (P< 0.05).

**Discussion**

Apex locators have advantages over radiographic method; EWL determination with apex locators is easier, faster and can be indefinitely repeated without exposure to radiation.<sup>5</sup> Moreover, modern apex locators can locate not only the apical foramen but also, in contrast to radiographic method, the apical constriction, which is an optimal endpoint for root canal preparation and filling. The accuracy of apex locators is higher when compared with that of the radiographic method.<sup>6</sup>

Failure to accurately determine and maintain working length (WL) may result in length being too long leading to apical perforation, overfilling or overextension and increased post-operative pain with prolonged healing period and a lower success rate. A WL too short of the apical constriction can lead to incomplete cleaning and under filling causing persistent discomfort, and continued periradicular infection.<sup>7</sup> The apical constriction (AC) is suggested as the end-point of root canal treatment. This anatomical landmark is a point where pulpal and periodontal tissues reach together and is identified as minor apical foramen. It is generally accepted to be located at 0.5-1 mm coronal to the radiographic apex. AC might be located on one side of root at a distance up to 3 mm from the anatomical apex. Moreover, the position and topography of minor foramen varies between teeth, making it difficult to determine clinically.<sup>8</sup> The present study assessed efficacy of Root ZX, Apex ID apex locator and Sybron Endo’s Mini Apex Locator.

In present study, in group I, Root ZX, in group II ID apex locator and in group III Sybron Endo’s Mini Apex Locator was used. Each group had 15 teeth. Jenkinset al<sup>9</sup> conducted a study in which a total of 90 multirrooted teeth (maxillary and mandibular molars) with irreversible, infected or necrotic pulp tissue and completely formed roots were included in this study and were divided randomly into six groups (Root ZX II, Raypex 6, I-Root, Romiapex A-15, Sybron Endo Mini and Root ZX mini). The working length was determined using six different apex locators, and the accuracy of the

apex locators was compared with IOPA radiographs, to be categorized as accurate, short, and long or beyond. A total of 270 canals were evaluated, of which 233 (86.3%) canals exhibited acceptable working length, 28 (10.4%) canals exhibited short working length, and only 9 (3.3%) canals exhibited working length beyond the apex. There were statistically significant results in all the groups ( $P < 0.05$ ) and the comparison between the groups was statistically insignificant.

We found that reading with root ZX was acceptable in 13, short in 1 and beyond in 1 case, ID apex locator was acceptable in 12, short in 3 and beyond in 0, Endo's Mini Apex Locator was acceptable in 11, short in 2 and beyond in 2 cases. D'Assuncao et al<sup>10</sup> conducted a study in which seventy extracted human permanent molars with mature apices were selected. Equal number of maxillary and mandibular permanent molars (35 each) was sectioned at the cemento-enamel junction. Access opening was done and only the mesiobuccal root canal was studied for the purpose of standardization. Electronic working length measurements were taken before and after preparation of the mesio-buccal canal with Root ZX and ProPex II using various irrigants. P-values for actual and final canal lengths for Root ZX employing NaOCl(0.001), CHX(0.006), LA(0.020) and for ProPex II was (0.001) respectively. When the data were compared, results were statistically significant ( $P < 0.05$ ).

### Conclusion

Authors found that Root ZX was more effective than ID apex locator and Sybron Endo's Mini Apex Locator in accessing working length.

**Conflicts of Interest:** The authors declare that there is no conflict of interest regarding the publication of this paper.

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**Ethical Clearance:** Ethical clearance has been taken from Institutional Ethical Committee

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# Correlation of Cancer Antigen 125 Levels with Adnexal Masses

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## Abstract

**Background:** Adnexal masses can be of varied etiology. It may be benign like luteal cyst, infective like abscess or malignant like ovarian cancer. These masses are detected on pelvic or abdominal examination and sometimes incidentally found on ultrasonographic evaluation. Adnexal masses manifest with a wide spectrum of clinical, morphological and histological features. Cancer Antigen 125 is a marker in the blood that is known to be elevated in women with ovarian cancer, but also in people with other medical conditions and in some healthy people. This biomarker can be useful when an ovarian mass is felt on examination or seen on ultrasound and the physician is unsure whether it is ovarian cancer. The Aims and Objectives was to study the diagnostic value of Cancer Antigen 125 in adnexal masses, the correlation of this tumour marker with type of adnexal masses.

**Material and Method:** Fifty patients from reproductive to postmenopausal age group meeting the inclusion and exclusion criteria with adnexal mass were taken. Thorough history taking, clinical examination, laboratory investigation including CA 125 and histopathological evaluation was done.

**Results:** The mean age was found to be  $42.3 \pm 11.1$  years. Of fifty cases 80% were benign and 20% were malignant in histopathology. Maximum number of cases (54%) were with parity between 1-3. Clinical presentation had no clear predictive value in malignant or benign nature of the mass. In our study CA125 has a sensitivity of 90% and specificity of 35%. Positive predictive value was 25.71% and negative predictive value of 93.3%.

**Conclusion:** The detection of pelvic mass with an associated elevated CA 125 is highly suspicious of ovarian cancer, but there are various benign conditions which mimic the above findings, especially in premenopausal women.

**Keywords:** CA125, Adnexal mass, malignancy.

## Introduction

Adnexa is composed of ovaries, fallopian tubes, broad ligament and structures those evolved from

embryonic nests residing in it. The mass/masses arising from any of these structures are known as adnexal mass. Adnexal masses can have gynaecologic or nongynaecological aetiologies, ranging from normal luteal cysts to ovarian cancer to bowel abscesses. Diagnosis, nature and type of adnexal mass is a clinical challenge. Ovarian mass is by far the most common of all adnexal masses. Various parameters which are used in clinical practice include the gynaecologist's clinical findings, related biochemical tests including tumour markers, radiological findings, and intra-operative findings during laparotomies. Generally the final diagnosis is established from histopathological findings. Bimanual examination in detection of adnexal mass has

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positive predictive value of 37% only and the negative predictive value has been found to be 99% .<sup>[1]</sup> Most adnexal masses in prepubertal girls have been found to be benign, and 5-15% have been found to be malignant<sup>[2]</sup>. Raised CA125 marker may help to distinguish benign from malignant adnexal masses <sup>[3]</sup>. To identify whether the mass is benign or malignant is an important step in determining the prognosis of the patient<sup>[4]</sup> .Therefore bridging the gap between the least invasive aid i.e. pelvic examination and the invasive laparotomy is the biomarker CA125. The various tumours markers related to ovarian pathology are CA125, OVX1, LDH, AFP and many more, some of these are still under research<sup>[5]</sup> . For early detection of ovarian cancer CA125 has been preferred <sup>[6]</sup>. This biomarker is present on the cell surface of mesothelial origin. This biomarker is also elevated in a large number gynaecological and non-gynaecological pathologies <sup>[7]</sup>. Thus, this biomarker cannot be used as a reliable screening test and interpretation is not possible without additional inputs from various modalities of evaluation. Pelvic ultrasonologic findings in conjunction with CA 125 represents the most frequently utilised investigations for patients with adnexal masses <sup>[8]</sup>. The CA 125 not only the most widely used tumor marker for the diagnosis of epithelial ovarian cancers but also it is used in monitoring the success of treatment <sup>[9, 10]</sup>. The aim of the study was to evaluate the role of serum CA125 levels in diagnosis of various adnexal pathology especially malignant ovarian tumour.

### Method and Material

The patients presenting with adnexal mass clinically and/or ultrasonographic ally were taken up for further evaluation. Finally fifty patients who had adnexal mass removed operatively were considered in the study. The decision to operate was purely at the treating gynaecologist's discretion.

Study Design-A prospective, observational Study

Study Duration-December 2017 to November 2018

#### Inclusion Criteria:

1. Woman of reproductive age group to postmenopausal presenting with adnexal mass with symptoms like pain abdomen, pelvic pain, abnormal bleeding per vagina or discharge per vagina and gastrointestinal pressure symptoms.
2. Asymptomatic patients in whom pelvic mass is detected at the time of routine pelvic examination.

#### Exclusion Criteria:

1. Age <15 years.
2. Pregnancy with adnexal mass.
3. Mass of nongynecological origin.
4. Patient who do not get operated.

All the patients who gave consent for the study and in whom surgery was indicated as per consultant were taken up for the study. Thorough history taking, clinical examination, routine laboratory investigation was done. All the patients were subjected to appropriate investigations which included all routine investigation and any special investigation if required. The biomarker CA 125 was estimated in all the patients meeting. All the cases were also subjected to transabdominal and transvaginal sonography by using 3.5MHZ probe and 6.5MHZ probe respectively using EPIQ 7G, Philips Ultrasound system. The statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 22. The values were represented in number (%) and mean  $\pm$  SD.

### Results

The mean age was found to be  $42.3 \pm 11$  years. Maximum number of the patients, twenty eight (56%) were seen between the age group of 31 to 45 years. There were sixteen (32%) patients in the age group >45yrs and six (12%) patients in the age group 16-30yrs.

**Table 1: Clinical parameters of the patients**

	Benign N%	Malignant N%
Frequency	40(80%)	10(20%)
Mean Age	39years	51years
Nulliparous	6(15%)	1(10%)
Postmenopausal	12(30%)	4(40%)
Multilocular Mass (USG finding)	5(12%)	10(100%)
Thick Septations (USG finding)	5(12%)	9(90%)
Papillary Projection (USG finding)	0	3(30%)
CA125>35U/mL	26(65%)	9(90%)

Out of 50 cases, CA 125 values >35U/ml were found more in multilocular adnexal masses i.e. 14/15 cases(93.3%) as compared to unilocular masses 18/32(56.25%). Mean CA125 was 243.6U/ml in multilocular cyst and 67.8U/ml in unilocular cyst. Most of the malignant masses had thick septations on USG evaluation, which were 9/10 (90%). Patients In

premenopausal age group were 34 in number, out of which 28/40(70%) presented with benign condition and 6/10(60%) with malignant conditions. Patients in menopausal age group were 16 in number, out of which

12/40(30%) were benign and 4/10(40%) were malignant (Table 1). In post-menopausal age group CA125 values were raised in 11 cases and out of which 4 cases were malignant.

**Table 2: Histopathological findings**

Finding	Frequency	CA125 >35	CA125 <35
Serous cystadenoma	13(26%)	4(8%)	9(18%)
Dermoid Cyst	9(18%)	6(12%)	3(6%)
Mucinous cystadenoma	6(12%)	5(10%)	1(2%)
Endometriotic cyst ovary	7(14%)	6(12%)	1(1%)
Xanthogranulomatoussalpingoophritis	3(6%)	3(6%)	-
Clear cell carcinoma	2(4%)	2(4%)	-
Papillary adenocarcinoma	3(6%)	3(6%)	-
Adult Granulosa cell tumour	2(4%)	1(2%)	1(2%)
Fibroid(broad ligament)	1(2%)	1(2%)	-
Serous Cystadenocarcinoma	2(4%)	2(4%)	-
Mucinous Cystadenocarcinoma	1(2%)	1(2%)	-
Product of conception	1(2%)	1(2%)	-

**Discussion**

Adnexal mass is one of the commonest presentation to a gynecologist and can be benign or malignant. It has generated much interest in the evaluation of all aspects of adnexal tumors. Adnexal masses manifests with wide spectrum of clinical, morphological and histological features. This tumour marker in the blood that is known to be elevated in women with ovarian cancer, but also in people with other medical conditions and in some healthy people. The significance of this tumour marker increases when it is correlated with clinical and imaging finding.

We conducted an observational study on 50 women presented with adnexal mass and subsequently operated and pathologically evaluated. The mean age was found to be 42.3 ± 11.2 years in our study. The study shows that among those less than 45 years of age group, most of the neoplasms were benign and as age increases the risk of malignancy increases. A study done by Dolitic et al [11]also reported that patients with malignant masses are significantly older and are most often menopausal than patients with benign adnexal masses.

Parity is a strong protective factor, particularly against the epithelial ovarian cancer (EOC), and the

effect is further intensified by increasing the number of births. Patalich et al [12] showed a 60% lower risk of EOC in women with parity ≥3 as compared with women with parity <1. The risk of ovarian cancer is reduced by 80% in women with parity >5, and increasing parity also protects women against the development of borderline tumours. In the present study, 54% of the patients were having parity between 1-3 and out of this 85% had benign lesions and 15% malignant. Because of the small sample size no significant observation was made in the present study as far as parity is concerned

The value of CA 125 varies between different laboratories depending on type of assay used, but levels <35U/L are considered to be normal. In view of wide distribution of CA 125 expression, serum CA 125 levels can be raised in various benign and inflammatory conditions such as menstruation, pregnancy, endometriosis, pelvic inflammatory disease, and non-gynaecological conditions. In our study CA125 was raised in 35(70%) number of the cases (Table 2) and out of which malignant lesions were 9(25%) and benign pathologies were 26(75%). The combination of pelvic mass and elevated level CA 125 arouses the suspicion of ovarian neoplasm, but other benign conditions should always be considered in the differential diagnosis. Raised

CA125 should not be considered in isolation especially in pre-menopausal female in the Indian scenario. This is so because genital tuberculosis and pelvic inflammatory disease is not uncommon and CA125 may be elevated in these conditions. A study conducted by Moss et al<sup>[13]</sup> in patients with adnexal mass showed that only 20% of the patients had malignancy. Another study by Aziz et al<sup>[14]</sup> in patients with adnexal mass had similar results. In our study sensitivity to diagnose malignancy on the basis of raised CA125 was 90% and specificity 35%, positive predictive value came out to be 25.71% and negative predictive value was 93.3%.

Sonographic evaluation of the structure of an ovarian mass in predicting the risk of malignancy have been reported. Various parameters taken were septal wall thickness, papillary projections, type of cyst. Univariate analysis of variables assessed by ultrasound of adnexal masses in our study showed presence of thick septae in 14, of which 9(64%) were malignant. All 3 cases showing papillary projection were malignant. Out of 14 cases showing multiloculation 11(79%) were found to be positive for malignancy.

In the present study histopathological analysis revealed that surface epithelial tumors were the most common tumors found (46%). serous cystadenoma (28%), 14% were mucinous cystadenoma, and 1% each were serous cystadenocarcinoma and papillary serous cystadenocarcinoma. According to study by Das et al surface epithelial tumor constituted 68% of the all ovarian tumor and serous cystadenoma was the most common benign tumor. Dermoid cyst (18%) the second largest occurring tumor in our study. Other tumors found were endometrioma in 14% of cases, genital tuberculosis in 6% of the cases, papillary adenocarcinoma, clear cell CA and adult granulosa cell tumor in 4% each, fibroid and product of conception in 2% each (Table 2).

Thus CA 125 can be useful when an ovarian mass is felt on exam or seen on ultrasound and the physician is unsure whether it is ovarian cancer. It is recommended that all women with an ovarian mass get a CA 125 level test. The postmenopausal women should be further evaluated if the biomarker level is over 35 U/ml. However, the chances of malignancy is less if CA125 level is normal. Before menopause women should not unnecessarily be evaluated unless the level is very high, since they are more likely to have a noncancer cause of an elevated CA 125.

**Ethical Clearance:** Ethical approval was taken from the Institutional Ethics Committee before initiating the study.

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**Conflict of Interest:** Nil

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# Dependence of Demographic Indicators upon Government Expenditure on Health: A Study of the Indian States

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## Abstract

Investment in health care is becoming more and more significant day by day because of an economic environment where resources are extremely scarce. As a result, there is a growing interest among economists in applying the economic skills to the health issue. As government health services are primarily meant for catering to the needs of the under served population, it will continue to play a significant role as a service provider. Hence, there is an urgent need to understand how demographic indicators vary in response to the changes in government health care expenditure or alternatively what effect does public health care expenditure have upon the demographic indicators (measured in terms of health outcomes).

**Keywords:** *Demographic Indicators, Health Outcomes, Government Expenditure, Health Care.*

## Introduction

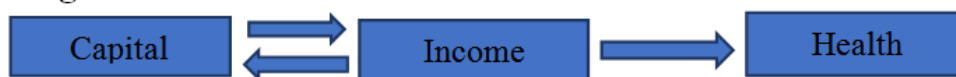
The United Nations adopted its Universal Declaration of Human Rights in 1948, which states that ‘everyone has the right to a standard of living for the health and well-being for himself and his family, including food, clothing, housing, medical care and necessary services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control’. This necessitates the need for government intervention in the

health sector of a country. There is increasing interest on the part of the policymakers in the composition of public spending and it stems in part from the recognition that expenditure allocation in favour of education and health can boost economic growth while promoting equity and reducing poverty<sup>1</sup>. Investment on health in turn plays its part in increasing income also. The following figure explains the three stages framework of health-wealth nexus.

### Stage 1: The Traditional Understanding



### Stage 2: The Current State



### Stage 3: The Desired State



Source: Report of the National Commission on Macroeconomics and health, GoI<sup>2</sup>

**Figure 1: Evolution of understanding of health-wealth nexus**

In the three stages framework of health-wealth nexus, a rapid transition is needed in which efficient health systems improve quality of life, well-being of the people and reduce burden of the disease which in turn will increase the productivity and growth of the economy (stage 3). A huge public investment is needed to push the economy from one stage to the other.

One concern brought about the allocation of the public health care expenditure (PHCE) is the share of PHCE that is to be linked to the Gross Domestic Product (GDP). A study of the relationship between GDP and PHCE in developed countries showed that almost 92% of changes in PHCE can be explained by changes in economic growth, and that GDP per capita growth is the best indicator of the amount of resources a country can afford to allocate to the health sector<sup>3</sup>. Real GDP is the factor that has been identified most influential while determining the health care expenditure<sup>4</sup>. Even in under developed countries, for example a cross-sectional study in 30 African countries reveal that per capita GDP was the most influential factor while explaining per capita health care expenditure<sup>5</sup>. In India, huge gap in different states in economic terms and also in terms of development of health sector can be seen. In a study among the slum dwellers in Hyderabad, India, out-of-pocket health expenditure represents about 10% of total household expenditure<sup>6</sup>. In Rajasthan, India, only 3% of patients at public health facilities have at least one diagnostic test performed on them, but 38% nevertheless get prescribed an injection or a drip<sup>7</sup>. Such low-quality medical care is common throughout the developing world which in turn increases the curative health expenditure among the households. While analysing the performance of individual states, the gap between the states is an issue of serious concern<sup>8</sup>. Health, being a state subject in India, state policies has an important bearing on the public health expenditures in India. After liberalization, degree of control exercised by centre has been reduced in many areas leaving much greater scope for States to improve their performance level and initiatives. Keeping in view the theoretical considerations, the need is to find out whether the public health care expenditure does have a major impact on health outcomes in India. The World Bank Report, 1993 revealed the fact that the burden of disease in developing countries could be reduced greatly if governments provide a minimum package of essential, cost-effective clinical services<sup>9</sup>. From methodological point of view, since a country's growth rate depends on the growth rate of its different states, hence, states will

be a more appropriate units of study and thus, it provides the opportunity for analysing the effect of public health care expenditure on outcomes achieved in India, considering the states as units at a more disaggregated level. Moreover, practically, there is a need to define health in terms of different health indicators such as life expectancy, infant mortality, crude death rate etc.<sup>10</sup>.

**Research Question:** The research question that arises having the above discussed backdrop is whether there is any dependence of demographic indicators on government health expenditure or alternatively whether government health expenditure has a significant influence on health outcomes.

## Methodology

**Area of Coverage:** The study Covers 21 states of India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.

**Period of study:** The period of study is 22 years, i.e., from 1991 to 2012 as adequate data is available for this period.

**Variables and data sources:** The study is based on secondary data. The demographic indicators considered are Crude Birth Rate (CBR), Crude Death Rate (CDR), Infant Mortality Rate (IMR), and Sex Ratio. Government expenditure on health care includes revenue and capital expenditure on medical, public health and family welfare. Main sources of the database are Ministry of Statistics and Programme Implementation (MoSPI) and Ministry of health and family welfare (MoHFW).

**Method Used:** For examining the dependence of demographic indicators upon public health care expenditure in India, statistical tool of linear regression model has been used. This study is a panel data analysis and STATA 11.0 version has been used to perform this procedure.

## Results and Discussion

We use the growth rate of public health care expenditure (PHCE) as the explanatory variable and demographic indicators (CBR, CDR, IMR, and Sex Ratio) as the dependent variables.

First, we consider the demographic indicator Crude Birth Rate (CBR) and the growth rate of public health care expenditure (PHCE).

$$Y_{1t} = \alpha_1 + \beta_1 X_{1t} + U_t \quad \dots(i)$$

(t represents time period)

Where  $Y_{1t}$  represents the CBR,  $X_{1t}$  represents the growth rate of public expenditure on healthcare and  $U_t$  is the error term. The estimated value of equation (i) is given by,

$$\bar{Y}_{1t} = 23.7583 + -0.0391X_{1t} \\ (1.1135) (0.0092)$$

From the above equation, it has been found that CBR is negatively associated with PHCE growth rate. The above equation shows that a 1% increase in PHCE decreases CBR by 0.0391% and CBR is predicted to be 23.7583 when PHCE is zero. The following table shows the effect of PHCE on CBR in different states of India.

**Table 1: Effect of PHCE growth rate on CBR in different states of India: 1991-2012**

Dependent Variable (CBR) ( $Y_1$ )	Coefficients	Standard Error	t value	p>   t
PHCE (%) (Andhra Pradesh)	Reference Category	--	--	--
PHCE (%) (Arunachal Pradesh)	1.8005	.8115	2.22	0.027
PHCE(%) (Assam)	5.5443	.8115	6.83	0.000
PHCE (%) (Bihar)	9.5309	.8115	11.74	0.000
PHCE (%) (Goa)	-6.7025	.8115	-8.26	0.000
PHCE(%) (Gujarat)	3.7334	.8115	4.60	0.000
PHCE(%) (Haryana)	5.5589	.8115	6.85	0.000
PHCE (%) (Himachal Pradesh)	.4289	.8115	0.53	0.597
PHCE (%) (Jammu & Kashmir)	.0119	.8115	0.01	0.988
PHCE (%) (Karnataka)	1.0142	.8115	1.25	0.212
PHCE (%) (Kerala)	-4.4463	.8115	-5.48	0.000
PHCE (%) (Madhya Pradesh)	9.6220	.8116	11.86	0.000
PHCE (%) (Maharashtra)	-.1486	.8116	-0.18	0.855
PHCE (%) (Manipur)	-3.6692	.8115	-4.52	0.000
PHCE (%) (Meghalaya)	6.1706	.8115	7.60	0.000
PHCE (%) (Orissa)	2.0785	.8435	2.46	0.014
PHCE (%) (Punjab)	-.0005	.8115	-0.00	1.000
PHCE (%) (Rajasthan)	9.4177	.8115	11.61	0.000
PHCE (%) (Tamil Nadu)	-2.8999	.8115	-3.57	0.000
PHCE (%) (Uttar Pradesh)	10.9174	.8115	13.45	0.000
PHCE (%) (West Bengal)	-.0898	.8132	-0.11	0.912
Constant	21.4780	.5871	36.59	0.000
Number of observations = 462				
Prob = 0.0000				
R- squared = 0.7752, Adjusted R- squared = 0.7644				

Andhra Pradesh is obtained to be the base or the reference category (decision is arbitrary). The p-value for most of the coefficients in the above table is less than 0.05 indicating that growth rate of PHCE has a significant influence upon CBR (except for the states Himachal Pradesh, Jammu and Kashmir, Maharashtra, Punjab and West Bengal).

We now consider the demographic indicator Crude Death Rate (CDR) and the growth rate of public health care expenditure (PHCE).

$$Y_{2t} = \alpha_2 + \beta_2 X_{2t} + U_t \quad \dots(ii)$$

(t represents time period)

Where  $Y_{2t}$  represents the CDR,  $X_{2t}$  represents the growth rate of public expenditure on healthcare and  $U_t$  is the error term. The estimated value of equation (ii) is given by

$$\bar{Y}_{2t} = 7.8569 + -.0106X_{2t} \\ (.0606) (.0033)$$

It is found from the above equation that CDR is also negatively associated with PHCE growth rate. The above equation shows that a 1% increase in PHCE decreases CDR by .0106% and CDR is predicted to be 7.8569 when PHCE is zero. The following table shows the effect of PHCE on CDR in different states of India.

**Table 2: Effect of PHCE growth rate on CDR in different states of India: 1991-2012**

Dependent Variable (CDR) ( $Y_2$ )	Coefficients	Standard Error	t value	p>   t
PHCE (%) (Andhra Pradesh)	Reference category	--	--	--
PHCE (%) (Arunachal Pradesh)	-1.6507	.2931	-5.63	0.000
PHCE(%) (Assam)	1.1931	.2931	4.07	0.000
PHCE (%) (Bihar)	.5489	.2931	1.87	0.062
PHCE (%) (Goa)	-.8329	.2931	-2.84	0.005
PHCE(%) (Gujarat)	-.4913	.2931	-1.68	0.094
PHCE(%) (Haryana)	-.6918	.2931	-2.36	0.019
PHCE (%) (Himachal Pradesh)	-.5074	.2931	-1.73	0.084
PHCE (%) (Jammu & Kashmir)	-2.0315	.2931	-6.93	0.000
PHCE (%) (Karnataka)	-.4817	.2930	-1.64	0.101
PHCE (%) (Kerala)	-1.6179	.2931	-5.52	0.000
PHCE (%) (Madhya Pradesh)	2.0585	.2931	7.12	0.000
PHCE (%) (Maharashtra)	-.9520	.2931	-3.25	0.001
PHCE (%) (Manipur)	-2.9920	.2931	-10.21	0.000
PHCE (%) (Meghalaya)	.0812	.2930	0.28	0.782
PHCE (%) (Orissa)	1.8518	.3047	6.08	0.000
PHCE (%) (Punjab)	-.8253	.2931	-2.82	0.005
PHCE (%) (Rajasthan)	-.0588	.2931	-0.20	0.841
PHCE (%) (Tamil Nadu)	-.2487	.2931	-0.85	0.397
PHCE (%) (Uttar Pradesh)	1.6419	.2931	5.60	0.000
PHCE (%) (West Bengal)	-.9925	.2937	-3.38	0.001
Constant	8.1889	.2120	38.62	0.00
Number of observations = 462				
Prob = 0.0000				
R- squared = 0.6476, Adjusted R- squared = 0.6308				

Andhra Pradesh is obtained to be the base or the reference category (decision is arbitrary). The p-value for most of the coefficients in the above table is less than 0.05 indicating that growth rate of PHCE has a significant influence upon CDR (except for the states Bihar, Gujarat, Himachal Pradesh, Karnataka, Meghalaya, Rajasthan and Tamil Nadu).

Let us, now, find out the effect of the growth rate of public health care expenditure (PHCE) upon the Infant

Mortality Rate (IMR) in India.

$$Y_{3t} = \alpha_3 + \beta_3 X_{3t} + U_t \quad \dots(iii) \\ (t \text{ represents time period})$$

Where  $Y_{3t}$  represents the IMR,  $X_{3t}$  represents the growth rate of public health care expenditure and  $U_t$  is the error term. The estimated value of equation (iii) is given by,



$$\hat{Y}_{3t} = 55.2816 + -.1503X_{3t}$$

(.6568) (.0359)

It is found from the above equation that IMR is also negatively associated with PHCE growth rate.

The above equation shows that a 1% increase in PHCE decreases IMR by .1503% and IMR is predicted to be 55.2816 when PHCE is zero. The following table shows the effect of PHCE on IMR in different states of India:

**Table 3: Effect of PHCE growth rate on IMR in different states of India: 1991-2012**

Dependent Variable (IMR) (Y <sub>3</sub> )	Coefficients	Standard Error	t value	p>  t
PHCE (%) (Andhra Pradesh)	Reference category	--	--	--
PHCE (%) (Arunachal Pradesh)	-16.5471	3.1758	-5.21	0.000
PHCE (%) (Assam)	10.3835	3.1758	3.27	0.001
PHCE (%) (Bihar)	1.8110	3.1758	0.57	0.569
PHCE (%) (Goa)	-36.9891	3.1757	-11.65	0.000
PHCE (%) (Gujarat)	-2.9866	3.1757	-0.94	0.347
PHCE (%) (Haryana)	1.8247	3.1757	0.57	0.566
PHCE (%) (Himachal Pradesh)	-6.1688	3.1759	-1.94	0.053
PHCE (%) (Jammu & Kashmir)	-9.4122	3.1758	-2.96	0.003
PHCE (%) (Karnataka)	-6.0889	3.1756	-1.92	0.056
PHCE (%) (Kerala)	-46.2621	3.1758	-14.97	0.000
PHCE (%) (Madhya Pradesh)	24.6894	3.1763	7.77	0.000
PHCE (%) (Maharashtra)	-17.2676	3.1761	-5.44	0.000
PHCE (%) (Manipur)	-40.1788	3.1757	-12.65	0.000
PHCE (%) (Meghalaya)	-2.9173	3.1756	-0.92	0.359
PHCE (%) (Orissa)	22.9969	3.3012	6.97	0.000
PHCE (%) (Punjab)	-12.6733	3.1757	-3.99	0.000
PHCE (%) (Rajasthan)	13.6484	3.1758	4.30	0.000
PHCE (%) (Tamil Nadu)	-16.1295	3.1759	-5.08	0.000
PHCE (%) (Uttar Pradesh)	18.2416	3.1756	5.74	0.000
PHCE (%) (West Bengal)	-11.2568	3.1826	-3.54	0.000
Constant	61.5331	2.2974	26.78	0.000
Number of observations = 462				
Prob = 0.0000				
R- squared = 0.7766, Adjusted R- squared = 0.7659				

Andhra Pradesh is obtained to be the base or the reference category (decision is arbitrary). The p-value for most of the coefficients in the above table is less than 0.05 indicating that growth rate of PHCE has a significant influence upon IMR (except for the states Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, and Meghalaya).

Let us, now, find out the effect of the growth rate of public health care expenditure (PHCE) upon the Sex ratio in India.

$$Y_{4t} = \alpha_4 + \beta_4 X_{4t} + U_t \quad \dots(iv)$$

(t represents time period)

Where Y<sub>4t</sub> represents the Sex ratio, X<sub>4t</sub> represents the growth rate of public expenditure on healthcare and U<sub>t</sub> is the error term. The estimated value of equation (iv) is given by,

$$\hat{Y}_{4t} = 939.7628 + .0868X_{4t}$$

(9.8710) (.0278)

From the above equation, it is found that the PHCE growth rate has a positive impact upon the sex ratio in India. The above equation shows that a 1% increase in PHCE increases sex ratio by .0868% and sex ratio

is predicted to be almost 940 when PHCE is zero. The following table will show the effect of PHCE on Sex Ratio in different states of India.

**Table 4: Effect of PHCE growth rate on sex ratio in different states of India: 1991-2012**

Dependent Variable (sex ratio) (Y <sub>4</sub> )	Coefficients	Standard Error	t value	p>  t
PHCE (%) (Andhra Pradesh)	Reference category	--	--	--
PHCE (%) (Arunachal Pradesh)	-84.5562	2.4645	-34.31	0.000
PHCE(%) (Assam)	-44.3151	2.4645	-17.98	0.000
PHCE (%) (Bihar)	-64.6440	2.4645	-26.23	0.000
PHCE (%) (Goa)	-16.4990	2.4644	-6.69	0.000
PHCE(%) (Gujarat)	-57.3522	2.4644	-23.27	0.000
PHCE(%) (Haryana)	-113.6665	2.4644	-46.12	0.000
PHCE (%) (Himachal Pradesh)	-10.1293	2.4645	-4.11	0.000
PHCE (%) (Jammu & Kashmir)	-86.7591	2.4645	-35.20	0.000
PHCE (%) (Karnataka)	-16.4557	2.4643	-6.68	0.000
PHCE (%) (Kerala)	79.3002	2.4645	32.18	0.000
PHCE (%) (Madhya Pradesh)	-59.5280	2.4648	-24.15	0.000
PHCE (%) (Maharashtra)	-54.4166	2.4647	-22.08	0.000
PHCE (%) (Manipur)	-5.0281	2.4644	-2.04	0.042
PHCE (%) (Meghalaya)	-7.4043	2.4643	-3.00	0.003
PHCE (%) (Orissa)	-5.1281	2.5618	-2.00	0.046
PHCE (%) (Punjab)	-99.0240	2.4644	-40.18	0.000
PHCE (%) (Rajasthan)	-60.3824	2.4644	-24.50	0.000
PHCE (%) (Tamil Nadu)	5.1014	2.4646	2.07	0.039
PHCE (%) (Uttar Pradesh)	-85.1901	2.4643	-34.57	0.000
PHCE (%) (West Bengal)	-47.6010	2.4697	-19.27	0.000
Constant	979.4571	1.7828	549.37	0.000
Number of observations = 462				
Prob = 0.0000				
R- squared = 0.9679, Adjusted R- squared = 0.9664				

Andhra Pradesh is obtained to be the base or the reference category (decision is arbitrary). The p-value for all the coefficients in the above table is less than 0.05 indicating that growth rate of PHCE has a significant influence upon sex ratio.

**Conclusion**

An efficient and equitable expenditure on health care in a country by the government contributes a lot in terms of improvement of human capital formation which in other way will improve the productivity of the country. There is an urgent need on the part of the government to

contribute a larger section of a country’s Gross Domestic Product on health care and education. Taking into account the equity considerations, the increased public expenditure would help the poor and socio-economically backward people to access the services as they cannot afford a private provider. Hence the study of the effect of public health care expenditure on health outcome is of utmost necessity to assess a country’s contribution to the formation of human capital.

**Ethical Clearance:** As this paper is based on secondary data and information, hence no ethical clearance has been obtained for this purpose.

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**Conflict of Interest:** Nil

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# Correlation of Total Serum Calcium and Ionic Calcium Levels with Severity of Birth Asphyxia

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## Abstract

**Background:** Birth asphyxia is a leading cause of morbidity and mortality among neonates in India. Common complications of birth asphyxia are cerebral palsy, persistent pulmonary hypertension of newborn, cardiogenic shock, irreversible renal cortical necrosis, hypotension, and heart failure. The risk of hypoxic-ischemic encephalopathy (HIE) increases with increasing severity of birth asphyxia. Hypocalcemia occurs with increased frequency in neonates with birth asphyxia. In our present study, we measured both ionized and total serum calcium levels in neonates with birth asphyxia and compared these levels with normal healthy neonates. Among cases, serum and ionic calcium levels were compared among neonates with different stages of HIE to find co-relation of calcium levels with the severity of birth asphyxia.

**Method:** Total serum calcium and ionic calcium levels obtained at birth were compared among neonates with and without birth asphyxia. Among asphyxiated neonates, total and ionic calcium levels were compared among neonates with different staging of HIE.

**Results:** Total serum calcium and ionic calcium levels at birth were significantly lower in cases ( $8.04 \pm 0.89$  mg/dl,  $3.62 \pm 0.46$  mg/dl) as compared to controls ( $9.32 \pm 0.72$  mg/dl,  $4.79 \pm 0.49$  mg/dl). In the case group level of Total serum calcium and ionic calcium levels showed a decreasing trend with increasing stage of HIE. Level of total serum calcium and ionic calcium were  $8.88 \pm 0.290$ ,  $4.03 \pm 0.178$  mg/dl among babies who had no HIE,  $8.07 \pm 0.675$ ,  $3.61 \pm 0.354$  mg/dl among babies who had HIE-1,  $7.78 \pm 0.572$ ,  $3.54 \pm 0.572$  mg/dl among babies who had HIE-2 and  $7.03 \pm 0.596$ ,  $3.12 \pm 0.342$  mg/dl among babies who had HIE-3.

**Conclusion:** Total serum calcium and ionic calcium levels are decreased in birth asphyxia. Total serum and ionic calcium levels are also decreased with increasing severity of HIE.

**Keywords:** Birth Asphyxia, Total serum Calcium, Ionic Calcium, Hypoxic Ischemic encephalopathy.

## Introduction

Birth asphyxia is an insult to the fetus or the newborn due to lack of oxygen (hypoxia) and lack of

perfusion (ischemia) to various organs of sufficient magnitude and duration to produce various functional and biochemical changes. It is the leading cause of morbidity and mortality among neonates in India. Along with prematurity and systemic infections birth asphyxia is one of the three most common causes of neonatal deaths<sup>1,2</sup>. Out of a total of 2.7 million stillbirths occurring globally 1.2 million occur during the intrapartum period largely due to asphyxia<sup>3</sup>. Common complications of birth asphyxia are cerebral palsy, persistent pulmonary hypertension of newborn, cardiogenic shock, irreversible renal cortical necrosis, hypotension, and heart failure<sup>4</sup>. Hypoxic-ischemic encephalopathy (HIE) is a disturbed

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neurological and behavioral state consisting of altered level of consciousness and other signs of brain stem and motor dysfunction. HIE can be classified into three stages as per Sarnat and Sarnat scoring system. The risk of HIE increases with increasing severity of birth asphyxia. HIE staging and timely management is important to prevent serious long term neuromotor abnormalities among survivors<sup>5</sup>.

Various metabolic derangements have been seen in asphyxiated newborns. Hypoglycemia, hyperkalemia, hyponatremia, hyperuricemia, hypocalcemia, and raised creatinine levels are the biochemical abnormalities associated with poor outcomes in birth asphyxia<sup>6</sup>.

Hypocalcemia occurs with increased frequency in neonates with birth asphyxia<sup>7</sup>. Hypocalcemia in asphyxiated infants may trigger seizures or may compromise cardiovascular function with deleterious consequences<sup>8</sup>. Calcium occurs in two forms in serum Total serum calcium and ionic calcium. Correlation between ionized and total serum calcium level is poor when serum albumin concentration is low. In our present study, we measured both ionized and total serum calcium levels in neonates with birth asphyxia and compared these levels with normal healthy neonates. Among cases, total serum and ionic calcium levels were compared among neonates with different stages of hypoxic-ischemic encephalopathy to find a correlation of calcium levels with the severity of birth asphyxia.

### **Material and Method**

A total of 100 neonates admitted in the Neonatal Intensive Care Unit in the Department of Pediatrics, MMIMSR, Mullana (Ambala) were enrolled for study. Approval from the institutional ethical committee and informed consent from parents was taken before starting the study. Fifty term neonates, appropriate for gestational age with birth asphyxia (APGAR score < 7 at five minutes of life) were included in the case group. The control group included 50 term neonates appropriate for gestational age without birth asphyxia. Preterm and post-term neonates, neonates having gross congenital malformation, neonates of mother having diabetes, chronic renal or hepatic disease were excluded

from the study. Among the case group, Sarnat and Sarnat scoring was done and neonates were classified having no HIE, stage 1, stage 2 or stage 3 of HIE. Two ml of cord blood samples collected at the time of birth were used for the assessment of ionized and total serum calcium values at birth. Total serum calcium levels were obtained by analysis on a fully automatic biochemical analyzer, SIEMENS Dimensions Rxl Max Integrated Chemistry System. Ionized calcium levels were obtained by a fully automatic electrolyte analyzer, HDC Lyte Automated HD Consortium India Limited Descriptive and inferential statistical analysis of the data was done. SPSS (Statistical package for social sciences) version 21 was used for data analysis and interpretation. Total serum calcium and ionic calcium levels at birth were compared among asphyxiated and non asphyxiated neonates. Among the case group, total and serum calcium levels at birth were compared among neonates with different stages of hypoxic-ischemic encephalopathy and mode of resuscitation used.

### **Results**

There were 29 males and 21 females among cases and 31 males and 19 females among controls. Mean birth weight was  $2.72 \pm 0.44$  kgs among cases and was  $2.80 \pm 0.40$  kgs among controls. 27 neonates were delivered by vaginal delivery and 23 were delivered by caesarian section both among cases and controls. Out of 50 cases of birth asphyxia, 33 babies were resuscitated by the bag and mask ventilation and 17 cases were resuscitated by bag and tube ventilation. Among cases 18 did not develop HIE, 10 newborn developed HIE-1, 9 developed HIE 2 and 13 developed HIE 3.

Total serum calcium and ionic calcium at birth were found to be significantly lower among cases ( $8.04 \pm 0.89$ ,  $3.62 \pm 0.46$  mg/dl) as compared to controls ( $9.32 \pm 0.72$ ,  $4.79 \pm 0.49$  mg/dl) with p value < 0.001.

In case group significantly lower value of Total serum calcium and ionic calcium at birth were found among babies resuscitated by bag and tube ( $7.20 \pm 0.64$ ,  $3.22 \pm 0.39$  mg/dl) as compared to babies resuscitated by bag and mask ( $8.47 \pm 0.67$ ,  $3.83 \pm 0.34$  mg/dl) with p-value < 0.001.

**Table 1: Comparison of Total serum calcium and ionic calcium levels at birth among case group on the basis of mode of resuscitation used**

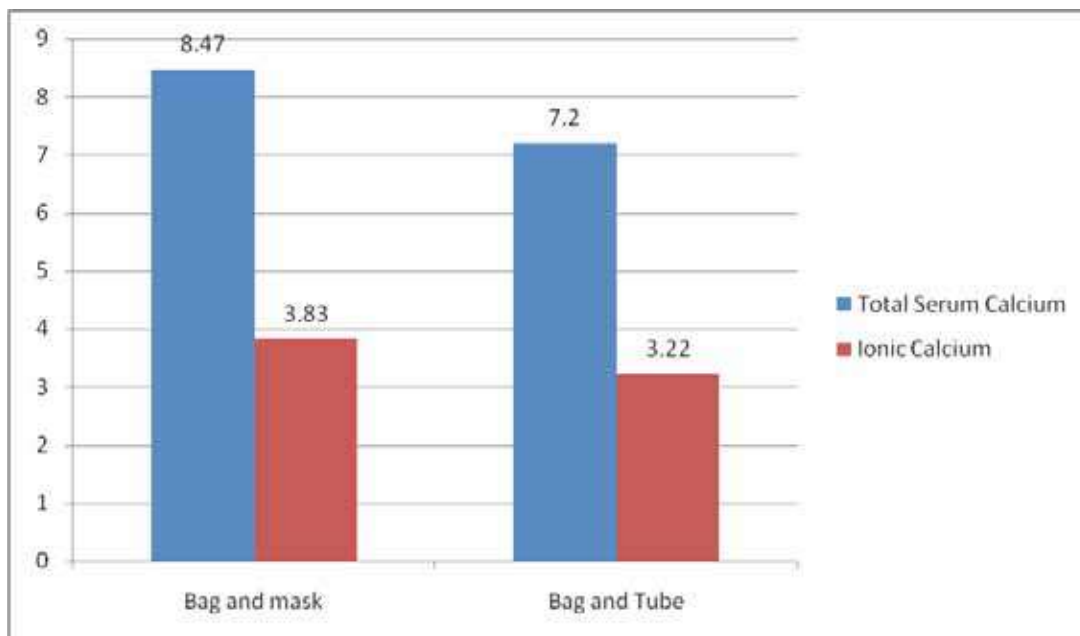
Group-Cases	Mode of Resuscitation Used	Number	Mean	SD	p-value
Total Serum Calcium (mg/dl)	Bag and mask	33	8.47	0.67	<0.001
	Bag and tube	17	7.20	0.64	
Ionized Calcium (mg/dl)	Bag and mask	33	3.83	0.34	<0.001
	Bag and tube	17	3.22	0.39	

In case group level of Total serum calcium at birth was  $8.88 \pm 0.290$  mg/dl among babies who had no HIE,  $8.07 \pm 0.675$  mg/dl among babies who had HIE-1,  $7.78 \pm 0.572$  mg/dl among babies who had HIE-2 and  $7.03 \pm 0.596$  mg/dl among babies who had HIE-3. Level of ionic calcium at birth was  $4.03 \pm 0.178$  mg/dl among

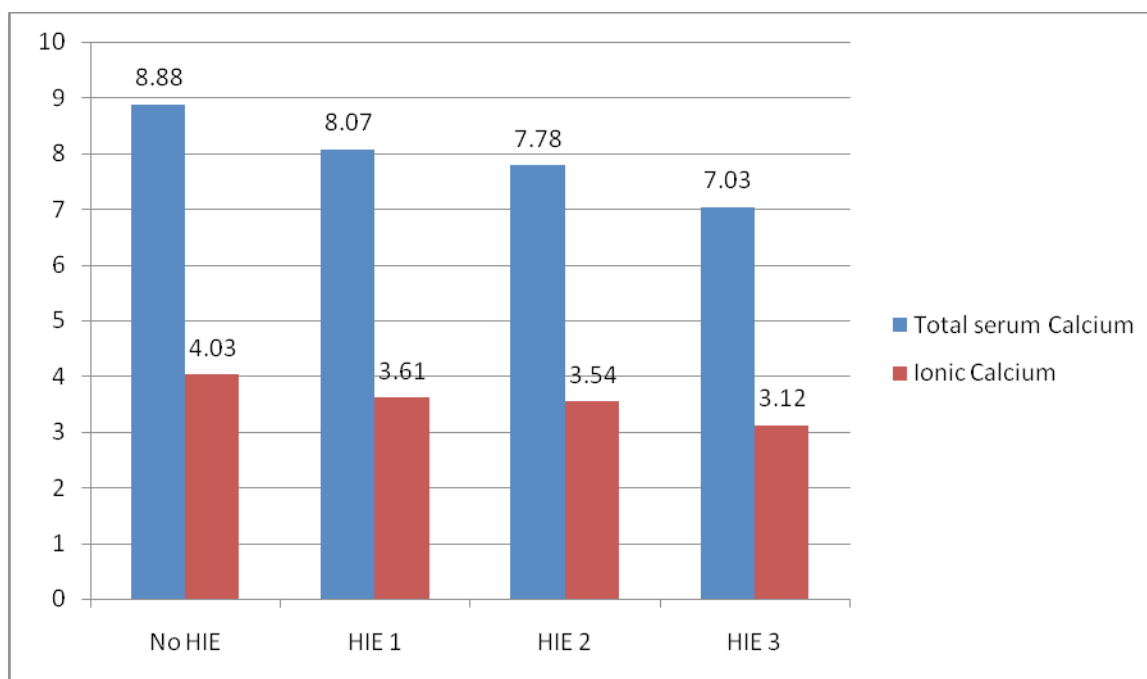
babies who had no HIE,  $3.61 \pm 0.354$  mg/dl among babies who had HIE-1,  $3.54 \pm 0.572$  mg/dl among babies who had HIE-2 and  $3.12 \pm 0.342$  mg/dl among babies who had HIE-3. Pearson correlation coefficient was  $-0.818$  for Total serum calcium and  $-0.769$  for ionic calcium.

**Table 2: Comparison of Total serum calcium and ionic calcium levels at birth among case group on basis of HIE staging**

Group-Cases	HIE Stage	Number	Mean	SD	p-value	Pearson Correlation
Total Serum Calcium (mg/dl)	0	18	8.88	0.290	<0.001	-0.818
	1	10	8.07	0.675		
	2	9	7.78	0.572		
	3	13	7.03	0.596		
Ionic Calcium (mg/dl)	0	18	4.03	0.178	<0.001	-0.769
	1	10	3.61	0.354		
	2	9	3.54	0.332		
	3	13	3.12	0.342		



**Figure 1: Comparison of Total serum calcium and ionic calcium levels at birth among case group on the basis of mode of resuscitation used**



**Figure 2: Comparison of Total serum calcium and ionic calcium levels at birth among case group among different HIE staging**

## Discussion

Birth asphyxia is one of the leading causes of perinatal death and recognizable cause of brain damage in newborn.<sup>9</sup> Common complications of birth asphyxia are cerebral palsy, irreversible renal cortical necrosis, persistent pulmonary hypertension of newborn, hypotension, cardiogenic shock or heart failure.<sup>10,11</sup> A number of metabolic disturbances like thermal instability, lactic acidosis, hypoglycemia, low sodium, and low calcium levels may occur along with birth asphyxia.<sup>12</sup> Only a third of deliveries in India are institutional and many asphyxiated babies are brought late to hospitals.<sup>3</sup> The signs of asphyxial injury are nonspecific and overlap with other illnesses. In the absence of perinatal records, it is difficult to retrospectively diagnose perinatal asphyxia. Several studies have been conducted to evaluate markers that help distinguish an asphyxiated from non-asphyxiated neonates and to assess the severity of asphyxia. Cerebral function of the newborn may be assessed by various noninvasive methods such as EEG, MRI, Cranial ultrasound and by various blood samples such as level of CK-BB, LDH, etc. But in India, these tests are usually available at tertiary care hospitals only. We conducted our study to check levels of total serum calcium and ionic calcium in birth asphyxia

and its relation with the severity of hypoxic-ischemic encephalopathy. Calcium level is a routine test available at most of the primary health facilities. Co-relation of calcium levels with severity of birth asphyxia will help in advance prediction of severity of birth asphyxia and its timely management.

Our study showed a significant decrease (with  $p$ -value < 0.001) of total serum calcium and ionic calcium levels both at birth among asphyxiated newborns as compared to non asphyxiated newborns. A study conducted by P Basu et al<sup>13</sup> had also concluded that total serum calcium level is lower in asphyxiated newborns as compared to non asphyxiated newborns. Studies conducted by Yoneda S et al<sup>14</sup> who had also reported lower ionized calcium levels at birth in asphyxiated newborns as compared to non asphyxiated newborns.

In our present study Total serum, calcium and ionic calcium levels showed a decreasing trend with increasing severity of HIE with Pearson correlation coefficient -0.818 for Total serum calcium and -0.769 for ionic calcium. In Study done by Yoneda S et al<sup>14</sup> neonates with birth asphyxia were divided into two groups of HIE, neonates with HIE who made full recovery and neonates with HIE having poor outcome and it was concluded that

serum ionic calcium levels were significantly lower in neonates with HIE who had poor outcome as compared to neonates with HIE who had favorable outcome. Results similar to our study showing lower levels of serum calcium levels with increasing severity of HIE were also reported by study by Seema Shah et al<sup>4</sup>. In

Study done by Yoneda S et al<sup>14</sup> neonates with birth, asphyxia were divided into two groups of HIE, neonates with HIE who made full recovery and neonates with HIE having poor outcome had also concluded that serum ionic calcium levels shortly after birth were significantly lower in neonates with HIE who had poor outcome

**Table 3: Comparison of total serum calcium levels in different HIE stages between Seema Shah et al<sup>4</sup> study and our study**

Study Type	Hie Stage	Number	Total Serum Calcium Levels
Seema shah et al study <sup>4</sup>	Non-HIE	25	9.12±0.64
	HIE-1	8	8.32±1.12
	HIE-2	16	7.76±0.48
	HIE-3	9	7.12±0.56
Our study	Non-HIE	18	8.88±0.29
	HIE-1	10	8.07±0.68
	HIE-2	9	7.78±0.58
	HIE-3	13	7.03±0.60

**Conclusion**

From our present study, it can be concluded that birth asphyxia leads to a decrease in both total serum calcium and ionic calcium levels at birth. Also, both total serum and ionic calcium levels are decreased in proportion to the severity of hypoxic-ischemic encephalopathy.

**Funding:** Nil

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from Institutional Ethics Committee, Maharishi Markandeshwar (Deemed to be) University, Mullana, Ambala, Haryana.

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# Usage of Complementary Alternative Medicine among the Patients Attending Tertiary Care Hospital

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## Abstract

**Background:** Complementary and alternative medicine (CAM) includes Ayurveda, Homeopathy, Unani, yoga and Naturopathy, and other traditional medicine.

**Aim and Objectives:** The study was conducted to determine the prevalence of usage of CAM among the patients attending tertiary care hospital.

**Methodology:** It was observational study. 528 patients were included in to the study randomly from out-patient department. Study instrument was a pre-designed, pre-tested, semi-structured schedule.

**Results:** The prevalence of Complementary alternative Medicine usage was 22.3%. Homeopathy was used most commonly (59.3%) by the users. 10.2% of users were continuing the usage of CAM. Most common indications for usage of CAM were musculo-skeletal problems (29.7%), allergies (23.7%).

**Conclusion:** Around one-fourth of patients attending tertiary care hospital were using CAM. Patients opted for CAM because of lesser side effects and more effective. Only few percent revealed to the doctors about the usage of CAM

**Keywords:** *Complementary Alternative medicine, alternative medicine, Ayurveda, Homeopathy, Unani.*

## Introduction

Health care usage in India is influenced by many social, cultural factors which are usually diversified in nature. With escalating costs of allopathic medicine, and continuing demand for health care services there is need to explore how the people are tackling their health care needs. World Health Organization in its document it is

stated that “traditional and complementary medicine can make a significant contribution to the goal of Universal Health coverage by being included in the provision of essential health services”<sup>1</sup>.

Traditional medicine is based on the knowledge, skills, beliefs of indigenous cultures, Complementary medicine or alternative medicine refer to broad set of health care practices that are not part of that country’s own tradition or conventional medicine and are not fully integrated into the dominant health-care system<sup>2</sup>.

The example of complementary alternative medicine includes Ayurveda, Homeopathy, Unani, Naturopathy etc. and these include Chinese, Asian, Pacific Islander, American Indian and Tibetan practices<sup>3</sup>.

A study done in India about AYUSH services expressed that understanding patterns of usage in various socio-demographic groups is important<sup>4</sup>.

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This study was planned to know the magnitude and type of complementary alternative medicine usage among the patients attending the tertiary care hospital.

**Objectives:**

1. To determine the prevalence and most common type of Complementary Alternative medicine usage.
2. To determine the indications associated with the usage of CAM.

**Material and Method**

**Type of Study:** Descriptive cross-sectional study.

**Study Population:** Patients attending out-patient department of tertiary care hospital.

Study was conducted in October 2019 between 9.30 to 11.30 am at out-patient department. Total of 528 patients after returning from check-up in out-patient departments were taken into study randomly.

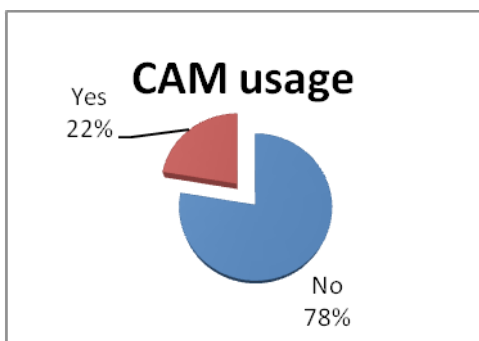
**Study Instrument:** A semi-structured, pre-designed, pre-tested schedule was applied after taking informed consent from the study participants. It contains questions related to socio-demographic details, usage of Complementary alternative medicine, indications for usage, reasons and type of CAM.

**Exclusion Criteria:** Patients aged below 15 years, who are severely ill.

Study analysis was done by using micro soft excel and SPSS software 22 version.

**Results**

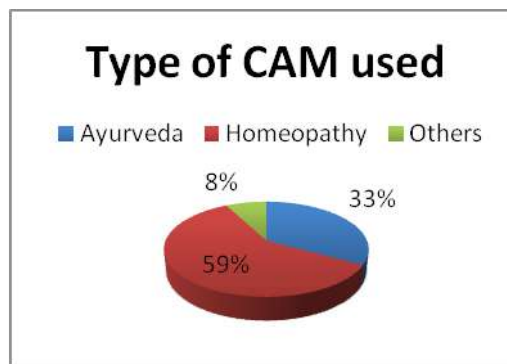
Among the total study subjects (528), more than two fifth of study subjects (22.3%)(118 out of 528) had used complementary alternative medicine (CAM). (Figure-1)



**Figure 1: The prevalence of CAM usage:**

Among them who revealed the usage of

Complementary alternative medicine, the most common type used by them was Homeopathy (59.3%), and Ayurveda (33%) (Figure-2)



**Figure 2: Types of CAM usage:**

Among them who had used Complementary alternative medicine, More than 85% of them belonged to low socio-economic status (based on Government Ration card). Majority (86.4%) were belong to Hindu religion. Most of the study subjects were males (61%) and were educated up to high school (55.9%)(Table-1).

**Table 1: Socio-demographic details of study subjects who had used Complementary alternative medicine (n=118)**

	N (%)
<b>Age in Years:</b>	
≤20	6 (5.1)
21-30	14 (11.9)
31-40	32 (27.1)
41-50	18 (15.3)
>50	<b>48 (40.7)</b>
<b>Gender:</b>	
Females	46 (39.0)
Males	<b>72 (61.0)</b>
<b>Ration Card:</b>	
Yes	<b>104 (88.1)</b>
No	14 (11.9)
<b>Education:</b>	
Illiterates	14 (11.9)
Primary and high school	<b>66 (55.9)</b>
Intermediate and above	38 (32.3)
<b>Religion:</b>	
Hindu	<b>102 (86.4)</b>
Christian	6 (5.1)
Muslim	8 (6.8)
Others	2 (1.7)

Around one third (33.1%) of the users were revealed that they were continuing the usage of Complementary

Alternative medicine while others (66.9%) were told that they used it in past one year.

Regarding indications of CAM usage: more than one fifth (29.7%) of them were using it for musculoskeletal problems and another chunk of one fifth (23.7%) of them were using it for Allergies (allergic rhinitis, dermatitis, food allergies). Other indications were Asthma (19%), Diabetes (19%), and for other indications (14.4%) (Table-2)

**Table 2: Indications for usage of complementary Alternative Medicine (n=118)**

Indication for usage of CAM	N (%)
Allergies	28 (23.7)
Bronchial asthma	19 (16.1)
Diabetes	19 (16.1)
Musculoskeletal problem	35 (29.7)
Others	17 (14.4)
Total	118

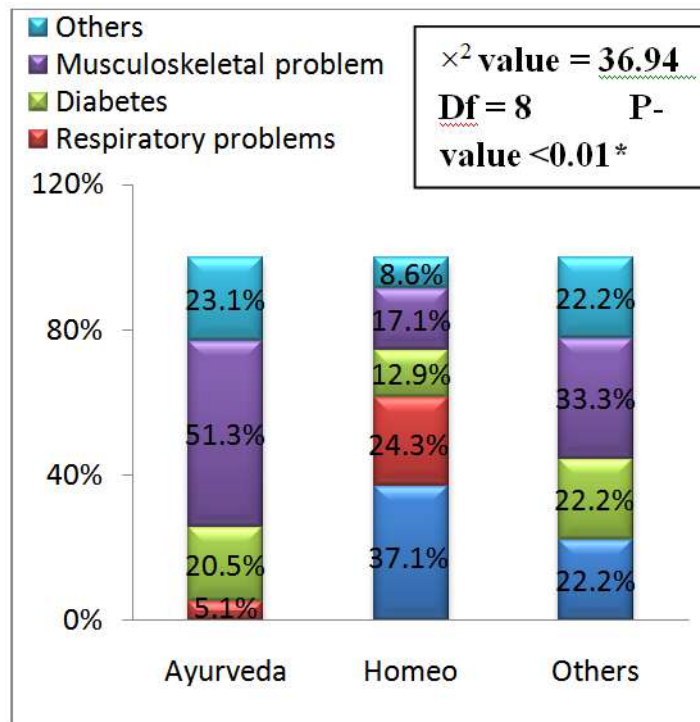
More than two fifth (45.8%) of users said that they considered usage of CAM because of lesser side effects. Other reasons for the usage said by them were more effective (16.9%), less cost (15.3%), no improvement with allopathy (13.6%), belief on practitioner (5.1%) (Table-3).

**Table 3 Reasons for usage of CAM:**

Reason for using CAM	N (%)
No improvement with allopathy	16 (13.6)
Less cost	18 (15.3)
Safer/less side effects	54 (45.8)
Belief on practitioner	6 (5.1)
Easy availability	4 (3.4)
More effective	20 (16.9)
Total	118

Very few of them (6.8%) told to their doctor about their usage of CAM, where as others didn't reveal because their doctor didn't ask them (47.5%), fear to tell (27.1%), forgot to reveal (11.9%) and because they felt there was no need to reveal because they were using natural medicine (6.8%).

Among the study subjects who were using Ayurveda, more than half of them (51.3%) were using it for musculoskeletal problems, and more than one third (37.1%) of homeopathy users were said that they were using it for Allergies. It was found to be statistically significant (figure-3).



**Figure 3: Type of CAM usage in relation with indications**

## Discussion

This study was done among the patients attending out-patient department in a tertiary care hospital.

The prevalence of usage of Complementary Alternative Medicine was found to be 22.3% among the study subjects (n=528). (figure-1). This result is in similar lines with study done at a tertiary care hospital by Roy V et al<sup>5</sup> and study done by Arjun aRao et al<sup>6</sup>. The present study result is lesser than the prevalence found out in a study done in North India<sup>7</sup> and study done by Jayanthi Roy et al<sup>8</sup>. This difference may be because difference in the study population.

The most common type of CAM usage was homeopathy (59.3%) and next comes Ayurveda (33.1%). (figure-2). This is different in lines with the studies done by M.S. Bhalerao et al<sup>9</sup>, Arjuna Rao et al<sup>6</sup>, M J Ranath et al<sup>10</sup>. where most common CAM was Ayurveda.

Most of the CAM users (88.1%) were belonged to low socio-economic class.(table-1) This findings in similar lines with study done by Rudra S et al<sup>4</sup> based on NSS 2014 survey.

The common indications for usage of CAM were musculoskeletal problems (29.7%), Allergies (23.7%) (table-2) which is similar to finding revealed in study done by Jayanthi Roy<sup>8</sup>.

It was found that Ayurveda, Homeopathy used mainly for musculoskeletal problems and allergies respectively. (figure-3)

The reasons for usage of CAM were found to be safer (less side effects), more effective, less cost Table-3).

## Conclusion and Recommendation

Around one-fourth of study subjects were CAM users and Homeopathy was common type used by them. They were using CAM for musculoskeletal problems, allergies, bronchial asthma, Diabetes. Only few persons revealed to the doctor that they were using CAM. Sensitization should be done to patients that they should reveal about the usage of CAM to the treating doctors.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Taken from Institutional ethics committee.

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# Adoption of Health Management Information System (HMIS) among ESIC Healthcare Professionals in Southern Districts of Tamil Nadu: An Integrated Model

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## Abstract

It has been emphasised that a Health Management Information System (HMIS) will improve the ability to collect, store and analyse accurate health data, service delivery efficiency and effectiveness of intervention. The objective of the system is to record information on health events and check the quality of services at different levels of healthcare. The successful implementation of Information and Communications Technology (ICT) and health programmes requires complex balancing of the competing views and concerns of the different stakeholders. Some clinicians will view new technology with suspicion, fearing its challenge to their professional autonomy and status. Patients will often seize on the potential benefits but will also hold legitimate concerns about the security and confidentiality of any electronically held patient data. IT specialists may seek to use cutting edge technology in the respective environments where existing tried and tested technology would be more than adequate to deliver real improvements in patient care. The adoption of the health management information system among Employees' State Insurance Corporation (ESIC) healthcare professionals and important issues related to system usage, including the implementation and current use of the HMIS at ESIC main hospital and dispensaries in Tirunelveli sub-region were examined by using a Technology Acceptance Model (TAM). Information and data were collected from 171 ESIC healthcare professionals in three southern districts (Tirunelveli, Tuticorin and Kanyakumari) in Tamil Nadu. An analysis provided enough evidence for the proposition that integration of ICT with the health care professional – patient relationship adequately addressed the service efficiency.

**Keywords:** *ICT, Health Management Information System, Stakeholders, Information systems and Service Efficiency*

## Introduction

In the context of increasing incidences of both communicable and non-communicable diseases, especially among the rural poor, a strong and vibrant hospital management information system (HMIS) is warranted. The HMIS is defined as a subsystem of a hospital, which comprises all information processing actions as well as the associated human or technical actors in their respective information processing role. To maximize communication in a hospital, the managing

organization should consider two parts: a human part and a machine or technical part. Successful implementation is dependent on how these two parts of a hospital work together to handle changes as well as challenges<sup>[7]</sup>. Here technology is the enabler and not the driver and further, more emphasis should be put on the people working in these newer forms of information system. To provide optimal care, health care institutions need timely patient information from different sources at the point-of-care<sup>[9]</sup>. One way to achieve this is through the use of ICT in health care. This encompasses the full range of electronic digital and analogue ICT, from radio and television to telephones (fixed and mobile), computers, electronic-based media such as digital text and audio-video recording, and the internet.

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**Review of Literature:** A stratified random sample of medical group practices was used in a study by

Gans, Kralewski, Hammons, & Dowd, (2005) to know the progress of adoption of electronic health records (EHRs). Group practices were defined as three or more physicians practicing together with a common billing and medical record system. The main aim of the study was to assess the information technology usage of the medical practitioners. A five point scale was used to rate the benefits of electronic health records. It was found that electronic health records improved the access to medical record information. Further, they improved the workflow in medical practice and also brought about improved patient care<sup>[1]</sup>.

Some studies used the telemedicine referrals as a second opinion advice tool. Technology helped a lot in assisting the patients and updating medical knowledge. The staff was told about the available technology. Further, proper training and equipments were also given to them. But the main problem was that the staff was unable to put the technology into real practice (Shiferaw & Zolfo, 2012). Telemedicine referrals brought about a lot of awareness at the community level and also at the level of officials<sup>[2]</sup>.

Information Technology (IT) in health sector could be used for better diagnosis, better training and sharing of knowledge and improving communication about health (Kalpa, 2012). The scope of public health informatics is immense and it requires the application of knowledge from numerous disciplines, particularly information science, computer science, management, organizational theory, psychology, communications, political science, and law<sup>[3]</sup>. Standards or guidelines have to be formulated to maintain quality in health information system. Public private partnership should be encouraged to expand the utilization of health information technology.

Information management processes greatly helped in knowledge creation, sharing and use. They also helped to meet the future challenges of effectiveness, increasing needs and demands of patients and decreasing availability of staff resources (Kivinen & Lammintakanen, 2013). There were four sub-categories in the “usage of management information system”: system quality, information quality, use and user satisfaction and development. Most of the generated information was used for the human resource management<sup>[4]</sup>.

A few studies reported that effective e-health investment did not result in better quality and improved productivity but it freed up capacity and enabled

greater access (Kaye, Kokia, Shalev, Idar, & Chinitz, 2010). From the perspective of the doctors, health IT (particularly EHR) was found to be time-consuming. The doctors were too busy to deal with it and they feared that it would depersonalize healthcare and would interfere with their rapport with their patient<sup>[5]</sup>.

Medical Audit was found to be vital for the measurement of the quality of care given to the practice population (Elhadi, et al., 2007). Medical audit required standard setting, data collection, comparison with standards, review of data and standards<sup>[6]</sup>.

**Research Issue:** In the context of development and application of technologies, in the field of communication, challenges are numerous and require micro level studies to understand the issues as well as practical solutions<sup>[10]</sup>. As it involves both human and material (technology) factors in the application of a new system in the Indian reality a comprehensive approach is need of the hour. Health care services are mostly addressing the emotional side than the physical side<sup>[8]</sup>. Hence, a suitable framework has to be developed by incorporating the relevant variables and parameters.

### Objectives:

1. To apply the Technology Acceptance Model (TAM) in order to predict and explain the extent to which the Health Management Information System (HMIS) is perceived as useful and easy to adopt by physicians and healthcare professionals in ESIC hospitals and dispensaries.
2. To examine and explain the perception, behavioural intentions, behaviour relationship within TAM.

**Hypothesis:** 1.  $H_0$  There is no significant relationship between the constructs: System Quality, Computer Self-Efficacy, Facilitating Conditions, Perceived Usefulness, Perceived Ease of Use, Perceived Behavioural Control, Attitude, Subjective Norm and Behavioural Intention.

### Methodology

Technology Acceptance Model (TAM) was applied and tested in this study. Data were collected from the ESIC hospital and dispensaries in Tirunelveli sub-region (Tirunelveli, Tuticorin and Kanyakumari districts) covering 171 healthcare professionals working in different departments. The TAM based model shows the relationship between the dependent and the independent variables. The TAM based model was divided into



two parts: i) Products of interactions between System, Organization and Physicians and ii) Physician and staff outcomes. Limit on professional autonomy, training, computer self-efficacy and facilitating conditions form an integral part of the system, organization and physician environment. These independent variables have their own role to play in the working environment and directly or indirectly impact the Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Perceived

Behavioral Control (PBC) constructs. The users of the system would have their own opinion and attitude towards system usage. Subjective norm refers to the social influence and peer pressure. Both attitude and subjective norm influence Behavioral Intention (BI) and form a gate way for the second part of the model (i.e.) Physician and staff outcomes. System adoption would be the final part of the model. Any intention to use the system automatically enhances adoption and experience.

**Table 1: Results of Correlation Analysis**

	System Quality	Computer Self-Efficacy	Facilitating Conditions	Perceived Usefulness	Perceived Ease of Use	Perceived Behavioural Control	Attitude	Subjective Norm	Behavioural Intention
System Quality	1	.704(**)	.696(**)	.731(**)	.561(**)	.709(**)	.660(**)	.674(**)	.647(**)
	.	.000	.000	.000	.000	.000	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Computer Self-Efficacy	.704(**)	1	.739(**)	.652(**)	.587(**)	.714(**)	.732(**)	.680(**)	.611(**)
	.000	.	.000	.000	.000	.000	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Facilitating Conditions	.696(**)	.739(**)	1	.670(**)	.672(**)	.806(**)	.663(**)	.683(**)	.714(**)
	.000	.000	.	.000	.000	.000	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Perceived Usefulness	.731(**)	.652(**)	.670(**)	1	.603(**)	.685(**)	.673(**)	.666(**)	.672(**)
	.000	.000	.000	.	.000	.000	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Perceived Ease of Use	.561(**)	.587(**)	.672(**)	.603(**)	1	.737(**)	.512(**)	.603(**)	.628(**)
	.000	.000	.000	.000	.	.000	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Perceived Behavioural Control	.709(**)	.714(**)	.806(**)	.685(**)	.737(**)	1	.646(**)	.626(**)	.645(**)
	.000	.000	.000	.000	.000	.	.000	.000	.000
	171	171	171	171	171	171	171	171	171
Attitude	.660(**)	.732(**)	.663(**)	.673(**)	.512(**)	.646(**)	1	.753(**)	.678(**)
	.000	.000	.000	.000	.000	.000	.	.000	.000
	171	171	171	171	171	171	171	171	171
Subjective Norm	.674(**)	.680(**)	.683(**)	.666(**)	.603(**)	.626(**)	.753(**)	1	.699(**)
	.000	.000	.000	.000	.000	.000	.000	.	.000
	171	171	171	171	171	171	171	171	171
Behavioural Intention	.647(**)	.611(**)	.714(**)	.672(**)	.628(**)	.645(**)	.678(**)	.699(**)	1
	.000	.000	.000	.000	.000	.000	.000	.000	.
	171	171	171	171	171	171	171	171	171

\*\*Correlation is significant at the 0.01 level (2-tailed).

### Adoption of Health Information System in ESIC

**Hospital:** The results of correlation analysis revealed a significant and positive relationship between the factors of adoption of health information system in ESIC hospital among the health care professionals. This indicates that all the major factors analysed in the present study are significant for the adoption of the HMIS in ESIC hospital and dispensaries.

The hypothesis that System Quality may positively impact the perceived usefulness of HMIS ( $r=.731$ ) was accepted. Likewise, the impact of System Quality on the perceived ease of use of HMIS ( $r=.561$ ) and on the perceived behavioural control of HMIS users ( $r=.709$ ) were found as positive. Computer self-efficacy positively impacted the perceived usefulness of HMIS ( $r=.652$ ), the perceived ease of use of HMIS ( $r=.587$ ) and the perceived behavioural control of HMIS users ( $r=.714$ ).

Facilitating conditions impacted the perceived behavioural control of HMIS users ( $r=.806$ ) and the computer self-efficacy of HMIS users ( $r=.739$ ) positively.

Users' perceived behavioural control positively impacted the intention of HMIS adoption ( $r=.645$ ).

HMIS perceived ease of use positively impacted the perceived usefulness of HMIS ( $r=.603$ ) and the attitude towards HMIS adoption ( $r=.512$ ).

HMIS perceived usefulness and attitudes toward HMIS adoption ( $r=.673$ ) and the intention to adopt HMIS ( $r=.672$ ) were found as positive and significant.

Attitude towards adopting HMIS positively impacted the intention of adopting HMIS ( $r=.678$ ) and the hypothesis that HMIS subjective norms may positively impact the intention of adopting HMIS ( $r=.699$ ) was accepted.

It has been a well established fact that the use of cumbersome, paper-based processes for checking and reporting patient health issues will undermine the efficiency and transparency in the healthcare environment. Further, the use of software metrics technologies to assess patient health information is a key issue in the management of health information system. The results in this study suggested that the adoption of health management information system in ESIC healthcare settings has been significantly improved by better system quality and facilitating conditions available

in the ESIC hospital. Significant improvement in patient data quality and handling is seen from the adoption of health management information system. However, if healthcare professionals are expected to trust the health management information system for routine usage, there will be likely need for more uniform and standardized settings in the existing software interface. Computer self-efficacy had a significant effect on perceived usefulness, perceived ease of use and behavioural intention. The healthcare professionals working in the ESIC hospital and dispensaries have prior experience with computers and subsequently, the training given to them by IT staff further enhanced their personal innovativeness in IT and computer self-efficacy. The findings show that "training" has a significant positive effect on HMIS self-efficacy and behavioural control. This means that if healthcare professionals are willing to adopt HMIS and have received enough training on HMIS, then their operation of HMIS will improve. The ESIC hospital management can provide education opportunity or training course to enhance the computer skill of healthcare professionals. More learning chances will help to improve the perceived behavioural control of healthcare professionals and finally, in this way, one can strengthen healthcare quality and eliminate the resistance from healthcare professionals. Further, the hospital management can encourage or set an order to healthcare professionals to pursue online health information management classes and courses. The health management information system used in the ESIC hospital and dispensaries comes with handy multitasking features but priority should be accorded to business continuity of computer systems and server backup facility. If these glitches are rectified, one could expect proper adoption of HMIS among ESIC healthcare professionals in Tirunelveli sub-region. Perceived ease of use indicates more importance than computer self-efficacy in determining perceived usefulness of HMIS for healthcare. The ESIC hospital management should choose a health management information system which is easy to use; this could help healthcare professionals feel the available health information system as useful and thereby produce more behavior intention. Hospital management and internal policy makers can set a technology standard for software manufacturers to ensure the basic level of ease of use. Practically, the results suggest that there exists compatibility between the health management information system and the work demands and between the reliability of the health management information system impact perceptions of

usefulness and ease of use as well. These two attitudinal variables ultimately influence one's attitude toward computer usage, one's behavioural intention to use the available health management information system, and actual use. Attitude also positively affects the intention to use health management information system among the ESIC healthcare professionals. Hence, attitude is an important factor and it plays a prime role in integrating software technology in modern healthcare settings. The results also state that prior computer experience is another factor that encourages the HMIS adoption process among ESIC healthcare professionals. Further, it can be concluded that perceived usefulness and perceived ease of use of the software are considered as important factors in the acceptance of health management information system in healthcare practice.

### Conclusion

The TAM based model will help the ESIC healthcare professionals to effectively adopt the HMIS software in the ESIC hospital and dispensaries in the Tirunelveli sub-region and thus will create a plan for addressing gaps in the HMIS adoption process among them. At the same time, this study has addressed the perspectives and opinions of stakeholders in the ESIC hospital and dispensaries only. Hence, in future, there is a need to elicit the perspectives of stakeholders at government hospitals in the state. Comparative studies could also be carried out between ESIC and state government, private hospitals to determine their differing perspectives regarding HMIS adoption, benefits and barriers.

**Conflicts of Interest Statement:** The authors whose names are listed above in this research paper certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest. The study reported in this research paper was self-funded and the findings of this research (part of a PhD thesis) had been reviewed and approved by the Bharathiar University, Coimbatore, Tamil Nadu in accordance with its policy on objectivity in research.

**Ethical Approval:** "All procedures performed in this research study involving ESIC healthcare professionals were in accordance with the ethical standards of the Bharathiar University, Coimbatore, Tamil Nadu."

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# Malpositioning of Central Venous Catheter from Right Internal Jugular Vein into Ipsilateral Vertebral Vein: A Rare Phenomenon

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## Abstract

**Introduction:** Central venous catheter insertions are being increasingly practiced by anaesthesiologists in major surgeries involving haemodynamic changes and massive fluid shifts. A common complication is misplacement of central line in intravenous territory which requires prompt identification and correction.

**Case Report:** The present case report describes a landmark guided CVC insertion done prior to surgery in a 70 year old patient with multiple stones in right renal pelvis and bilateral ureters with consequent right sided hydronephrosis and obstructive renopathy. Despite venous backflow from all 3 ports, chest X-ray showed central line folding upon itself directed upwards at the level of transverse process of 7<sup>th</sup> cervical vertebra which was confirmed on colour doppler to be in right vertebral vein.

**Conclusion:** Malpositions of central venous catheters are common and call for USG guidance to be made mandatory in every institute where USG is available.

**Keywords:** *Misplaced central venous catheter, Internal jugular vein cannulation, Land mark guided CVC insertion.*

## Introduction

Present day indications of central venous cannulation can be reiterated as lack of peripheral veins, to administer ionotropes, total parenteral nutrition, volume resuscitation, frequent sampling for VBG, haemodialysis and central venous monitoring for fluid administration. American Society of Anaesthesiologists Task Force recommends the use of ultrasound during IJV catheterisation because it is rapid and safe.<sup>1</sup> Our institution has been performing CVC insertions under

USG guidance since quite sometime now, but the landmark technique is still being practiced whenever USG is not available. We describe a patient in whom a CVC of diameter 7 french and length 20 cm became folded below the clavicle and accidentally entered the ipsilateral vertebral vein.

**Case Report:** A 70 year old patient (weight 67 kg, height 165cm) was admitted to our tertiary care centre with respiratory distress and decreased urine output. His hemodynamic parameters were pulse rate 102/min, non invasive blood pressure 160/100mmHg, oxygen saturation 92% on room air. His body temperature was recorded as normal. He was put on oxygen via face mask with flow rate 6L/min on which he maintained oxygen saturation >94%. He was catheterised and uro-flowmeter was attached for monitoring hourly urine output.

His USG abdomen and pelvis revealed multiple renal stones on right side and bilateral ureteric stones with right sided HDUN. It was decided to stabilise the patient

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and take him up for Percutaneous Nephrolithotomy coming morning. His initial blood investigations were as follows: Hb-6.6 gm/dl, haematocrit-22%, TLC-7800/mm<sup>3</sup>, DLC-76(N), 16(L), 4(M),4(E), platelet count-1.6 lac/cu mm, INR-1.2, Na<sup>+</sup>-134mEq/l, K<sup>+</sup>-5.8mEq/l, urea-78mg/dl and creatinine -5.18mg/dl. Electrocardiogram showed normal sinus rhythm with a rate of 89/min and Chest X-ray was within normal limits. Pre-anaesthetic assessment was done and patient was kept nil per oral night before surgery for PCNL procedure under general anaesthesia.

For the purpose of CVP guided fluid administration and blood transfusion, it was decided to put central venous catheter in the patient one day prior to surgery. We went forward with the procedure without ultrasonographic assistance due to the unavailability of USG at that time. Informed consent was taken and patient was shifted in pre-operative room and vitals were attached to the monitor which were within normal limits. The patient was positioned in a 15 degree head down position with head rotated to left side for right IJV cannulation. After cleaning the procedure site with 2% hypochlorite solution and sterile draping, 2% lignocaine injection 2ml was infiltrated in the skin and subcutaneous tissue. Sternal and clavicular heads of SCM muscle and carotid artery were marked with a marker. After adequate preparation and assembling of instruments, guiding prick was taken and aspirated for non-pulsatile venous backflow. On attempting to insert the guide wire through the needle, a lot of resistance was encountered after initial 10cm. It was thought that the guide wire was getting obstructed at the level of clavicle and hence the guidewire was pulled back, angulation of needle with the skin was reduced, reaspirated for venous backflow and attempted for reinsertion. After 2-3 failed attempts, needle was still getting free backflow of venous blood. So it was evident that the needle was in the internal jugular vein and hence, the guidewire was inserted though with some resistance still. No ECG changes were encountered during guidewire insertion. After dilating over guide wire, central line was inserted till 12 cm. Blood flow was aspirated from only the proximal port while forward flow was elicited in all 3 ports. Upon pulling back the catheter to 10cm, backflow was elicited from all three ports. Sutures and sterile dressing were applied

A chest radiograph was advised to confirm the position of tip of CVC and to rule out any complications otherwise not evident during the procedure. In chest radiograph, CVC was found lying behind the IJV

directed upwards at the level of transverse process of 7<sup>th</sup> cervical vertebra(Fig-1). Because the central venous catheter was functioning well with no extravasation of fluid, it was decided to get a colour doppler done which revealed it to be in right side vertebral vein.



**Figure 1: Misplaced CVC**

Malpositioning of CVC is known to increase the risk of catheter wedging, trapping and blockade, venous thrombosis and embolism, cranial retrograde injection, thrombophlebitis, endothelial damage, fluid leakage, localised lymphedema and swelling.<sup>2</sup> So the central line was pulled out till 6cm, guide wire was reinserted taking care this time that the J-curve is pointing medially and caudally and central line was reinserted over it till 12cm and fixed. Venous backflow was aspirated from all three ports and repeat CXR showed the tip to be in the distal 1/3<sup>rd</sup> of SCV(Fig-2).



**Figure 2 : Correctly placed CVC**

## Discussion

Central venous cannulations are commonly performed procedures in operating room as well as intensive care units. Although USG due to its real-time imaging has emerged as a blessing in these invasive procedures, landmark technique is still in vogue. The complications associated with landmark technique include immediate ones like haemothorax, pneumothorax, arrhythmias, misplaced catheter, and failed cannulation or delayed like infection, venous thrombosis, central venous stenosis, etc. Out of these, the misplacements of catheters have been reported in 5-12% cases, more so during the subclavian vein cannulation.<sup>3</sup>

The misplacement of catheter tip can occur either within the venous system or in dangerous cases, out of the venous system in reportedly every possible anatomical position like arterial system by inadvertent puncture or venous anomaly, mediastinum, pleura, pericardium, trachea, esophagus, subarachnoid space, paravertebral space and other aberrant sites. Although right internal jugular vein due to its straighter route to the right heart has infrequent misplacements, the intravenous malpositions can occur in ipsilateral subclavian vein,<sup>4</sup> mammary vein,<sup>5</sup> accessory hemiazygous vein,<sup>6</sup> vertebral vein<sup>7</sup> or contralateral pericardiophrenic vein<sup>8</sup>, internal jugular vein<sup>9</sup>, subclavian vein<sup>10</sup> etc.

Various factors have been attributed to increase the risk of central line misplacement like anatomical variations, venous stenosis, build of the patient, placement technique, direction of bevelled end of needle, resistance encountered while guide wire insertion, diameter of catheter etc. In our case, the resistance encountered during placement and absence of typical P wave changes on ECG during guide wire insertion raised suspicion of misplacement. It follows that any resistance while inserting guide wire makes it kink towards the path of least resistance by entering into other vein or if pushed with excessive force perforating the vein to enter extra vascular structures like pleura, pericardium or even lungs.

There are several ways for confirmation of correct placement of central venous catheter, out of which chest radiographs are the most commonly used. For correct CVC placement, tip of the catheter should lie within superior vena cava, above its junction with the right atrium typically at the level of carina. It must be parallel to the vessel wall or in other words, not making an acute angulation into the vessel to avoid kinking. It has been

postulated that tip seen above the pericardial reflection leads to vessel wall erosion while very low situated lines (in the right atrium) can cause arrhythmias, cardiac perforation, placement in the coronary sinus, damage to the tricuspid valve or even tamponade.<sup>11</sup>

Several other ways have been postulated for confirmation of displacement like SVC wave form confirmation after catheter placement, measurement of CVP by manometer, use of bedside USG during placement and confirmation by saline flush test, C-arm with image intensifier for clarity in identifying path of catheter, TEE or TTE for confirmation of tip of the catheter in the SVC. Although the facility of USG is available in our institution, but the number of machines are limited which was the main reason why only landmark guidance was used. Decision to take out the central line and reinsert it was taken promptly after seeing the digital X-ray, and the replacement was confirmed to be correct.

Although the displacement of central line from right internal jugular vein into vertebral vein is relatively rare, it can be identified on ultrasonography as the coiling of CVC from 6<sup>th</sup> or 7<sup>th</sup> cervical transverse process and going upwards or on chest radiograph as was seen in our case.<sup>12</sup> Main possible contributing factors are excessively rotating the patient's head and deep insertion of puncture needle. The later was thought to be the cause of displacement in our patient. Care should be taken to choose an appropriate length of catheter and keeping the bevel of needle medial while placement.<sup>13,14</sup> Due to possible complications like trapping of catheter, thrombosis, leakage of infusion fluid and endothelial damage, it is advised to reposition the catheter in such cases.

## Conclusion

Misplacement of CVC is showing a declining trend due to the introduction of ultrasonography. Use of the knowledge of landmarks and ultrasonography correctly during placement along with immediate waveform analysis, chest X-ray/TEE should be practiced by all anaesthesiologists in the modern era.

### Abbreviations:

CVC- Central Venous Cannulation

USG- Ultrasonography

TTE- Trans Thoracic Echocardiography

TEE- Trans Esophageal Echocardiography

SVC- Superior Vena Cava

IVC- Inferior Vena Cava

SCM- Sternocleidomastoid muscle

VBG- Venous Blood Gas analysis

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**Authorship Statement:** The manuscript has been read and approved by all the authors, that the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work.

**Ethics committee approval not sought:** No approval from the ethics committee is required for case report publication as per institution protocol.

Written informed consent and non-disclosure statement: Written informed consent was obtained and confidentiality for patient's private information ensured to the patient before publication of this case report.

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# Prevalence of Nomophobia and its Association with Loneliness, Self Happiness and Self Esteem among Undergraduate Medical Students of a Medical College in Coastal Karnataka

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## Abstract

**Background:** Revolution in technology with introduction of variety of smart phones has lead to increase in mobile dependence. Increased use of smart phone seemingly has created issues and challenges for students. The burden of this problem is now on a raise globally

**Objective:** To assess the prevalence and severity of nomophobia related to the use of smart phones among undergraduate medical students and the association of nomophobia with loneliness, self happiness and self-esteem among in them.

**Method:** A cross sectional study was conducted among 228 undergraduate students. 57 participants were selected by simple random sampling technique from first, second, final year MBBS students and Interns who were using smart phones. A pretested validated self administered, structured questionnaire was used to collect general information, patterns of mobile phone use. Nomophobia, Loneliness, Self Happiness, Self esteem were assessed by using Nomophobia Scale (NMP-Q), University of California, Los Angeles (UCLA) Loneliness Scale, Subjective Happiness Scale, Rosenberg's Self-Esteem Scale, respectively. Statistical analysis was conducted using Chi-squared test, Mann Whitney U test for various associations. Karl Pearson correlation coefficient was used to correlate the scores of the scales used.

**Results:** Median age of the participants was 21 years. 36.8% of the participants were males and 63.2% were females. It was observed that, 100% of the participants had nomophobia. Moderate nomophobia was found to be 53.5%, while 11.4% had severe and 35.1% had mild nomophobia. Duration of smart phone use in a day and frequency of checking the smart phone showed statistically significant association with severity of nomophobia. Nomophobia was found to be positively correlated with loneliness and negatively correlated with self happiness and self esteem, however only correlation of nomophobia and self esteem was statistically significant.

**Conclusion:** This study highlights the high prevalence of nomophobia amongst medical students and reflects the relation of nomophobia and psychological well being.

**Keywords:** *Nomophobia, Medical Students, Loneliness, Self-esteem, Self-happiness.*

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## Introduction

Technological revolution with introduction of variety of smart phones and further decreasing cost of smart phones has lead to increase in mobile dependence worldwide.<sup>1</sup> Nowadays, cell phones have become a part and parcel of our life for means of communication and a basic requirement with innumerable benefits like



facilitating social networking, gaining knowledge and updating it, as a means of entertainment and utility purposes as personal diary, calculator and calendaretc.<sup>2</sup> Indian market, just next to China has emerged as the second largest consumer market for mobile phone handsets.<sup>3</sup> In today's fast moving world, cell phone technology has introduced a new sense of speed and connectivity to social life.<sup>4</sup> The smart phones are popular connectivity devices among the youth, including medical students.

Excessive use of smart phone seemingly has created issues and challenges for students and the most pressing ones include physical or health related, psychological and social issues. It has also become a major parental concern.<sup>5</sup> According to Shambare et al. (2012), cell phones are "possibly the biggest non-drug addiction of the 21st century". Studies reveal that, college students have been using phones for more than 9 hours a day, which could lead to phone addiction. Smart phones have emerged as an example of "a paradox of technology", with both the property of freeing and enslaving. Freeing from the real world and enslaving to the virtual world.<sup>6</sup>

Nomophobia is one of the psychological problems and it is demonstrated by addictive use of phones by users including students.<sup>7</sup> Nomophobia is a term used to describe "the fear of being out of mobile phone contact" and the "anxieties mobile phone users suffer". Over use of mobiles have led to involvement of various psychological factors e.g., low self-esteem, extrovert personality etc. In addition other mental disorders like, social phobia or social anxiety, and panic disorder may also precipitate nomophobic symptoms. The burden of this problem is now on a raise globally.<sup>8,9</sup>

The young adults are more likely to be addicted from nomophobia (Secur Envoy study). A survey described that most of the teens (77%) reported anxiety when they were without their mobile phones. Scientists proposed certain psychological predictors for suspecting nomophobia in a person such as, self-negative views, younger age, low esteem, self-efficacy; high extroversion/introversion, impulsiveness and sense of urgency and seeking.<sup>8</sup> Since younger generation are the major users of the mobile phones we decided to conduct the study among undergraduates of a medical college. Research conducted on determining the causes and associated variables of nomophobic behavior is limited. Hence, this study was conducted to assess the prevalence and severity of nomophobia related to the use

of smart phones among undergraduate medical students and the association of nomophobia with loneliness, self happiness and self-esteem among in them.

## Method

This cross sectional study was conducted among undergraduate students of a medical college during the study period of three months from January 2019 to March 2019. Ethical clearance for this study was obtained from the Institutional Ethics Committee and informed written consent was obtained from the study participants.

Sample size was calculated based on the findings of a study by SethiaS et al<sup>10</sup>, they reported a 67% prevalence of nomophobia. Hence considering 95% confidence interval and an allowable error of 10% and a non-response rate of 10%, a sample size of 228 was obtained. 57 participants were selected from first, second, final year MBBS students and Interns. Medical students including interns who were using smart phones were selected by simple random sampling technique to reach the desired number of participants from each group.

A pretested validated self administered, structured questionnaire was used. The questionnaire was divided into three parts, Part A (general information, patterns of mobile phone use etc), Part B [Nomophobia Scale (NMP-Q)]<sup>7</sup> and Part C (University of California, Los Angeles (UCLA) Loneliness Scale<sup>11</sup>, Subjective Happiness Scale<sup>12</sup> and Rosenberg's Self-Esteem Scale<sup>13</sup>).

In the current study the tools used had good reliability (Cronbach's Alpha coefficient NMP-Q:0.86, UCLA loneliness: 0.84, Subjective self happiness:0.76, Rosenberg Self esteem:0.86)

**Statistical Analysis:** Data was analyzed using Statistical Package for the Social Sciences (SPSS 16) trial version. Results were expressed as frequencies and proportions for categorical variables and median and inter quartile range for continuous variables. The prevalence of nomophobia was calculated as percentage of participants who scored more than 20 in NMP-Q. Chi-squared test was applied to capture the statistically significant differences in severity grading of nomophobia and pattern of smart phone use. Fischer's Exact probability test was considered if more than 20% of the cells had an expected count of less than 5. Mann Whitney U test was used to test the significant difference in nomophobia scores across the purpose of

smart phone usage. Karl Pearson correlation coefficient (r), was used to find the correlation of nomophobia scores with scores of loneliness, self happiness and self esteem among undergraduate medical students. The statistical significance level was fixed at p<0.05

**Results**

A total of 228 students participated in the study. The response rate was 100%. Median age of the participants was 21 (Interquartile range 19.0; 23.0) years. Among the participants, 36.8% of the participants were males and 63.2% were females. It was observed that, 100% of the participants had nomophobia. Moderate nomophobia was found to be 53.5%, while 11.4% had severe and 35.1% had mild nomophobia. Prevalence of moderate to severe nomophobia was 67.9% among males and 63.2% among females. There was no statistically significant association between gender and severity of nomophobia (p= 0.47). The age of the participants did not have a statistically significant association with severity of nomophobia (p= 0.34).

First year students had the highest prevalence of moderate to severe nomophobia with 77.2%, followed by interns with 68.4% and second year and third year students with 57.9% and 56.1%, respectively. It was observed that there is minimal difference in the median nomophobia scores among different batches of students.

However, it was found to be higher among 1<sup>st</sup> year students in comparison to other batches (p= 0.09). (Figure 1).

The severity of nomophobia was found to increase with increase in duration of smart phone use but however it was not statistically significant (p= 0.28). Duration of smart phone use in a day and frequency of checking the smart phone showed statistically significant association with severity of nomophobia (p= 0.02). (Table 1).

Most of the participants used their smart phone for browsing (90%), listening to music (92%), talking to family and friends (90%) followed by using social media (86%), texting (82%), for killing time (63%), gaming (40%) and watching movies (12%). It was found that gaming, texting, listening to music and use as time killer was significantly associated with nomophobia (p<0.05). (Table 2).

Most of the participants used their smart phone when they felt bored (96.1%) and when they were alone (86.4%) followed by when they were waiting for someone (87.3%) or travelling (71.1%). A small proportion of the participants reported using the smart phone while in the class (23.2%) and driving (6.6%). The participants reported that the average number of messages, calls and e-mails per day were eighty, ten and five respectively.

**Table 1: Distribution of participants according to the severity of nomophobia and pattern of smart phone use. (n=228)**

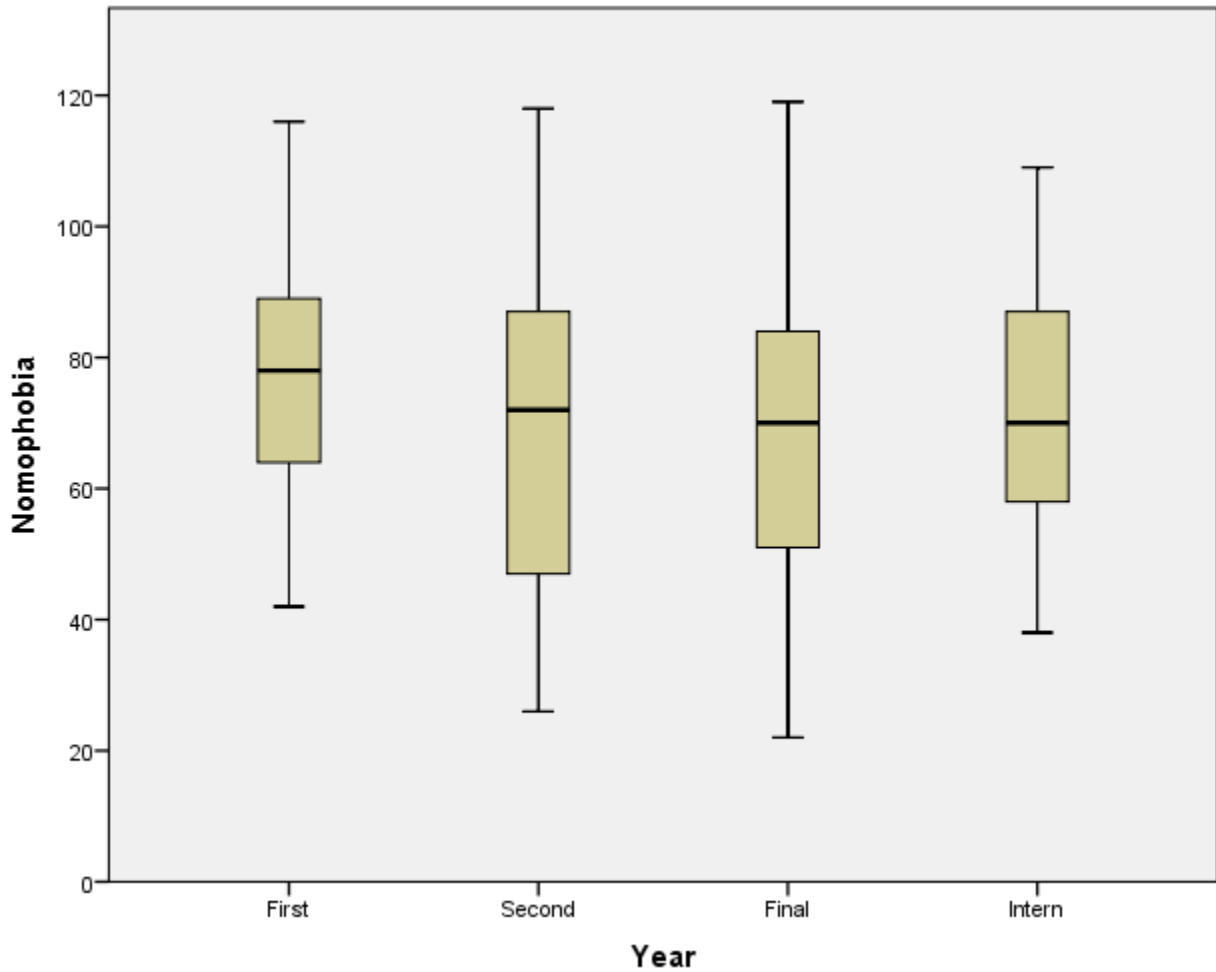
Pattern of Smart Phone Use		Nomophobia		P value †
		Moderate to Severe (%)	Mild (%)	
Duration of smart phone use (years)	Less than 2	22(56.4)	17(43.6)	0.28
	2-5	64(63.4)	37(36.6)	
	More than 5	62(70.5)	26(29.5)	
Having mobile data plan	Yes	146(65.5)	77(34.5)	0.34*
	No	2(40)	3(60)	
Duration of Smart phone use in a day (hours)	Less than 2	15(46.9)	17(53.1)	0.02
	2-5	100(65.4)	53(34.6)	
	More than 5	33(76.7)	10(23.3)	
Smart phone check frequency	Once every half an hour	81(74.3)	28(25.7)	0.001
	Once in every half an hour to an hour	63(60)	42(40)	
	Once beyond an hour	4(28.6)	10(71.4)	
Number of applications in the phone	Less than 20	48(58.5)	34(41.5)	0.09
	20-50	84(66.1)	43(33.9)	
	More than 50	16(84.2)	3(15.8)	

Test of Significance used: †Chi square Test and \*Fischers exact test

**Table 2: Distribution of nomophobia scores on the basis of reason of smart phone use (n=228).**

Purpose of smart phone use † (%)		Median Scores	Interquartile Range	p value *
Social Networking	Yes (86)	73.0	53.25; 88.75	0.24
	No (14)	70.0	49.0; 83.25	
Gaming	Yes (40)	77.0	58.0; 93.5	0.01
	No (60)	69.0	51.0; 83.0	
Texting	Yes (82)	74	55.0; 88.25	0.02
	No (18)	62.5	42.75; 84.5	
Calling	Yes (90)	74.0	53.75; 88.0	0.08
	No (10)	59.0	44.0; 81.0	
Time Killer	Yes (63)	75.0	55.25; 90.0	0.02
	No (37)	68.0	48.25; 82.75	
Music	Yes (92)	73.0	55.0; 88.5	0.04
	No (8)	54.0	41.0; 81.0	
Browsing	Yes (90)	73.0	52.0; 88.0	0.73
	No (10)	63.5	56.25 :87.50	
Movies/Series	Yes (12)	65.0	45.0; 83.0	0.09
	No (88)	74.0	53.5; 88.5	

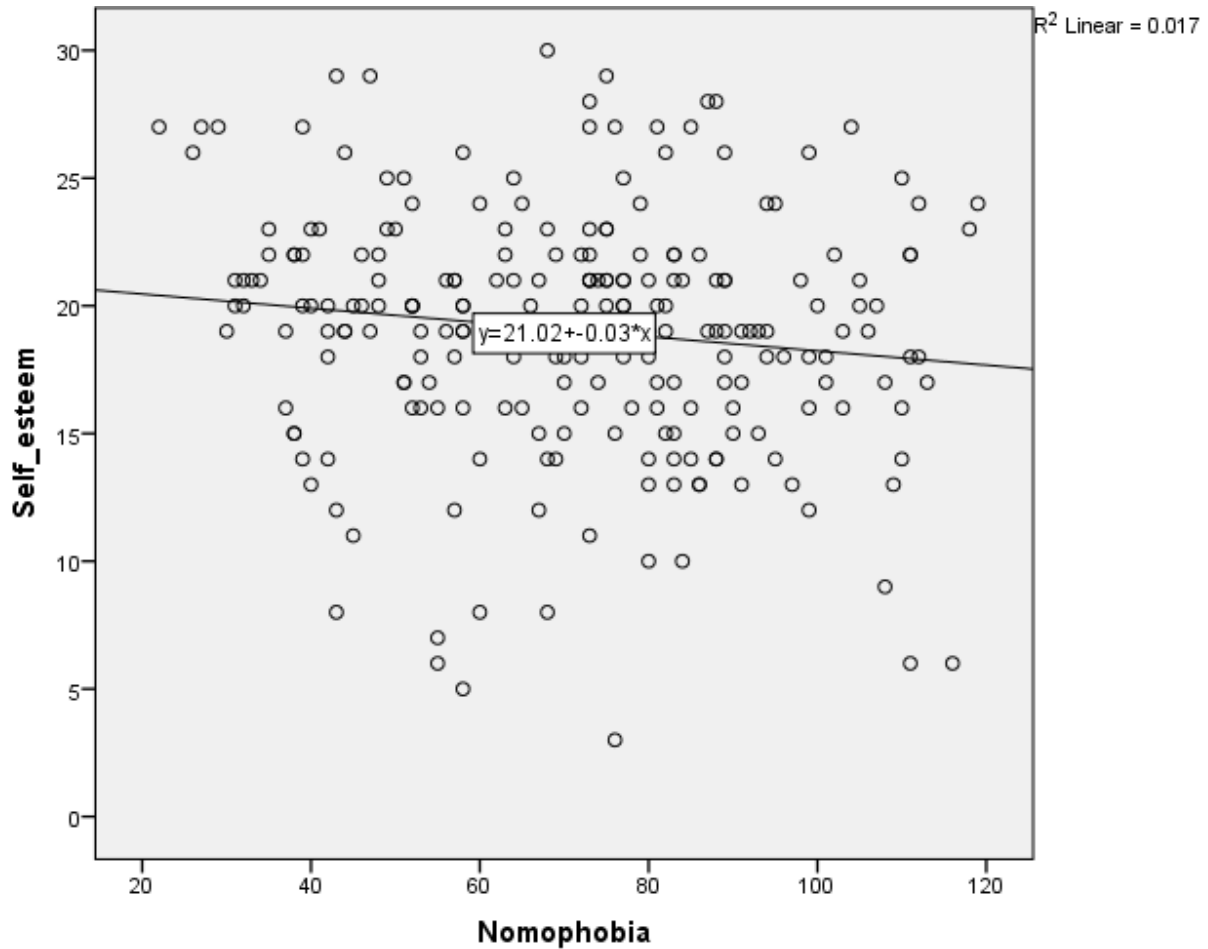
†Purpose of internet use had multiple responses; \*Mann Whitney U Test



**Figure 1: Box plot representing the nomophobia scores among the study participants. (n=228)**

Nomophobia was found to be positively correlated with loneliness ( $r = 0.12$ ) but showed no statistical significance ( $p = 0.06$ ). Nomophobia was found to be negatively correlated with self happiness ( $r = -0.06$ )

and self esteem ( $r = -0.13$ ). Correlation of nomophobia with self happiness was not statistically significant ( $p = 0.3$ ). Nomophobia and self esteem showed a statistically significant correlation ( $p = 0.05$ ). (Figure 2).



**Figure 2: Scatter diagram representing the correlation between nomophobia and self esteem scores among participants. (n=228)**

### Discussion

In the current study, all the participants reported to have nomophobia, however 53.5% had moderate nomophobia, while 11.4% had severe and 35.1% had mild nomophobia. In a similar study done in a medical college in Kerala, the prevalence of nomophobia was reported to be 97%.<sup>14</sup> Sethia S et al also reported that only one participant did not report to have nomophobia.<sup>10</sup> In the current study 11.4% had severe nomophobia. Sethia S et al in their study in Bhopal reported that 6.1% of the participants suffered from severe nomophobia.<sup>10</sup> It is alarming that nomophobia is rising among medical

students and those suffering from severe nomophobia is on the rise.

Most of the participants used their smart phone for browsing, listening to music, talking to family and friends. Similarly, the study by Madhusudan M et al reported that students were using smart phones for calling family members, friends and also for listening to music.<sup>14</sup>

In the present study nomophobia was found to be positively correlated with perceived loneliness and negatively correlated with happiness and self esteem,

also the correlation between nomophobia and self esteem showed statistical significance, this finding was similar to that reported by Ozdemir B et al.<sup>15</sup> The study conducted by Çakir and Oguz in 2015 on Turkish students in Ankara demonstrated a significant and positive correlation between smartphone addiction and loneliness.<sup>16</sup> Study done among Japanese medical students also reported that loneliness and mobile phone dependence were positively related to degree of addiction.<sup>17</sup> Suresh VC et al also reported a general trend of lower levels of subjective happiness in association with higher levels of internet addiction.<sup>18</sup> These results give an alarming indication that the youth are getting more and more dependent on smart phones, which may lead to serious psychiatric and psychological problems among the users.<sup>19</sup>

**Conclusion:** This study highlights the high prevalence of nomophobia amongst undergraduate medical students hence there is a need to increase awareness about increasing incidence of nomophobia amongst the medical students. The correlation of nomophobia with loneliness, self esteem and happiness reflects the relation of nomophobia and psychological well being. The observations in this study are from a small group of students, which may not reflect the scenario worldwide. However, millions of smart phone users are added every day indicating that full blown nomophobia has all the potential to reach to an epidemic scale. What we are seeing may be the just the tip of an ice berg which warrants further research.

**Limitations:** The generalisability of results is low as the study was carried out only among students from one medical college. Social desirability bias for the purpose and pattern of smart use cannot be ruled out.

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# Silver Diamine Fluoride in Arresting Dentinal Caries in School Children

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## Abstract

**Background:** In recent years, remineralisation of caries lesions has gained acceptance in the practice of minimally invasive dentistry and caries arrest treatment is being promoted as a part of basic oral health care. Silver diamine fluoride(SDF) has shown to be effective in arresting active caries in primary teeth. Whether a higher caries arrest rate can be achieved through more frequent application is unknown, hence in our study we had sought to explore this aspect. Aim: To evaluate the effectiveness of three different frequencies of application of SDF in arresting active dentinal caries primary teeth.

**Methodology:** 48 children aged 5-8 years were divided into three groups, group 1 who received monthly applications of SDF for three months, group 2 who received three monthly applications of SDF for 6 months and group 3 received 6 monthly applications. Active caries surfaces were recorded at baseline examination and SDF was applied. No attempt was made to excavate caries. Active and arrested caries were recorded at 6 months and one year for all the groups. Results: All three application protocols were effective in arresting caries at the end of 6 months and one-year. Inter-group comparison of active caries surfaces showed no statistically significant differences at the end of 6 months. At one year follow up there were statistically significant differences between the three groups, with caries arrest rate highest in group I, followed by group II and then group III.

**Conclusion:** Significant caries arrest was seen in all three application protocols of SDF at the end of six months as well as one year follow up. The one monthly application of SDF was most effective in arresting dentin caries in primary molars of children followed by the three monthly application and the 6 monthly application. Increasing the frequency of application of SDF solution can increase the caries arrest rate.

**Keywords:** *Silver diamine fluoride, active caries, caries arrest.*

## Introduction

Like many developing countries, in India due to the under-developed oral health care system, most of the decayed teeth in children remain untreated,

especially among those living in rural areas.<sup>1</sup> Treatment of dental caries requires surgical restorative approach. Sophisticated dental equipment, operators who are well trained and the procedure is relatively expensive. Caries if left untreated in children not just poses monetary problems to the parent but has potential risk and discomfort of the child with the disease. The ability to perform their routine activities, attending school, dietary patterns and sleep is greatly affected.<sup>2</sup>

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Caries is a dynamic process that can progress or regress depending on demineralization and remineralization. In recent years remineralisation of lesions and caries arrest treatment has gained acceptance

in the practice of minimally invasive dentistry. It is also promoted as a part of basic oral health care.<sup>3,4</sup> It has been reported that arresting dentinal caries in primary teeth is possible without restorative intervention.<sup>5</sup>

Silver diamine fluoride (SDF) is an inexpensive topical fluoride used in many countries to treat dentinal caries across the age spectrum. It is very effective in arresting active caries in primary teeth.<sup>6,7</sup> It is a very cost effective topical fluoride which consists of silver and fluoride component, where fluoride aids in remineralisation by forming Fluor apatite crystal which is more resistant to acid attack and also forms a reservoir for the release of fluoride thereby increasing the substantivity. Silver ions perform the antimicrobial action.<sup>8</sup>

Studies have shown that the application frequency of SDF for caries arrest is effective once a year or every 6 months.<sup>9,7</sup> Whether caries arrest rate can be increased by using more frequent application is unknown<sup>6</sup>, hence in our study we have sought to explore this aspect.

### Methodology

The present study was conducted in a school situated in a rural area just outside Mangalore city, at Kulur primary school. A total of 120 children aged 5-8 years were examined of which 48 children who fulfilled the inclusion criteria were included in the study.

#### Inclusion Criteria:

- Children who had active caries<sup>7,10</sup> affecting the primary molars.
  - Children for whom oral health care was inaccessible and were not willing for an invasive/restorative dental treatment.

#### Exclusion Criteria:

- Teeth that were grossly decayed.
- Teeth with more than one third of the crown missing.
- Teeth symptomatic of pulpal involvement, non-vital teeth, any presence of a sinus or an abscess, and premature hypermobility.

#### Procedure:

- A written informed consent was obtained from parents of all the children. Assent was obtained from the participating children.

- At the beginning of the study an oral health talk was delivered to all the participants and regular reinforcement was done by their teachers.
- Ethical clearance for our study was obtained from the ethical committee of our institution.
- Children were seated in a well illuminated area, and examined with the help of mouth mirror and CPI probe. Active caries was recorded when the probe, applied with light force could penetrate dentin<sup>7</sup>. To avoid any damage to the tooth during probing great care was taken. No attempt was made to remove soft caries with an excavator. However gross debris was removed before examination. All five surfaces of each primary molar were examined After baseline examination, children were randomly allocated into three subgroups:
  - Group 1 children received 4 applications of silver diamine fluoride at one monthly intervals for 3 months. (baseline, end of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month)
  - Group 2 children received 3 applications of silver diamine fluoride at 3 monthly intervals for 6 months. (baseline, end of 3<sup>rd</sup>, and 6<sup>th</sup> month)
  - Group 3 children received 2 applications of silver diamine fluoride (one at the baseline and one at the end of 6 months)

38% SDF (Fagamin, Tedequim SRL Argentina) was dispensed in a plastic dappen dish. (Fig 3) The teeth selected were isolated from saliva using cotton rolls. Silver diamine fluoride was painted with a micro applicator tip brush for 2 minutes. Vaseline was applied to prevent any mucosal discomfort. Children were instructed to avoid eating or drinking for a minimum of 30 minutes post the application of SDF. SDF was applied to tooth surfaces as per the study protocol at regular intervals. All the children were re-examined at 6 months and at the end of one year. Caries was recorded as arrested when the dentin could not be penetrated.<sup>6</sup>

**Statistics:** Descriptive statistics of the quantitative variable were documented using Mean and standard deviation. ANOVA was used to compare between mean of quantitative variable between three groups. P<0.05 was considered statistically significant.

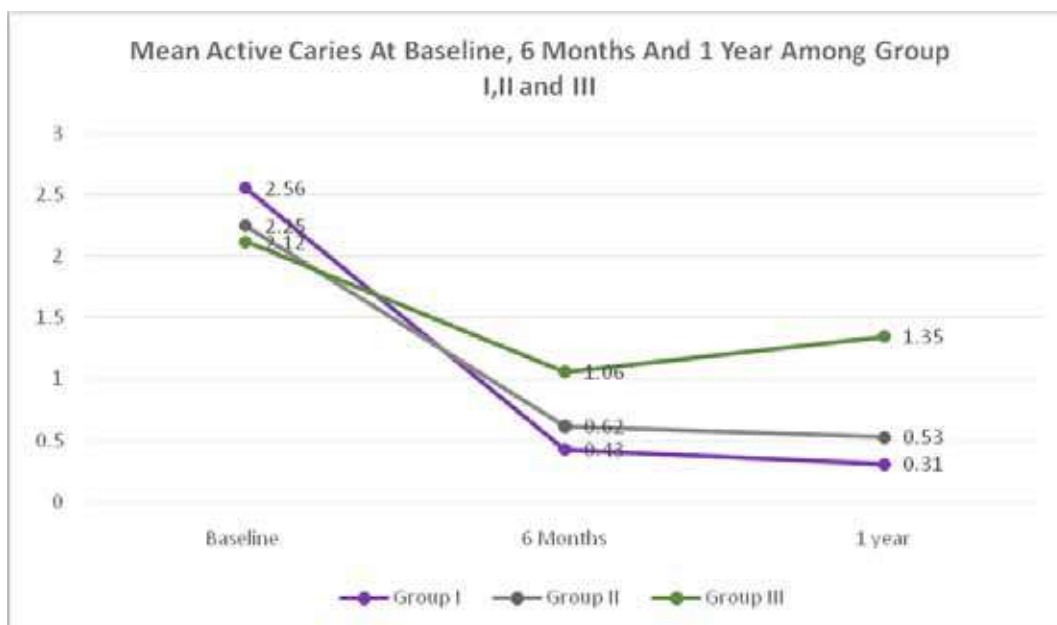
Statistical software SPSS (Statistical Package for Social Sciences) Version 24.0 (IBM Corporation, Chicago, USA) was used to analyse the collected data.



### Results

The mean active caries at baseline in all three groups were significantly reduced at 6 months and further at the end of 1 year (Graph 1). We observed no statistically significant differences when the mean active caries surfaces among the three groups were compared at 6 months (Table 1). However, we found statistically significant differences in mean active caries surfaces at 1 year among the three groups (Table 2).

The post hoc pair wise comparison showed, a mean difference of -0.22 between group 1 and group 2 which was not statistically significant. When group I was compared with group III, a mean difference of -1.04 was found which was statistically significant. When group II was compared to group III, a mean difference of -0.82 showed no statistical significance. (Table 3).



Graph 1:

Table 1: Comparison of active caries surfaces at 6 months

Groups	N	Mean	S.D.	S.E.	Min.	Max	F-value	P-value <sup>#</sup>
Group I	16	0.43	0.72	0.18	0.00	2.00	1.660	0.202
Group II	16	0.62	0.71	0.17	0.00	2.00		
Group III	16	1.06	1.38	0.34	0.00	5.00		

Table 2: Comparison of active caries surfaces at 1 year

Groups	N	Mean	S.D.	S.E.	Min.	Max	F-value	P-value <sup>#</sup>
Group I	16	0.31	0.60	0.15	0.00	2.00	4.847	0.013 <sup>†</sup>
Group II	15	0.53	0.63	0.16	0.00	2.00		
Group III	14	1.35	1.44	0.38	0.00	5.00		

Table 3: Post hoc pair wise comparison of active caries surfaces at 1 year.

Groups	M.D.	95% C.I.	P-value <sup>*</sup>
Group I v/s Group II	-0.22	-1.05-0.61	0.797
Group I v/s Group III	-1.04	-1.89--0.19	0.013
Group II v/s Group III	-0.82	-1.68-0.03	0.064

## Discussion

SDF has gained much attention in the past decade due to its simplicity and affordability. Numerous clinical trials have shown the effectiveness of SDF in arresting coronal carious lesions in primary teeth<sup>6</sup> and root caries in permanent teeth.<sup>11,12</sup>

The school included in our study comprised of children from low socio-economic strata who had very limited access to professional dental health care.

A systematic review<sup>13</sup> by Gao et al suggested that 38% SDF when used was very effective in case of primary teeth. Therefore, in our study we used a high concentration of 38% SDF due to its higher caries arrest.

This review also found that the guidelines on the prevalence of SDF application used to arrest caries have very little evidence, suggesting that more number of clinical trials should be performed to determine the optimal frequency strategy.

The commonly adopted regimen for the frequency of application of SDF is either once a year or every 6 months for arresting caries in primary teeth.<sup>6</sup> By reducing the time intervals between the SDF applications, caries arrest process could be enhanced.<sup>6</sup>

In our study, we found no significant differences in the active caries surfaces at baseline amongst the three groups. With this we can infer that the number of active caries surfaces in all three groups were comparable at the beginning of the study. However, at the end of 6 months and one year we observed a significant reduction in the mean number of active caries surfaces in all the three groups. From this we infer that all three treatment protocols of SDF were effective in caries arrest.

Inter group comparisons of active caries surfaces at the end of 6 months showed no significant differences amongst the three groups. This could probably be attributed to the short follow up time. However, at the end of one year we observed significant differences in active caries surfaces between the groups. The group 1 had the least mean active caries surfaces followed by group 2 and group 3.

A more detailed post hoc analysis of the results showed that Group 1 was significantly more effective in caries arrest than group 3 which could be attributed to the higher frequency of application of SDF in group 1. These results were in agreement with the study done

by MHT Fung et al<sup>14</sup>, and Zhi et al<sup>6</sup> who found that increasing the frequency of applications could increase the caries arrest rate and cause decrease in active carious lesions. However, there were no significant differences in the mean active caries surfaces between group 1 and group 2. From this we infer that caries arrest rates were comparable in these two groups. This could be attributed to the fact that both the groups had an intensive regimen of applications of SDF.

In our study we have used two application regimens of SDF which have not been reported in any other study, that is group 1 which had monthly applications for 3 months (a total of 4 applications) and group 2 which had three monthly applications for 6 months (a total of 3 applications). We also used a semi-annual application of SDF in group 3 which is frequently reported in literature.<sup>15,16,6</sup>

We observed a remarkable caries arrest rate when SDF was applied at monthly or 3 monthly intervals as compared to 6 monthly intervals (bi annual) at the end of 1 year, which indicated that increasing the frequency of applications showed an increase in caries arrest rate.

The positive outcomes of this study at the end of one year could also be attributed to the fact that the regular reinforcement of oral hygiene practices and the sustained release of silver and fluoride explained by “zombie effect”.<sup>17</sup>

One interesting observation of our study was that caries arrest rate was seen to be more in occlusal caries surfaces as compared to proximal caries surfaces. This could be because SDF could be retained for a longer time in occlusal caries surfaces. Proximal caries surfaces favor more food lodgment which probably could have caused a reduction in the action of SDF.

In our study, we found blackish discoloration in all the SDF treated teeth of the children which is a known side effect of SDF. We did not observe any other side effects, which is in agreement with Duangthip et al<sup>18</sup> who also did not report any other side effects other than the black staining over a follow up period of 18 months.

It is estimated that 9.5mg fluoride is contained in one drop of 38% SDF solution (sufficient to treat five teeth) which is much lower than the average lethal dose of 520mg/kg.<sup>8</sup> Hence the treatment protocol for application of SDF appears to be safe in our study group which comprised of school children.

There are certain limitations in this study that should be mentioned. The follow up period could have been longer to evaluate the effect of SDF over a longer period of time.

We recommend that either a one monthly or three monthly applications of SDF could be adopted when a non-restorative treatment approach is selected for managing dentinal caries in primary teeth. We suggest the caries risk of the child as well as compliance to be taken into consideration while selecting the above two protocols. The general recommendation is that more frequent applications of topical fluoride is advised in high risk children.<sup>19,20</sup> Our study comprised of school children for whom access to professional dental treatments was unavailable. SDF application provided a simple treatment in the halt of carious lesions in these children.

### Conclusion

Significant caries arrest was seen in all three application protocols of SDF at the end of six months as well as one year follow up. Application of SDF at one monthly interval (89.06%) was most effective in caries arrest followed by 3 monthly applications (68.66%) and 6 monthly applications (48.92%). Increasing the frequency of application of SDF solution can increase the caries arrest rate.

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# Study of Effects of Formalin Exposure in Dissection Hall on Pulmonary Function Tests of Medical Students

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## Abstract

**Introduction:** Formalin is being used for preservation of biological specimens including cadavers in laboratories and dissection halls of medical colleges worldwide. It is used as disinfectant and preservative solution in Anatomy mortuaries, Pathological laboratories, Hospitals and plastic industries. Exposure occurs mainly by inhalation. This study was planned to assess effects of exposure to formalin on lung function of medical students.

**Method:** Spirometry was done before exposure, after acute exposure and at end of academic year. Results were analysed.

**Results:** There was significant decrease in values of FVC, FEV<sub>1</sub>, FEF<sub>25-75</sub>, FEF<sub>2-1.2</sub> and MVV ( $p < 0.05$ ) after acute exposure to formalin. There was no any noticeable change in FEV<sub>1</sub>/FVC ratio ( $p > 0.05$ ). Though the PEF<sub>R</sub> was decreased after acute exposure it was not up to a statistically significant level ( $p > 0.05$ ). The values of FVC, FEV<sub>1</sub>, FEF<sub>25-75</sub>, FEF<sub>2-1.2</sub> and MVV which were reduced significantly after acute exposure came to normal after chronic exposure. The FEV<sub>1</sub>/FVC ratio was almost same ( $p > 0.05$ ). PEF<sub>R</sub> was significantly increased ( $p < 0.05$ ) compared to that after acute exposure.

**Conclusion:** In Anatomy dissection hall local exhaust ventilation system should be installed and personal protective equipments such as safety eyeglasses and gloves should be made available and used to reduce exposure to FA and prevent adverse effects on health of students.

**Keywords:** Formalin exposure Dissection hall Medical students Lung function.

## Introduction

Since ages Formalin is being used for preservation of biological specimens including cadavers in laboratories and dissection halls of medical colleges worldwide. Formalin is aqueous form of formaldehyde (CH<sub>2</sub>O). British Chemist August Wilhelm Von Hofmann

discovered formaldehyde in 1856<sup>1</sup>. Formalin contains 37% by weight or 40% by volume of formaldehyde gas in water. It is colourless & irritant, giving pungent formaldehyde (FA) vapours at room temperature<sup>2</sup>. It is used as disinfectant and preservative solution in Anatomy mortuaries, Pathological laboratories, Hospitals and plastic industries. For preservation of cadaver it is infused with chemical substances into the body tissues, that include formalin, alcohol, glycerine, carbolic acid and dye<sup>3</sup>. This embalming procedure helps cadaver to maintain a life like state to maximal extent and to retain the normal anatomical relations as required for dissection purposes<sup>4</sup>. Formaldehyde can be toxic, allergenic and probably carcinogenic as well. Exposure occurs primarily by inhalation. Sometimes it may be absorbed via skin by exposure of formaldehyde

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containing fluids. The symptoms of exposure include irritation of airway, obstructive disorders like bronchial asthma, ocular irritations, corneal clouding, leukaemia, nasopharyngeal cancers, spontaneous abortions, congenital malformations, and menstrual irregularities. It may also cause dermatitis<sup>5</sup>. Medical students during dissection of cadavers are regularly exposed to formalin. The factors affecting level of exposure are time spent in anatomical dissection hall, working conditions at place and type of embalming procedure followed. Exposure to formalin is considered a significant health hazard because of its widespread use and subsequent toxicity<sup>6</sup>. However few studies have been carried out for studying effects of formalin exposure on lung function tests of medical students in this part of country. Hence the present research was planned for studying acute and chronic effects of formalin exposure on the pulmonary function tests of medical students.

### Materials and Method

The present study was carried out on 150 medical students (Males & females together) of a Medical College located in Western Maharashtra, admitted for academic year 2017-18. Out of 150 students some were dropped due to being absent on the day of test or some other reason. Finally 132 students were observed till end of academic year. Approval from Institutional Ethical Committee (IEC) was taken for the study. Students of both gender who were medically fit after general medical examination were included for this study. Students having history of any chronic respiratory illness like bronchial asthma; hypertension, diabetes mellitus, congenital anomalies of spine & thoracic cage, smoking habit were excluded. Informed written consent was obtained from all students included in study. Pulmonary function test (PFT), a baseline record prior to formalin exposure was carried out by using a computerized "MEDSPIROR" (RMS Chandigarh, India) instrument. Spirometry was carried out as per guidelines of American Thoracic Society<sup>7</sup>. Before recording PFT, subjects were shown a demonstration of the test. Consequently a minimum three readings of each test were taken for every subject and the best of the three was selected for having reproducibility and validity of the recorded parameters. The pulmonary function parameters studied included FVC (Forced Vital Capacity), FEV1 (Forced Expiratory Volume in First second of FVC), FEV1% (FEV1 as% of FVC), PEFR (Peak Expiratory Flow Rate in litres/sec), FEF25-75% (Forced Expiratory Flow Rate during 25 to 75% of expiration, FEF 0.2-1.2 (Forced Expiratory

Flow between 0.2 -1.2 litres of expiration) and MVV (Maximum Voluntary Ventilation). Students are exposed to formalin treated cadavers in anatomy dissection hall for three days in a week and duration of daily exposure is 3 hours. After one month of exposure spirometric PFTs were repeated which was considered as acute effect of formalin exposure. Students were handed over a self administered predesigned questionnaire for collection of information about symptoms arising from inhalation of formaldehyde fumes from formalin-treated cadavers (Questionnaire I). All the symptoms were graded on a scale of 0-3; grade 0: not at all, not recognizable, grade 1: barely recognizable, grade 2: strong, prominent and irritating, grade 3: intolerable. Then at the end of first academic year of exposure again spirometric PFTs were repeated which were considered as chronic effects of formalin exposure. Statistical analysis was carried out after summarizing the data by computing mean and standard deviation (SD) of each PFT parameter studied. The significance of difference of each variable was found by comparing basal levels with that after acute and after chronic exposure by applying ANOVA (Analysis of variance). Student t test was applied to compare the findings of PFTs before exposure with that after acute exposure and after chronic exposure.

### Results

The observed results were tabulated. Anthropometric parameters of both male & female students are shown in Table 1.

In table 2 the symptoms due to acute exposure to formalin and the severity of them is depicted.

The findings of PFT parameters before exposure to formalin & after acute exposure (after 1 month) are shown in Table 3. It was observed that there was significant decrease in values of FVC, FEV1, FEF25-75, FEF.2-1.2 and MVV ( $p < 0.05$ ) after acute exposure to formalin. There was no any noticeable change in FEV1/FVC ratio ( $p > 0.05$ ). Though the PEFR was decreased after acute exposure it was not up to a statistically significant level ( $p > 0.05$ ). Table 4 is depicting the changes in PFT parameters after acute and after chronic exposure. From Table 4 it was observed that values of FVC, FEV1, FEF25-75, FEF.2-1.2 and MVV which were reduced significantly after acute exposure came to normal after chronic exposure. The FEV1/FVC ratio was almost same ( $p > 0.05$ ). PEFR was significantly increased ( $p < 0.05$ ) compared to that after acute exposure. Table 5

shows the values of PFT before exposure to formalin and after completion of exposure (chronic exposure). From Table 5 it was observed that after chronic exposure the values of PFT parameters which were reduced after acute exposure (Table 2) have come to normal and some

above normal after chronic exposure. From table 6 it is observed that the values of most of PFT parameters which were reduced ( $p < 0.05$ ) after acute exposure except no change in FEV1/FVC% ( $p > 0.05$ ), came to almost normal after chronic exposure.

**Table 1: Anthropometric measurements**

	Age in Years Mean $\pm$ SD	Height in cms Mean $\pm$ SD	Weight in kg Mean $\pm$ SD
Males (n=60)	18.31 $\pm$ 1.18	173.23 $\pm$ 7.49	68.73 $\pm$ 12.51
Females (n=72)	18.27 $\pm$ 0.99	159.27 $\pm$ 6.24	58.47 $\pm$ 12.41

**Table 2: Symptoms after acute exposure to formalin (their grading, number of students & % of students having the grade) (n=132)**

Symptoms	Grade 0	Grade 1	Grade 2	Grade 3
Unpleasant smell	5 (3.78)	60 (45.45)	52 (39.39)	15 (11.36)
Excessive lacrimation	17 (12.87)	51 (38.63)	51 (38.63)	13 (9.84)
Headache	63 (47.72)	42 (31.81)	22 (16.66)	5 (3.33)
Running nose	78 (59.09)	40 (30.30)	11 (8.33)	3 (2.27)
Redness of the eyes	75 (56.81)	37 (28.03)	20 (15.15)	0
Itching in eyes	39 (29.54)	51 (40.63)	36 (27.27)	6 (4.54)
Nausea	105 (79.54)	20 (15.15)	7 (5.30)	0
Congested nose	95 (71.96)	34 (25.75)	3 (2.27)	0
Dryness or soreness in throat	82 (62.12)	38 (28.78)	12 (9.09)	0
Itching or sore skin on hands	96 (72.72)	29 (21.96)	5 (3.78)	2 (1.51)
Cough	94 (71.21)	32 (24.24)	6 (4.54)	0
Respiration difficulties	92 (69.69)	30 (22.72)	10 (7.57)	0
Blurring of vision	90 (68.18)	34 (25.75)	8 (5.33)	0
Skin eruptions	118 (89.39)	11 (8.33)	3 (2.27)	0
Restlessness	94 (71.21)	32 (24.24)	6 (4.54)	0
Fainting episode	123 (93.18)	9 (6.81)	0	0
Disturbed sleep at night	123 (93.18)	5 (3.78)	3 (2.27)	1 (0.7)
Post dissection nausea	124 (93.93)	8 (6.06)	0	0
Post dissection vomiting	130 (98.48)	2 (1.51)	0	0
Discolouring of nails	125 (94.69)	4 (3.03)	3 (2.27)	0

**Table 3: (n =132): Findings of Pulmonary function test before exposure to formalin & after one month exposure**

PFT Parameter	Before Exposure to Formalin	After One Month Exposure	P value
FVC (L)	2.97 $\pm$ 0.75	2.68 $\pm$ 0.68	0.0013
FEV1 (L)	2.71 $\pm$ 0.65	2.47 $\pm$ 0.65	0.0039
FEV1/FVC %	91.52 $\pm$ 6.38	92.12 $\pm$ 6.89	0.4641
PEFR(L/sec)	5.71 $\pm$ 1.66	5.44 $\pm$ 1.71	0.1831

PFT Parameter	Before Exposure to Formalin	After One Month Exposure	P value
FEF25-75 (L)	3.64 ± 1.08	3.09 ± 0.80	<0.0001
FEF.2-1.2 (L)	5.09 ± 1.67	4.56 ± 1.54	0.0074
MVV (L/min)	102.12 ± 30.12	93.68 ± 28.25	0.0196

FVC (Forced Vital Capacity), FEV1 (Forced Expiratory Volume in one second), EFV1/FVC ratio, PEFR (Peak Expiratory Flow Rate), FEF.2-1.2(Forced expiratory flow between 0.2 to 1.2 L of expiration, MMFER (Maximum mid expiratory flow rate) or FEF25-75 and MVV (Maximum Voluntary Ventilation).

**Table 4: Findings of Pulmonary function test after one month exposure to formalin & after completion of exposure**

PFT Parameter	After One Month Exposure to Formalin	After Completion of Exposure	P Value
FVC(L)	2.68 ± 0.68	3.14 ± 0.79	< 0.0001
FEV1(L)	2.47± 0.65	2.86 ± 0.69	< 0.0001
FEV1/FVC %	92.12 ± 6.89	92.43 ± 6.39	0.7068
PEFR(L/sec)	5.44 ± 1.71	6.06 ± 1.69	0.0031
FEF25-75 (L)	3.09 ± 0.80	3.88 ± 1.11	< 0.0001
FEF.2-1.2 (L)	4.56 ± 1.54	5.63 ± 1.70	< 0.0001
MVV (L/min)	93.68 ± 28.25	115.13 ± 29.45	< 0.0001

**Table 5: (132): Findings of Pulmonary function test before exposure to formalin & after completion of exposure**

PFT Parameter	Before Exposure to Formalin	After Completion of Exposure	P value
FVC(L)	2.97 ± 0.75	3.14 ± 0.79	0.07
FEV1(L)	2.71 ± 0.65	2.86 ± 0.69	0.0598
FEV1/FVC %	91.52 ± 6.38	92.43 ± 6.39	0.2486
PEFR(L/sec)	5.71 ± 1.66	6.06 ± 1.69	0.0922
FEF25-75 (L)	3.64 ± 1.08	3.88 ± 1.11	0.0698
FEF.2-1.2 (L)	5.09 ± 1.67	5.63 ± 1.70	0.0107
MVV (L/min)	102.12 ± 30.12	115.13 ± 29.45	<0.0005

**Table 6: Findings of Pulmonary function test before exposure to formalin, after acute exposure & after completion of exposure**

PFT Parameter	Before Exposure to Formalin	After One Month Exposure	After Completion of Exposure	P Value
FVC(L)	2.97 ± 0.75	2.68 ± 0.68	3.14 ± 0.79	<0.0001
FEV1(L)	2.71 ± 0.65	2.47± 0.65	2.86 ± 0.69	< 0.0001
FEV1/FVC %	91.52 ± 6.38	92.12 ± 6.89	92.43 ± 6.39	0.5197
PEFR(L/sec)	5.71± 1.66	5.44 ± 1.71	6.06 ± 1.69	0.0111
FEF25-75 (L)	3.64 ± 1.08	3.09 ± 0.80	3.88 ± 1.11	<0.0001
FEF.2-1.2 (L)	5.09 ± 1.67	4.56 ± 1.54	5.63 ± 1.70	< 0.0001
MVV (L/min)	102.12 ± 30.12	93.68 ± 28.25	115.13 ± 29.45	< 0.0001

### Discussion

Formalin has been used for preservation of cadavers in dissection halls and also preserving other

tissues in laboratories. It is a aqueous solution of formaldehyde(37-50%)<sup>2</sup>. In dissection hall medical students are exposed to it. Recently its exposure has



been considered as one of the multiple causes of chemical sensitivity<sup>8</sup>. In this study we evaluated effects of acute and chronic exposure in Anatomy dissection hall on lung function of 132 medical students. We also studied the symptoms arising from acute exposure. The most common symptom noticed by majority of students (127, 96.21%) was unpleasant smell. This is consistent with the earlier study<sup>4,9</sup>. Other symptoms depending on chronology and severity were excessive lacrimation (115, 87.12%); redness of eyes (93, 70.45%), running nose (54, 40.9%). Some less common symptoms noticed by students were itching of eyes, nausea, congested nose, dryness or soreness in throat, itching or sore skin on hands, cough, respiration difficulties, blurring of vision (Table 2). One study also recorded increase in number of symptoms like burning of eyes, lacrimation, irritation of airways and dermatitis<sup>10</sup>. After acute exposure to formalin (1 month) there was significant reduction in values of FVC, FEV<sub>1</sub>, FEF<sub>25-75</sub>, FEF<sub>2-1.2</sub> and MVV. But there was no any significant change in FEV<sub>1</sub>/FVC ratio and PEF<sub>R</sub>. On acute exposure there was immediate reduction in FVC while other parameters of lung function remain unchanged in earlier study. This indicates that there is bronchoconstriction resulting from hypersensitivity reaction<sup>11</sup>. The same study also reported decrease in values of FEV<sub>1</sub> immediately after exposure but it was not statistically significant. There is creation of haptens after binding of formaldehyde (FA) to endogenous proteins and these haptens can elicit an immune response. Some studies have concluded that exposure to FA has been associated with immunological hypersensitivity leading to various acute and chronic effects. A study on histology technicians also shown decrease in pulmonary function, as measured by FVC, FEV<sub>1</sub> and FEF<sub>25-75</sub> compared to controls<sup>12</sup>. After completion of academic year we measured PFT parameters again and reported as chronic exposure effects. From Table 4 it is obvious that the values of PFT parameters which were decreased after acute exposure have again come to normal at the end of exposure period. Similar findings were reported in a study done earlier<sup>13</sup>. In Table 5 values of PFT parameters before exposure and after completion of exposure are given. It is observed that there is no difference between values except that of MVV, which was increased. This shows that the values were restored to basal levels after chronic exposure (Table 6). This may be due to adaptation of respiratory system to continuous exposure in low concentrations. The limitation of this study is that we could not determine the exact concentration of FA to which our subjects

were exposed in dissection hall. But we studied the lung function at fixed time of day i.e. between 3.00 pm to 4.0 pm and single observer was doing the PFT so influence of some factors was abolished. From observations of our and other studies done so far FA may not be considered an ideal chemical for embalming of cadaver. Efforts should be taken to reduce the concentration of FA by using other chemicals like glutaraldehyde, which may be a good substitute for FA<sup>14</sup>. In anatomy dissection hall local exhaust ventilation system should be installed and personal protective equipments such as safety eyeglasses and gloves should be made available and used to reduce exposure to FA and prevent adverse effects on health of students.

**Conflict of Interest:** Authors declare that there is no conflict of interest.

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# Effectiveness of an Animation Video on Behavioral Response to Pain among Toddlers During Immunization in a Selected PHC at Mangalore India

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## Abstract

**Background:** Immunization is regarded as one of the most significant medical achievements of all times. Recently, increasing attention has been paid to the pain resulting from routine childhood immunizations. In addition, lack of adequate pain management during immunization exposes children to unnecessary suffering and the potential for long-term consequences, such as fear of needles. Hence this study is intended to assess the Effectiveness of an Animation Video On behavioral Response to Pain among Toddlers during Immunization.

**Materials and Method:** A quasi-experimental research (non-equivalent post-test-only control group) design was used for this study. The sample was drawn through purposive sampling technique and comprised of 60 toddlers undergoing for immunization (30 in experimental and 30 in control group) in a selected PHC at Mangalore, India. Data was collected using Behavioral response assessment scale to pain. (Modified FLACC behavioral assessment scale).

**Results:** Majority of the toddlers in Group I (83.33%) were having moderate behavioural response to pain, only 16.7% were having severe behavioural response to pain whereas in Group II (100%) all the toddlers experienced severe behavioural response to pain during immunisation. The mean score of behavioural response to pain of Group II ( $10.97 \pm 1.69$ ) was greater than that of Group I ( $7.17 \pm 1.206$ ).

**Conclusion:** An animation video during immunization can be an effective, simple, non-invasive, and cost effective diversional technique had a positive effect on children's distress behaviour and pain and having no side effects on the toddlers.

**Keywords:** Animation video, immunization, behavioral response, pain, toddlers.

## Introduction

Prevention of disease is one of the most important

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goals in child care. During infancy and childhood, preventive measures against certain infectious diseases are available. Immunization is an important and cost effective public health tool for disease control<sup>(1)</sup> Routine immunization injections are the most common painful procedures in childhood. Most of the immunizations are administered early in a child's life. Most toddlers and many school-age children experience high distress during immunization injections<sup>(2)</sup>.

Untreated immunization pain might also lead to distorted negative memories of that experience.

Ultimately, early pain is linked to poorer healthcare attitudes and elevated fear and avoidance of medical procedures in adulthood<sup>(3)</sup>. The child's distress is upsetting not only for the child but also for the adults involved—both parents and professionals—and it often makes it more difficult to complete the needed procedure<sup>(4)</sup>.

Non-pharmacological method of pain control are widely accepted and can be used with or without analgesics<sup>(5)</sup>. A cardinal responsibility of a community health nurse taking part in giving immunisation is to alleviate pain, promote growth, and development of child<sup>(6)</sup>.

**Aim:** To assess the Effectiveness of an Animation Video On behavioral Response to Pain among Toddlers during Immunization.

### Objectives of the Study:

1. To determine the behaviour response to pain among toddlers receiving immunisation with animation video (Group I) as measured by structured behavioural response assessment scale to pain (modified FLACC behavioural assessment scale).
2. To identify the behaviour response to pain among toddlers receiving immunisation without animation video (Group II) as measured by structured behavioural response assessment scale to pain.
3. To compare the effectiveness of animation video on behavioural response to pain among toddlers in Group I and in Group II during immunisation.
4. To find the association between behavioural response to pain among toddlers receiving immunisation in Group I and in Group II with their selected demographic variables.

### Materials and Method

**Study setting and sample size:** A quasi-experimental research (non-equivalent post-test-only control group) design was used for this study. The sample was drawn through purposive sampling technique and comprised of 60 toddlers undergoing for immunization (30 in experimental and 30 in control group) in a selected PHC at Mangalore India. The parents were interviewed on the basis of baseline proforma. The child along with the caregiver was taken to the treatment room. In experimental group (Group I) the investigator made the parent sit on the chair comfortably with the child on the

lap and showed the animation video. In control group (Group II) the children were placed in position and restrained by the nurse or parent as routine practice of the clinic.

The behaviours of the subjects were observed by the investigator in three phases during the procedure, i.e., placing the child in position, pre immunisation, and actual procedure until the child is out of the immunisation room. The investigator observed and scored the child's behavioural response to pain during immunisation injection using the behavioural response assessment scale to pain. Data was collected using behavioral response assessment scale to pain. (Modified FLACC behavioural assessment scale).

**Data Analysis:** The data was collected after obtaining prior permission from the concerned authority to conduct the study. The participants were assured about the confidentiality of their responses. The data was analyzed in terms of objectives of the study using both descriptive and inferential statistics. The data obtained was plotted in the master sheet.

### Findings:

### Results

#### Section I: Description of baseline proforma

- Majority (83.3%) of the samples were between 12-18 months of age.
- Majority (63.3%) of the samples were male.
- All (100%) of the children were undergoing DPT immunisation.
- Highest percentage (46.7%) of the children showed minimal resistance to previous immunisation.
- Majority (56.7%) of children had more than 10 kg of weight at the time of immunisation.

**Section II: Description of level of behavioural response to pain among toddlers during immunisation procedure in Group I:** The area-wise mean percentage shows that the behavioural response to pain was more in the areas arms (mean percentage=66.67%) legs (mean percentage=65.00%), and restlessness (mean percentage=65.00%). There was less behavioural response to pain in the areas like muscle tone (mean percentage=63.33) cry and vocalisation (mean percentage=58.33%) and facial expression (mean percentage=41.67), in the Group I. [Table-1].

**Section III. Description of level of behavioural response to pain among toddlers during immunisation procedure in Group II.**

The area wise behavioural response to pain in Group II was more in the areas of arms, muscle tone, and restlessness (mean percentage=96.67%) cry and vocalisation (mean percentage=95%) leg (mean percentage=88.33%), and facial expression (mean percent=71.67%). [Table-II]

**Section IV. Comparison between level of behavioural response to pain scores in Group I and Group II**

The majority of the toddlers in Group I (83.33%) are having moderate behavioural response to pain, only 16.7% are having severe Behavioural response to pain whereas in Group II all toddlers (100%) experienced severe behavioural response to pain during immunisation. [Figure-1].

**Section V: Significant difference between level of behavioural response to pain among toddlers during immunisation injection in Group and Group II**

Significant difference between level of behavioural response of pain in Group I and Group II showed that Group II has severe behavioural response than Group I (10.97±.928 V/S 7.17±1.206). The calculated value (t=13.680, p<0.001) indicates the significant difference between the behavioural response scores between the two groups. [Table-III].

**Section VI: Association of level of behavioural response to pain among toddlers in Group I and Group II with their selected demographic variables**

The behavioral response to pain among toddlers in Group I and Group II with their selected demographic variables shows no significant association at 0.05 level of significance. [Table-IV].

**Table-I: Description of level of behavioural response to pain among toddlers during immunisation procedure in Group I. N<sub>1</sub> = 30**

Item	Max. Possible Score	Range	Group I		
			Mean	SD	Mean %
Facial Expression	2	0-2	.83	.379	41.67
Arms	2	0-2	1.30	.466	65.00
Legs	2	0-2	1.33	.479	66.67
Cry & Vocalization	2	0-2	1.17	.379	58.33
Muscle Tone	2	0-2	1.27	.450	63.33

**Table-II Description of level of behavioural response to pain among toddlers during immunisation procedure in Group II. N<sub>2</sub>=30**

Item	Max. Possible Score	Range	Group II		
			Mean	SD	Mean %
Facial Expression	2	0-2	1.43	.507	71.67
Arms	2	0-2	1.77	.430	88.33
Legs	2	0-2	1.93	.254	96.67
Cry & Vocalization	2	0-2	1.90	.305	95.00
Muscle Tone	2	0-2	1.93	.254	96.67
Restlessness	2	0-2	1.93	.254	96.67

Figure 1 Comparison of level of behavioural response to pain among toddlers during immunisation procedure in Group I and Group II.

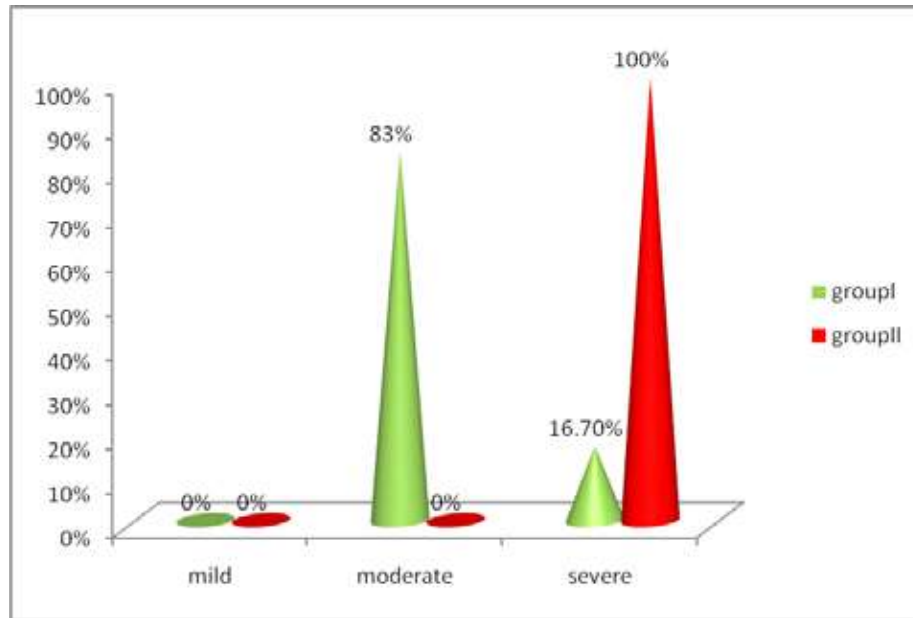


Figure 1: Level of behavioral response to pain among toddlers in Group I and Group II

Table III: Significant difference between level of behavioural response to pain scores in Group I and Group II. N=30+30

Group	Mean	SD	Mean diff	't' value
Group I	7.17	1.206	3.800	13.680
Group II	10.97	0.928		

T<sub>59</sub>=1.67 \*significant.

Table IV: Association of level of behavioural response to pain among toddlers in Group I and Group II with their selected demographic variables

Variables	Group I (%)			Group II (%)		
	< M	≥ M	P value	< M	≥ M	P value
<b>Age of the Child</b>						
a. 12-18 months	25.9	74.1	1.00	39.1	60.9	0.057*
b. 19-24 months	33.3	66.7		0.0	100.0	
c. 25-30 months	0.0	0.0		0.0	0.0	
d. 31-36 months	0.0	0.0		0.0	0.0	
<b>Gender</b>						
a. Male	31.6	64.8	0.710	31.6	68.6	1.00
b. Female	18.2	81.8		27.3	72.7	
<b>Child's Recent Past Experience</b>						
a. High resistance	0.0	100.0	0.055*	22.2	77.8	0.057
b. Minimal resistance	36.4	63.6		33.3	37.7	
c. Calm	36.4	63.6		33.3	67.7	
<b>Weight of the Child at the Time of Immunization</b>						
a. More than 10 kg	37.5	62.5	0.307	33.3	67.7	0.935
b. Less than 10 Kg	14.3	85.7		25.0	75.0	

\*Fisher's Exact test

## Discussion

The present study revealed that the behavioral response to pain among toddlers during immunization procedure in Group I and Group II showed that, the Group I had moderate behavioral response to pain (83.3%) and 16.7% had severe behavioral response to pain while undergoing immunization, whereas Group II had severe pain (100%) during the immunization.

The above findings are consistent with a quasi experimental study conducted at pediatric surgery ward (6th floor, C block) of Advanced Pediatric Centre (APC), PGIMER, Chandigarh by James *Jet et al* (2012) The mean pain score was significantly less i.e. almost half with animated cartoon ( $2.26 \pm 2.18$ ) as compared to routine care ( $4.76 \pm 2.08$ ) at pre venipuncture. Similarly the mean pain score during venipuncture was significantly less with animated cartoon ( $6.24 \pm 2.09$ ) as compared to routine care ( $8.06 \pm 1.70$ )<sup>(19)</sup>

The present study findings showed that there is no association between level of pain among toddlers in Group I and Group II and selected demographic variables (Fisher exact test,  $p > 0.05$ ).

The above findings are consistent with a quasi-experimental study was conducted on children of 3 to 6 years of age who were undergoing venipuncture in selected hospitals of Mangalore by MM Lobo and Umarani *j* (2012). The findings also revealed that there was no significant association between the level of pain and demographic variables<sup>(20)</sup>.

## Conclusion

Present study findings showed that, Distraction techniques like showing the animation video during immunizations are effective means for reduction of behavioural response to pain. It can also be used as a routine with immunisation so that children's behavioural distress can be managed in an effective way. The study concluded that animation video is effective on behavioural response to pain in children receiving immunisation. It is important for the nurses, who administer immunisation, to alter the painful responses as much as possible. Nurses must meet the challenges in relieving response by distracting the children.

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**Ethical Clearance:** Written informed consent was obtained from the parents of the children who brought their children for immunization at PHC. Ethical clearance was obtained from institutional ethics committee of CHCT, Mangalore.

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# Marsupialization for the Management of Unicystic Ameloblastoma-Retrospective Study

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## Abstract

**Background:** An ameloblastoma is a benign odontogenic epithelial origin tumor that occurs from the cell rests of enamel organ, the epithelial linings of any odontogenic cyst or the basalar cells of oral mucosa. Marsupialization along with second-stage curettage was found as a successful plan in treating unicystic ameloblastoma and a reduced recurrence rates. The present study was conducted with the aim to retrospectively analyses marsupialization for the management of unicystic ameloblastoma.

**Materials and Method:** The present retrospective study was conducted in the Department of maxillofacial surgery for a period of 4 years. The speed of shrinkage was taken as the reduction rate divided by the duration of marsupialization (days). The effectiveness was calculated as per the reduction rate as follows: extremely effective, reduction rate of more than 80%, with a complete disappearance of cysts during marsupialization; moderately effective, reduction rate more than 50% but less than 80%; poorly effective, reduction rate more than 20% but less than 50%; and ineffective, reduction rate less than 20%. All the data thus obtained was arranged in a tabulated form and analyzed statistically using SPSS 21 software. Probability value of less than 0.05 was regarded as significant.

**Results:** The present study enrolled 50 subjects with unicystic ameloblastoma, out of which only 44 patients came for regular follow ups and hence were enrolled in the study. The mean age of the patients was 38.54+/-6.32 years. In cases where the size of tumor was less than 3 areas, the speed of shrinkage was 0.073 and in others where the size was more than 3 areas, the speed of shrinkage was 0.187. There was no significant difference between the two as the p value was more than 0.05. In cases where the tumor was at body and symphysis, 6 were effective and 3 were poorly effective and in others where there was ramal involvement, 27 were extremely effective and 8 were poorly effective. There was no significant difference between the two as the p value was more than 0.05.

**Conclusion:** The recurrence rate was also less. Marsupialization along with curettage is highly recommended amongst patients with unicysticameloblastomas of mandible.

**Keywords:** ameloblastomas, marsupialization, odontogenic, epithelial.

## Introduction

An ameloblastoma is a benign odontogenic epithelial

origin tumor that occurs from the cell rests of enamel organ, the epithelial linings of any odontogenic cyst or the basalar cells of oral mucosa.<sup>1</sup> Ameloblastomas accounts for 11% of the odontogenic tumors in the jaw bone and 1% of all oral swellings.<sup>2</sup> As, it is a slow-growing, locally aggressive tumor that has a high rates of recurrence, the treatment protocol for ameloblastoma is controversial.<sup>1,3,4</sup> As recurrence rates are high as 75%-90% after conservative management<sup>3,4</sup> a wider

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resection of the jawbone is advised for the treatment of ameloblastoma. Though, this is the management but it also consequences in variety of other problems, like dentition and bone alterations, numbness of lower lip, and masticatory disorders.<sup>5,6</sup> Now, marsupialization along with second-stage curettage was found as a successful plan in treating unicystic ameloblastoma,<sup>7-9</sup> a variant of ameloblastoma with lesser invasiveness and a reduced recurrence rates.<sup>10-13</sup> Marsupialization has been used as the primary procedure for the management for odontogenic cysts, mainly large cystic lesions in the mandible.<sup>14,15</sup> The advantages of marsupialization are neoplastic bone generation in the cystic cavity, protection of oral tissues, conservation of pulp vitality, prevention of dental extractions, avoidance of surgical damage to crucial anatomic structures, and reduced risk of recurrence.<sup>8,14-16</sup> The present study was conducted with the aim to retrospectively analyses marsupialization for the management of unicystic ameloblastoma.

#### Materials and Method

The present retrospective study was conducted in the Department of maxillofacial surgery. Kalinga institute of Dental sciences for a period of 4 years. The medical records of patients who underwent marsupialization for ameloblastoma were enrolled in the study. The study was approved by the institutional ethical board. Only patients with confirmed diagnosis of mandibular unicystic or multicystic ameloblastoma, Subjects with initial treatment of marsupialization and complete radiological record of treatment were enrolled in the study. Most of the patients were managed under local anaesthesia except with extensive lesions and having limitation in mouth opening. Care was taken not to injure tooth roots, inferior alveolar nerve and permanent tooth buds. The corners were trimmed and served as opening sites. This was followed by histological examination of the biopsy specimen extracted from the opening sites. For longer duration marsupialization, a post operative obturator was given to prevent infection and wound closure. Clinical and radiographic examinations were done for 3 months and wide resection was performed if needed to remove tumor completely. Curettage was performed. After curettage, subjects were trained to have clinical and radiographic checking every 3 months in the first 2 years, thereafter every 6 months for at least 5 years. The tumor sizes were obtained, and their rate of reduction and speed of shrinkage were calculated. The radiographs before and after marsupialization were examined using Image J. The mean value of two readings was used

for analysis. The speed of shrinkage was taken as the reduction rate divided by the duration of marsupialization (days). Additionally, the effectiveness was calculated as per the reduction rate as follows: extremely effective, reduction rate of more than 80%, with a complete disappearance of cysts during marsupialization; moderately effective, reduction rate more than 50% but less than 80%; poorly effective, reduction rate more than 20% but less than 50%; and ineffective, reduction rate less than 20%. All the data thus obtained was arranged in a tabulated form and analyzed statistically using SPSS 21 software. Probability value of less than 0.05 was regarded as significant.

#### Results

The present study enrolled 50 subjects with unicystic ameloblastoma, out of which only 44 patients came for regular follow ups and hence were enrolled in the study. The mean age of the patients was 38.54±6.32 years.

Table 1 shows the Speed of Shrinkage of ameloblastoma. In cases where the size of tumor was less than 3 areas, the speed of shrinkage was 0.073 and in others where the size was more than 3 areas, the speed of shrinkage was 0.187. There was no significant difference between the two as the p value was more than 0.05. In cases where the tumor was at body and symphysis, the speed of shrinkage was 0.135 and in others where there was ramal involvement, the speed of shrinkage was 0.180. There was no significant difference between the two as the p value was more than 0.05. In cases unicystic ameloblastoma, the speed of shrinkage was 0.205 and in multicystic ameloblastoma, the speed of shrinkage was 0.081. There was no significant difference between the two as the p value was more than 0.05.

Table 2 shows the efficacy of marsupialization of ameloblastoma. In cases where the size of tumor was less than 3 areas, 4 were extremely effective and 3 were poorly effective and in others where the size was more than 3 areas, 29 were extremely effective and 8 were poorly effective. There was no significant difference between the two as the p value was more than 0.05. In cases where the tumor was at body and symphysis, 6 were effective and 3 were poorly effective and in others where there was ramal involvement, 27 were extremely effective and 8 were poorly effective. There was no significant difference between the two as the p value was more than 0.05. In cases unicystic ameloblastoma, 24 were extremely effective and 8 were poorly effective

and in multicystic ameloblastoma, 9 were extremely effective and 3 were poorly effective. There was no significant difference between the two as the p value was more than 0.05.

**Table 1: Speed of Shrinkage of ameloblastoma (%/days)**

Variable	Speed	P value
Size of Tumor		>0.05
<3 Areas	0.073	
>3 Areas	0.187	
Location of Tumor		>0.05
Mandibular Body and Symphysis	0.135	
Ramal Involvement	0.180	
Type of Tumor		>0.05
Unicystic Ameloblastoma	0.205	
Multicystic Ameloblastoma	0.081	

**Table 2: Efficacy of marsupialization of ameloblastoma**

Variable	Extremely/ Moderately Effective	Poorly Effective/ ineffective	P value
Size of tumor			>0.05
<3 areas	4	3	
>3 areas	29	8	
Location of tumor			>0.05
Mandibular body and symphysis	6	3	
Ramal involvement	27	8	
Type of tumor			>0.05
Unicystic ameloblastoma	24	8	
Multicystic ameloblastoma	9	3	

## Discussion

On the basis of the evidence, few physicians have also stressed to use marsupialization to multicystic ameloblastomas, 8, 17 that belongs to the subgroup of solid/multicystic ameloblastoma.<sup>11</sup> Though, the recurrence rate exceeds 50%<sup>8,17</sup> that may be due to its aggressive behavior.<sup>18</sup> The outcome supported the negative results on the efficacy of marsupialization for multicystic lesions. Due to the frequency of cases was fairly less in past studies,<sup>7-9,17</sup> more studies should be performed to determine the efficiency of marsupialization in cystic ameloblastoma. Additionally, although few researches regarding the reduction rates

and speed of shrinkage of oral cystic lesions after marsupialization<sup>7,19-21</sup> the rate of reduction and speed of shrinkage of unicystic ameloblastoma have barely been invested. One of the difficulties of marsupialization is that it is a time-consuming procedure<sup>22</sup> this shortage of data is a problem for assessment of the cost-effectiveness of marsupialization in case of cystic ameloblastoma. Marsupialization is regarded as a more conservative form of management for odontogenic lesions to reduce their size and to restrict the level of surgery.<sup>14,15</sup> Thus, this procedure was used for cystic ameloblastomas.<sup>7-9</sup> Maxillary ameloblastomas are more aggressive compared to their mandibular counterparts, that may be because of the cancellous type of maxilla.<sup>23</sup> Additionally, maxillary ameloblastoma have the predisposition to invade the central regions.

In the present study, cases where the size of tumor was less than 3 areas, the speed of shrinkage was 0.073 and in others where the size was more than 3 areas, the speed of shrinkage was 0.187. There was no significant difference between the two as the p value was more than 0.05. In cases where the tumor was at body and symphysis, the speed of shrinkage was 0.135 and in others where there was ramal involvement, the speed of shrinkage was 0.180. There was no significant difference between the two as the p value was more than 0.05. In cases unicystic ameloblastoma, the speed of shrinkage was 0.205 and in multicystic ameloblastoma, the speed of shrinkage was 0.081. There was no significant difference between the two as the p value was more than 0.05. In cases where the size of tumor was less than 3 areas, 4 were extremely effective and 3 were poorly effective and in others where the size was more than 3 areas, 29 were extremely effective and 8 were poorly effective. There was no significant difference between the two as the p value was more than 0.05. In cases where the tumor was at body and symphysis, 6 were effective and 3 were poorly effective and in others where there was ramal involvement, 27 were extremely effective and 8 were poorly effective. There was no significant difference between the two as the p value was more than 0.05. In cases unicystic ameloblastoma, 24 were extremely effective and 8 were poorly effective and in multicystic ameloblastoma, 9 were extremely effective and 3 were poorly effective. There was no significant difference between the two as the p value was more than 0.05.

Various clinical studies have found that the dredging technique for mandibular ameloblastoma has shown a lower recurrence rate and limited complications.<sup>24,25,26</sup>

As per the study by Last, Li et al<sup>13</sup> showed that most unicystic ameloblastoma have a recurrence after more than 4 years.

In the present study, the follow-up duration was lesser than 4 years for 23 patients, who may have tendency to develop recurrences in the future. On the contrary, as per Lau and Samman<sup>12</sup>, marsupialization before initiating curettage can decrease the rate of recurrence. A research hat reviewed 23 conservatively managed subjects with ameloblastoma of mandible and showed a low recurrence rate of 11%.<sup>27</sup> Though few experts challenged that CT is an appropriate tool for assessment of morphological alterations,<sup>9,28</sup> Panoramic x-rays are more prevalent in diagnosis and examination of jaw cystic conditions due to convenience, cost-efficiency, and lower radiation. As per past studies, there existed a linear association between the space of cystic cavities in mandible and radiolucent region on panoramic x-rays.<sup>19,29</sup> The average speed of shrinkage of the cystic ameloblastomas was found to be 0.166%/day, proving that the time interval needed for the radiolucent region to shrink by half after the marsupialization procedure was 10 months. This result was comparable with the past studies that found 8 to 12 months for odontogenic tumors.<sup>19,20,30</sup>

### Conclusion

Marsupialization greatly decreases the volume of cystic lesions. There was amazing improvement in all the cases in our study. The recurrence rate was also less. Marsupialization along with curettage is highly recommended amongst patients with unicystic ameloblastomas of mandible.

**Conflicts of Interest:** The authors declare that there is no conflict of interest regarding the publication of this paper.

**Source of Funding:** Self

**Ethical Clearance:** Ethical clearance has been taken from Institutional Ethical Committee.

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# Sepsis Unfolding a Very Large Pheochromocytoma in an Elderly Patient: A Case Report

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## Abstract

Pheochromocytoma in elderly, often escapes the diagnosis or diagnosed incidentally. Even large pheochromocytoma can be non-secreting until triggered by an external factor. We report here, a case of very large tumor in an elderly patient which was silent till she was hospitalized with sepsis. A 72-years-old female admitted with fever for 15 days. Physical examination and investigations led to the diagnosis of lower respiratory infection with sepsis. Ultrasonography followed by CT scan showed left cystic suprarenal mass of 16.4x13.9x11.7 cm and 24-hour fractionated metanephrines were elevated by >3 fold the upper normal limit by high performance liquid chromatography (HPLC) method. Histopathology confirmed pheochromocytoma and biologically aggressive tumor (Pheochromocytoma of the adrenal gland scaled score of 4). Based on literature search, our case represents one of the largest, biologically aggressive, cystic pheochromocytoma in elderly.

**Keywords:** Giant pheochromocytoma, asymptomatic, elderly, triggering factor, aggressive tumor.

## Introduction

Pheochromocytoma are catecholamine secreting tumors of adrenomedullary chromaffin cells. It is frequently diagnosed at 40-50 years of age and considered uncommon in elderly. The typical manifestations of pheochromocytoma are paroxysmal hypertension, headache, palpitations, and diaphoresis and surgical removal is the curative treatment. Elderly patients can remain asymptomatic for years and often diagnosed incidentally.<sup>1</sup>

**Case Presentation:** A 72-years-old female presented with intermittent fever with occasional chills since 15 days and anorexia and weight loss of 5kg in 6 months. She denied any other associated symptoms relevant to her present illness. She had undergone left hip replacement for fracture neck of femur 7-years back and it was uneventful. She denied history of diabetes or hypertension or family history of any significant illness. On physical examination, patient had BMI of 17.31 (weight of 40kg), pallor, temperature of 100.9°F, pulse rate of 96/min, blood pressure (BP) of 122/60 mm Hg, respiration rate of 28 breaths/min, pulse oximetry (SpO<sub>2</sub>) of 92% on room air and no lymph node enlargement. She had decreased breath sound on left infrascapular area and a mass was palpable in the left lower abdomen on deep palpation. Laboratory investigation revealed neutrophilic leucocytosis with total leucocytes count of 19,720/ $\mu$ L and neutrophil of 86.3%. Hemoglobin was of 6.8gm% and ESR was 135 on 1<sup>st</sup> hour. Peripheral smear showed normocytic normochromic anemia, neutrophilic

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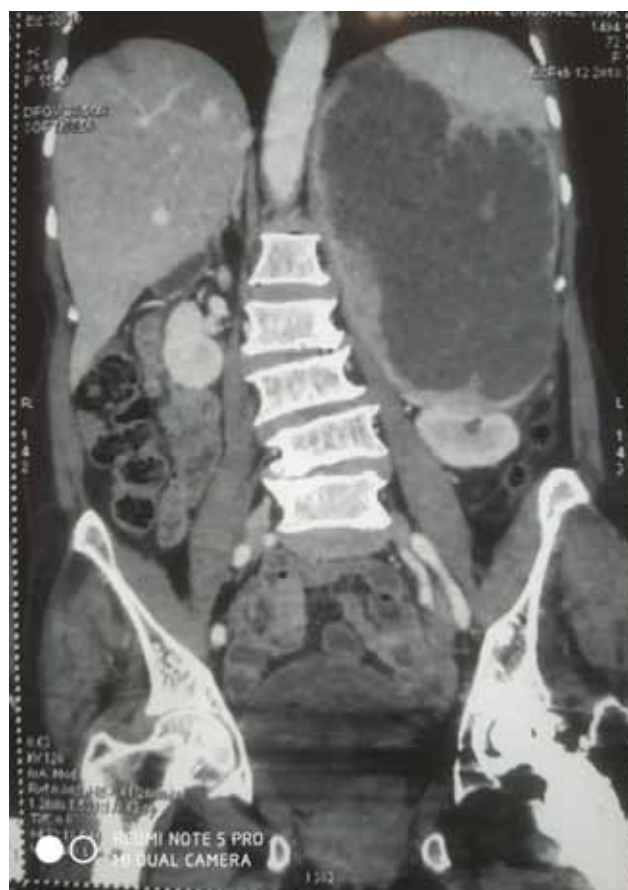
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leukocytosis with toxic changes. Random blood sugar was 111 mg/dL and other laboratory parameters were normal. Chest radiograph showed left sided pleural effusion and ECG was suggestive of sinus rhythm. Her echocardiography was unremarkable with normal ejection fraction. Ultrasonography of abdomen and pelvis revealed non-visualization of left kidney and a large complex cyst located posterior to pancreatic tail, possibly of left renal origin. Pleural fluid analysis was suggestive of exudation (sugar-170mg/dl, protein-3.03g/dl) and showed polymorphic leucocytosis (TLC-360/mm<sup>3</sup>, polymorph-70%) and no dysplastic or malignant cells on cytology examination. Blood cultures on two occasions were sterile. Contrast enhanced CT scan showed a large complex cystic left suprarenal mass of 16.4x13.9x11.7 cm (figure-1). Treatment was started in the line of sepsis with antibiotics, hydration with saline infusion and other symptomatic treatments like packed red blood cell transfusions and antipyretics. On 6<sup>th</sup> day of admission, patient had sudden onset of uneasiness, sweating, and pain in the left lumbar region. Her pulse rate was 116/min, BP was elevated to 210/130 mm Hg and SpO<sub>2</sub> was 80%. After immediate therapy, patient was shifted to intensive care unit (ICU). Further evaluation indicated development of acute renal failure, respiratory failure and tracheal aspiration fluid culture showed growth of pseudomonas organism. After laboratory and clinical parameters stabilized, she was shifted back to the ward after 12 days. Estimation of fractionated metanephrines in 24-hour urine by HPLC method showed metanephrine of 2095.92µg/24h (reference range: 74-297µg) and normetanephrine was 2753.25µg/24h (73-808µg). A final diagnosis of lower respiratory tract infection, sepsis and possibly pheochromocytoma was made. Her blood pressure medication has been changed to selective alpha-1 blocker prazosin, adequate fluid and liberal salt intake has been encouraged for volume expansion. Four weeks later, open left adrenalectomy was done and encapsulated mass was removed. Histopathology confirmed pheochromocytoma (figure-2). There was wide fluctuation of BP (systolic 60-170 and diastolic 40-90 mmHg) intra-operatively as well as postoperatively. Patient was shifted to ICU and started with saline infusion, blood transfusion, and inotropic support. But she had extensive anterior myocardial infarction and asystole on second post-operative day and despite of resuscitation measures; couldn't be revived. Microscopic examination showed neoplastic cells in diffuse sheets and nests and presence of capsular invasion, extensive areas of hemorrhage & necrosis, cellular monotony and

increase mitosis (scoring 1 point each), thus having 'Pheochromocytoma of the adrenal gland scaled score' (PASS) of four.<sup>2</sup>



a.



b.

**Figure 1 a & b. Contrast enhanced computed tomography of the abdomen showing 16.4x13.9x11.7cm left adrenal mass.**

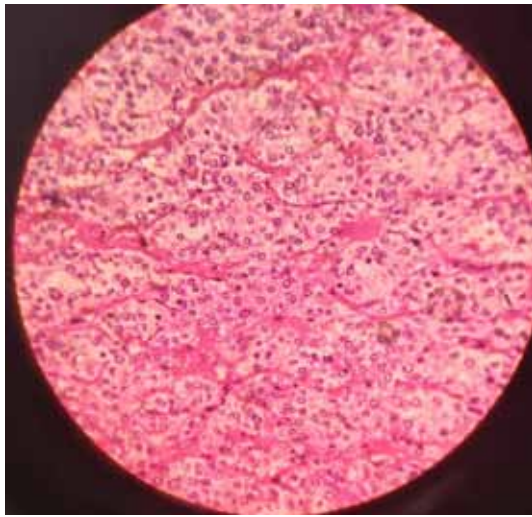
## Discussion

This report presented a case of very large pheochromocytoma at the age of 72 years which remained asymptomatic until she was admitted with sepsis. Pheochromocytoma in elderly are frequently diagnosed incidentally or in autopsy. A study of 50-year autopsy series from Mayo Clinic found 22% of patients having pheochromocytoma were above 68 years and 75% of these patients diagnosed after death.<sup>3</sup> Ross NS, Aron DC et al, reported 7% of incidentaloma at the age of 70 years in autopsy.<sup>4</sup> Further, a study from Sweden, observed the average age at diagnosis of pheochromocytoma was 48.5 years for ante mortem diagnosis and 65.8 years for those diagnosed after death.<sup>1</sup>

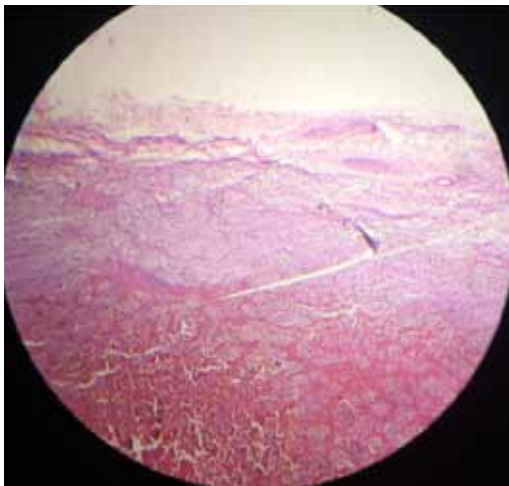
The broad spectrum of clinical manifestations results from excess release of catecholamines by the tumor. Paroxysmal hypertension is the most noted sign that leads to clinical suspicion. The triggering factors for paroxysms are medications (e.g. antidepressants, beta blockers, opiates, metoclopramide, chlorpromazine), anesthesia and surgery, postural changes, tyramine containing foods and physical stress. It can be inferred from many previous studies that a significant percentage of elderly patients remain clinically silent or have minor symptoms before the diagnosis.<sup>1,3,4</sup> The paucity of symptoms may be attributed to multiple factors like age related decreased tissue response to catecholamines, decreased baroreceptor function and also misdiagnosis by presence of other co-morbid illnesses of the elderly.

Catecholamine metabolism by catechol-O-methyltransferase becomes predominant within pheochromocytoma. Concentration of the enzyme increases proportionally to the size of the tumor leading to decrease in catecholamine levels and increase in inactive metabolites like metanephrine and normetanephrine.<sup>5</sup> This explains why even the larger tumors may not have prominent symptoms.

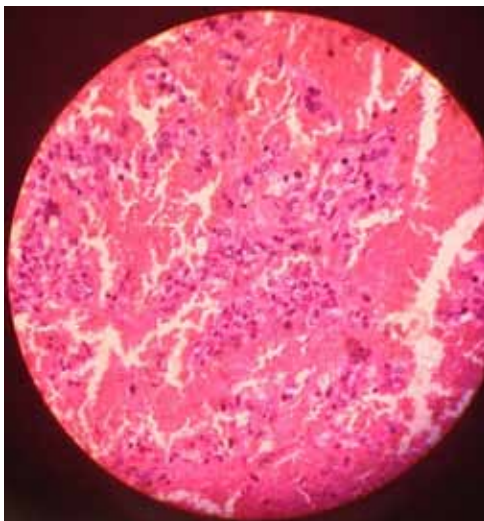
However, the diagnosis of incidental pheochromocytoma is increasing lately due to wide availability and frequent use of CT scan imaging and improved laboratory facility.<sup>6</sup> CT scan has a sensitivity of 98-100% and specificity of around 70%, similar to MRI for localization of the tumor but MRI has an advantage of detecting extra-adrenal tumor.<sup>2</sup> For biochemical diagnosis, plasma free or urinary fractionated metanephrines is superior to other tests of catecholamine excess. Plasma free metanephrine and 24 hour urinary fractionated metanephrines have the



a.



b.



c.

**Figure 2: Histology of the tumor showing a. Zellballen arrangement of cells b. capsular invasion and c. areas of hemorrhage and necrosis**



sensitivity of 89.5-100% and 85.7-97.1% and specificity of 79.4-97.6% and 68.6-95.1%, respectively.<sup>7</sup>

Pheochromocytoma are prone to hemorrhage and necrosis due to vasoconstriction, adrenal vein thrombosis and high venous pressure as consequences of excess catecholamine; eventually resulting in cystic pheochromocytoma. Severe physical stress like sepsis among other factors (like surgery, pregnancy, anticoagulants, bleeding diathesis or coagulopathy, and idiopathic) can predispose to hemorrhage and the most consistent feature is lumbar or flank pain.<sup>8,9,10</sup>

Malignant pheochromocytoma is defined by the documented evidence of metastasis and not by the presence of capsular or vascular invasion or mitosis or tumor size.<sup>11</sup> Functional imaging and immunohistochemical staining couldn't be done in our case because of lack of facilities. However, PASS classify pheochromocytoma histologically into those with biologically aggressive tumors having PASS score of  $\geq 4$  and those with low risk of malignancy having score of  $< 4$ .<sup>2</sup> Our patient had a biologically aggressive tumor with high risk of malignancy. Based on literature review, this case is comparable to the previously reported giant malignant pheochromocytoma measuring 13.5x10.6x9.8 cm by Chenqquan et al.<sup>12</sup> Giant cystic benign pheochromocytoma were previously reported by Gupta A et al measuring 25x17x15 cm and another of 19x18x12 cm by Ambati D et al, in elderly patients.<sup>13,14</sup> Our case represents one of the largest tumors in respect to biologically aggressive, cystic pheochromocytoma in geriatric patients.

### Conclusion

Even larger pheochromocytoma can be asymptomatic in elderly. It can be non-secreting until triggered by an external factor and also being symptomatic; it is confounded by many co-morbid illnesses of the elderly. Hence, it poses a greater diagnostic challenge which needs a more precise clinical guideline and treatment plan in elderly patients.

**Consent:** Informed written consent was obtained from the patient's close relative for the publication of this report and accompanying images.

**Competing Interests:** The authors declare none.

**Source of Funding:** Nil

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# Assessment of the Level of Awareness on Negative Impact on Playing Mobile Games among High School Students in Selected Higher Secondary School, Kanchipuram District, Tamilnadu

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## Abstract

The research project was to assess the level of awareness of negative impact of playing mobile games among high school students in a selected higher secondary school, Kanchipuram district, Tamil Nadu India. The objectives of the study were to assess the level of awareness on negative impact of playing mobile games among the high school students and to find out the association between the level of awareness on negative impact of playing mobile games with selected demographic variables of high school students. There were two stage of sampling technique such as stage I (purposive sampling technique) and stage II (simple random technique -lottery method) with samples of 175 high school students. An extensive review of literature on negative impact of playing mobile games were gathered. Demographic variable porforma and self structured tool were used to collect the data on level of awareness on negative impact of playing mobile game among high school students. The collected data were tabulated and analyzed. The mean value is 37.71 and standard deviation value is 1.75 and 33% were low level of awareness, 44% were moderate level of awareness, 23% were of high level of awareness on negative impact of playing mobile game among high school students. There were significant association between the level of awareness on negative impact of playing mobile games among high school students of age, gender, standard,number of mobile used at home, wearing spectacles, family income and BMI . According to the level of awareness health education given on negative impact on playing mobile games to the high school students.

**Keywords:** *Level of Awareness, Negative Impact, Playing Mobile Games, High School Students.*

## Introduction

Towards the end of the 20th century, mobile phone

ownership became ubiquitous in the industrialised world - due to the establishment of industry standards, and the rapid fall in cost of handset ownership, and use driven by economies of scale.<sup>(6)</sup>

A mobile game is a game played on a feature phone, smart phone/tablet, smart watch, PDA, portable media player or graphing calculator. Today smart phones are used for a variety of things. Like traditional mobile phones, smart phones are used to call and text, but also for example to navigate, use social networks and play games Smart phone games are popular, which is shown by games having the highest revenue among all smart phone app categories. Games generated 90% of Google Play and 75% of the Apple App Store revenue in 2015.<sup>(7)</sup>

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Addiction is considered by **WHO** (WHO Expert Committee - 1964) as dependence, as the continuous use of something for the sake of relief, comfort or stimulation, which often causes cravings when it is absent. A new kind of health disorder in this category among adolescents, “smart phone’s addiction/abuse/misuse” is now challenging health policy makers globally to think on this rapidly emerging issue. Indian adolescents are also affected by this high smart phone engagement, and the current paper will use meta-analysis to discuss their addictive behaviors. <sup>(8)</sup>

Adolescents are defined as young people between the ages of 10 and 19 years as per WHO (2014) criteria. Today, 20% of people persons in the world are adolescents, constituting 1.2 billion people worldwide. Nearly, 243 million adolescents live in India as per the UNICEF Report (2011).<sup>(9)</sup>

Smart phones are popular and have numerous benefits. Nevertheless, their many features and high availability has caused a certain dependence. This dependence has caused social problems, including obsessive use and addiction, which have created a mental health concern.<sup>(10)</sup>

**Statement of the Problem:** A study to assess the level of awareness on negative impact of playing mobile games among high school students in selected higher secondary school, Kanchipuram district, Tamil nadu, India

**Objectives:**

- To assess the level of awareness on negative impact of playing mobile games among the high school students .
- To find out the association between the level of awareness on negative impact of smart phone games with their selected demographic variables.

**Methodology**

**Research Approach:** Quantitative descriptive research approach was used for the study.

**Research Design:** Non experimental descriptive research design was adapted.

**Research Setting:** The research was conducted in Atomic Energy Central School No-1, Kalpakkam, Kanchipuram district, Tamil Nadu.

**Sample and Sample Size:** Students those who were studying in standard 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> in selected higher secondary school. 175 High secondary school students were chosen for the study.

**Stage I:** Purposive sampling technique was used to select the students who were playing mobile games

**Stage II:** Simple Random Technique [Lottery method] has been used to select equal number of participant from each class.

**Sampling Criteria:**

**Inclusion Criteria:**

- High school students who were available during the data collection.
- Those who can understand English and Tamil

**Exclusion Criteria:**

- High school students who were not having mobile phone at their home.
- The students who were absent on the data collection.

**Data Collection Procedure:** The researcher conducted a personal interview to collect personal information and their level of awareness of negative impact of playing mobile games among high school students. Each participant has been interviewed for 15 min. Data collection for the period of 1 week.

**Description of the Research Tool:**

**Section-A:** Personal information sheet about the information of the participants which includes age, gender, standard, no of mobiles used, type of mobile used, no of hours spend, are they wearing spectacles, previous knowledge about negative impact, family income, symptoms they experience without mobile games and their BMI

**Section-B:** Self – structured questionnaire in the form of likert scale was used to assess the level of awareness of negative impact of playing mobile games among high school students. It consists of 13 items such as salience, tolerance, learning capabilities, mood changes, aggressive behavior, unpleasant feeling, conflicts, physical problems, lack of sleep, vision problem, human contact, time wastage and hate speech.

**Scoring Procedure and Interpretation:** The total attainable score was 65, which was interpreted follows:

Score	Percentage	Level of Awareness on Negative Impact of Mobile Games
13-32	20-50%	Low Level of Awareness
33-49	51-75%	Moderate Level of Awareness
50-65	76-100%	High Level of Awareness

**Statistical Analysis:** Descriptive statistics like frequency distribution, percentage, mean, standard deviation and inferential statistics like chi-square test was used to analyses the data.

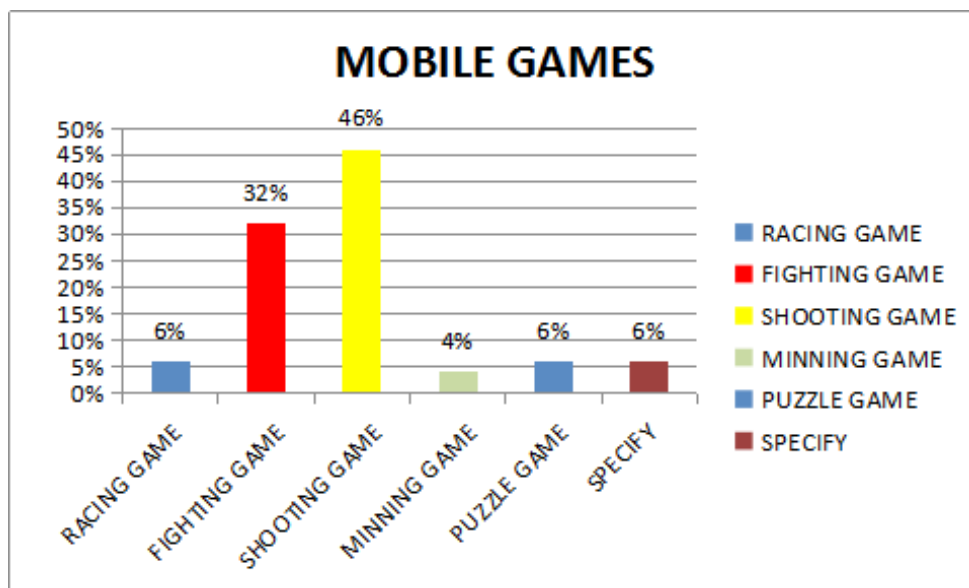
### Result and Discussion

**Table 1: Level of Awareness on Negative Impact of Playing Mobile Games**

Level of Awareness On Negative Impact of Playing Mobile Game	No of High School Students	Total No of Question	Score Range	No of students under each range	Total score	Mean	SD	Level of Awareness	
								Individuals	Total
Low awareness	175	13	13-32	58	6600	37.71	1.75	33%	100%
Moderate awareness			33-49	77				44%	
High awareness			50-65	40				23%	

The result showed mean (37.71) and standard deviation (1.75) aspects of high school students. The score for the level of awareness reveals that 58 (33%) have low level of awareness, 77(44%) have moderate level of awareness and 40 (23%) have high level of awareness.

**Distribution of the high school students based on the level of awareness on negative impact of playing mobile game (N = 175)**



**Graph 1: Percentage Distribution of the high school students according to their type of mobile used for**

**playing games**

The study further revealed that there is significant association between the level of awareness on the negative impact of playing mobile games among high school students of Age ( $\chi^2 = 27.835$ ) gender ( $\chi^2 = 15.93$ ), standard ( $\chi^2 = 22.26$ ), usage of mobile at home ( $\chi^2=26.62$ ), type of mobile games ( $\chi^2 = 20.15$ ), type of mobile ( $\chi^2 = 13.75$ ), wearing spectacles ( $\chi^2 = 15.42$ ), family income ( $\chi^2 = 46.995$ ), BMI ( $\chi^2 = 77.176$ ). Hence the researcher rejects a research hypothesis.

There is no significant association between the level of awareness on the negative impact of playing mobile games among high school students have previous knowledge on negative impact ( $\chi^2=3.621$ ), source of information on the negative impact of playing mobile games ( $\chi^2=12.15$ ), symptoms experienced ( $\chi^2=8.89$ ).

**Conclusion**

The study results shows that only 23% of students having good level of awareness on negative impact on playing mobile games which really gives us the alarm to focus on student's health to prevent negative impact due to playing mobile games.

**Source of Funding:** Self-funding and no external funding.

**Ethical Clearance:** Obtained clearance from Institutional Human Ethical Committee on 11.04.2018

**Conflict of Interest:** Nil**References**

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# The Cut that Scars: Exploring Female Genital Mutilation in Somalia with Reference to Select Texts

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## Abstract

Female Genital Mutilation (FGM) is termed as a horrendous practice that causes harm to the female genital organs. Tracing its roots before the arrival of Abrahamic religions, the ritual that was originally a part of Africa has crossed boundaries and is practiced around the globe. With more than 3 million girls cut every year, United Nations has declared FGM as a ritual that needs to be curbed. Somalia is one country where the incidence of genital mutilation and its aftermath is very high. Most women in Somalia undergo the ritual of cut to purify themselves. This paper looks into “type three cutting” (infibulation) in Somalia with the help of three works written by Somali authors-Hibo Wardere, Ayaan Hirsi Ali and Waris Dirie.

**Keywords:** Female Genital Mutilation, Tradition, Somali Writers, Violence.

## Introduction

Among the many gender violations, Female Genital Mutilation is a bodily violence that has existed from the pharaonic times to date. According to the United Nations, (UN) Female Genital Mutilation (FGM) also known as Female Circumcision (FC) involves all the practices that cause external injuries to the female genital organs in the name of religion, culture and tradition. It is an ancient ceremony that violates essential aspects of women’s and children rights. As Alice Walker wrote in *Warrior Marks*, “Clearly, female genital mutilation is a painful, complex, and difficult issue, which involves questions of cultural and national identities, sexuality, human rights, and the rights of women and girls to live safe and healthy lives.”<sup>1</sup>

In most cases, FGM is done from around three years to fourteen years. For better understanding the World Health Organisation has classified FGM into four divisions; type 1, type 2, type 3 and type 4.

Type 1, known as ‘cliterodectomy’ is the mildest form of the four and involves partial or total removal of the clitoral hood or the clitoris.

Type 2 called as ‘excision’ is the partial or total

removal of the labia minora, with or without removal of the clitoris and labia majora.

Type 3 also called as ‘infibulation’ is the most painful and horrific type of FGM. It involves the removal of the external genitalia as well as the sealing of the wound. Infibulation is also the most complicated type of cutting as only a miniscule opening is left to allow the flow of urine and menstrual blood. Scars are formed due to infibulations and for a scar to form; the legs of the victims are tied together for around two to six weeks.

Type 4 involves all harmful procedures to the female genitals for non- medical practices. These include; perforating, piercing, slitting, scraping and cauterization.

With a long evolved history, genital mutilation has emerged as a social norm that is quite challenging to be stopped suddenly. Even today, many countries especially the African Nations continue to practice this horrendous tradition. Though efforts to eliminate the practice have been happening for decades, the number of women and children subjected to this remain at large.

The attempt of this paper is to look into type three of genital mutilation also called as infibulation that occurs in Somalia with the help of works written by Somali

female writers Hibo Wardere, Waris Dirie and Ayaan Hirsi Ali.

## Methodology

Even after multiple attempts to ban Female genital mutilation in Somalia, the country still has one of the highest incidences of women having been cut. According to Thomson Reuters Foundation's research article; *Somalia: The Law and FGM*, there is still no law that punishes the practices of FGM. "The Constitution of Somalia (2012) state at Article 15 that: Circumcision of girls is a cruel and degrading customary practice, and is tantamount to torture. The circumcision of girls is prohibited. Article 29(2) further provides, 'Every child has the right to be protected from mistreatment, neglect, abuse or degradation'. Lack of education and tradition oriented thinking remains the main reason for the practice continuing among the Somalis.

Egyptian writer and women's activist Nawal El Saasawi in her work *The Hidden Face of Eve* wrote, 'The importance given to virginity and an intact hymen in these societies is the reason why female circumcision still remains a very widespread practice...Behind circumcision lies the belief, by removing parts of girl's external genital organs, sexual desire is minimized'.

Somali writer, Hibo Wardere in her work *Cut: One woman's fight against FGM in Britain today*, describes the torture she has been through. The cutting transforms Wardere into a new person and her relationship with her mother deteriorates. Like most in her tribe, she was cut in the presence of her mother and two other women. She quotes the ordeal as follows: "Then, with those long pincer nails, she dug between my legs and grasped my clitoris, my kintir...she lifted up that dirty razor, the one that still had the dried brown residue of other's blood clinging to it, like filthy reminders of her previous work, and she cut straight through my flesh". With no proper laws to curb the ritual, the story of Wardere remains the same for almost all Somali girls.

Waris Dirie is a Somali model and activist who endured the 'becoming a woman ceremony' at the age of five. As she belonged to a family of shepherds, unlike Wardere, she was cut by a gypsy woman under the shade of a tree on a flat rock with an old broken razor and was tied from hip to toes for the wounds to heal. In *Desert Flower: The Extraordinary Journey of a Desert Nomad*, Dirie write,

When the ties that bound me were removed from my legs, I was able to look at myself for the first time. I discovered a patch of skin completely smooth except for a scar down the middle like a zipper. And that zipper was definitely closed. My genitals were sealed up like a brick wall that no man would be able to penetrate until my wedding night, when my husband would either cut me open with a knife or force his way in .

Marriage was seen as the main reason for most girls being subjected to circumcision. A virgin woman always fetched higher price in the marriage market. Dirie's father agreed her marriage to a man in his 60's for five camels. To a family that herded sheep's, five camels were indeed a hefty prize.

Another Somali activist Ayaan Hirsi Ali also has the same story line like Wardere and Dirie. In her work *Infidel: My Life*, we see a similar pattern. She was cut in the vicinity of her home along with her brother and sister with a pair of scissors. Ayaan describes how the torture was more severe to her younger sister Haweya who was four at the time of her cutting. As a result of her cries and struggle, Haweya had to be stitched twice and the author mentions that her little sister was not the same anymore. "Haweya was never the same afterward. She became ill with a fever for several weeks and lost a lot of weight. She had horrible nightmares, and during the day began stomping off to be alone. My once cheerful, playful little sister changed".

## Results and Discussion

Traced to pharaonic rituals, FGM is often imbibed without knowing the real reason behind the procedure. As a result over the years this became a normative tradition and continues to do so. The concept of FGM in many cultures resonated with purity. As how her mother tells Wardere, "We are a family whose girls are known for our virginity. We are clean, and that means we can marry well, and you will stay pure until you get married to your husband". This was the notion of most mothers who had their daughters cut. The article *Somalia: The Law and FGM*, mentions that with the law of Somalia still in favour of FGM, countries sharing their borders with Somalia take their child to be cut in the country. "It is also suggested that many Somali women and girls from the Western diaspora (for example, in the USA, Australia, the UK and other European countries) are taken to Somalia for FGM because there is no risk of prosecution".



The issue takes a wider stage when it is understood that the cutting is not just limited to African countries. <sup>4</sup>According to Wardere (189), in 2001 around 66,000 women between the age of fifteen to forty nine living in England and Wales were cut. Taking cues from African nations, genital mutilation started to spread even to educated communities. Mothers often took their daughters to cut in order to preserve virginity and stop masturbation.

In table 1 below, the type 3 cutting that had to be endured by all three writers have been analyzed. With unfavorable settings and unsterilized tools, it is often a miracle that they survived. Waris Dirie and Hibo Wardere

had recuperated surgery done on them to minimize the damage that was done on their bodies. Even though it had little to do with sexual pleasure, the surgery helped them to urinate better.

14 questions are looked upon in table 1.

✓ Denotes YES

✗ Denotes NO

Some questions have answers in words while for some questions the data was not available and hence, NO MENTION is given.

**Table 1: Examining Type 3 cutting that was performed on Hibo Wardere, Waris Dirie and Ayaan Hirsi Ali**

	<b>Analysis of Infibulation</b>	<b>HIBO WARDERE</b>	<b>WARIS DIRIE</b>	<b>AYYAN HIRSI ALI</b>
1	Age when cut	6	5	5
2	Were women present during the procedure?	✓	✓	✓
3	Was the circumciser a woman?	✓	✓	✗
4	Were men present during the procedure?	✗	✗	✗
5	Was a sterilized tool used?	✗	✗	✓
6	Did the cut take place in a homely surrounding?	✓	✗	✓
7	Did the victim run a fever?	✗	✓	✗
8	Excessive bleeding?	✓	✗	No Mention
9	Thorn or needle used	Thorn	Thorn	Needle
10	Bandaged?	✓	✓	✓
11	Time taken to unbind	10 Days	1 Month	2 Weeks
12	Married	✓	✓	✓
13	Sexual experience	Painful	No Mention	No Mention
14	Recuperate surgery	✓	✓	✓

**Socio Cultural Contexts:** Located on the eastern part of the African continent, Somalia has a population of 15.64 million of which 73 percent of Somalis live in poverty. Without a proper central government and occurrence of civil wars, the education system of the country has one of the lowest enrollment rates. So, it is often difficult for NGO’s or other organisations to communicate about the practice of FGM with the people. Women seldom talk about the practice and men choose to keep silent. As Dirie says, “The health problems I’ve coped with since my circumcision also plague millions of girls and women throughout the world. Because of a ritual of ignorance, most of the women on the continent of Africa live their lives in pain. Who is going to help

the woman in the desert- like my mother- with no money and no power?”<sup>5</sup>

Tradition is an important factor to most Somali tribes. They seldom part with the beliefs that they hold on to. According to the Egyptian customs, clitoris was a part that grew with age and so to curb its growth it needed to be cut. A cut woman was seen as pure and chaste while an uncut girl was seen as a slut in the society. <sup>6</sup>Ayaan’s grandmother asks her daughter, “Imagine your daughters ten years from now- who would marry them with long kintirs dangling halfway down their legs?” This was the notion of most mothers and grandmothers; a notion that has been handed down from generations to generations.

## Conclusion

With a hole as small as a match stick head left for urine and menstrual blood to pass out, infibulation leaves the victim with lifelong infections, hemorrhage and pains. Childbirth is the most torturous procedure that a woman with type 3 cutting has to go through. Even after several measures taken, FGM continues to be on a high incidence in Somalia. Primary level education should be a very important step towards tacking FGM. Even though it gets difficult to convince elderly women rooted in their tradition about the practice, medical camps organized by people from their same tribe can do wonders that an outside intervention. It's high time that men are informed and they take a stand too. As Saadwai mentions, <sup>3</sup>parents see circumcision as a safeguard against the deviations a girl might take.

All through history, the feminine sex had to undergo harsh customs and cruel traditional practices that deprive them of their choices. Female genital mutilation is one such barbaric practice where a female is inhibited and subdued. Not just protests, but a strong mind that can break stereotyped barriers is utmost necessary to put an end to a practice like genital mutilation. Preventing a cut after all, can make a big difference.

**Conflict of Interest Statement:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Nil

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# Development of Rapid, Sensitive and in-expensive Point of Care Diagnostic Method for Brucellosis in Dairy Cattle at Resource-Limited Areas

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## Abstract

It is an emerging zoonotic disease spread all over the world, but its diagnosis is rather complex. Though a number of serological tests are currently available for diagnosis, none of them are useful at POC diagnosis. Further, they are not user-friendly and reproducible. Precisely for this reason, present study was aimed to develop a simple, inexpensive, field applicable POC diagnostics using protein G-based milk dipstick and indirect enzyme-linked immunosorbent (iELISA) assays. These are useful for rapid detection of brucellosis using a handheld ELISA reader at resource-limited POC areas near pen side. Overall, 4998 raw milk and whole blood samples were collected from organized dairy farms, where animals are reared (Goshalas), and villages in different districts of Andhra Pradesh and Telangana states, India. Collected samples used to evaluate diagnostic performances of these assays in comparison with milk ring test (MRT) and Rose Bengal Plate Test (RBPT) serological assays. The developed milk dipstick and iELISA showed 87.37%, 99.67% and 98.23%, 100% sensitivity and specificity respectively. Results proved that the developed assays can be used as potential diagnostics for rapid field diagnosis of *Brucellosis* from infected animals using raw milk and whole blood samples at resource-limited settings.

**Keywords:** MRT (Milk Ring Test), RBPT (Rose Bengal Plate Agglutination test), Point of Care (POC), Polymerase Chain Reaction (PCR), Milk dipstick, iELISA (indirect Enzyme-Linked Immunosorbent Assay).

## Introduction

*Brucella* is a facultative, intracellular, Gram negative pathogenic bacteria causes brucellosis. It is a neglected, highly infectious under reported zoonotic disease<sup>20</sup>. *Brucella* infects dairy animals, small ruminants, canine, swine, humans<sup>24</sup>, and is a highly contagious disease

of livestock causing severe morbidity, playing an enormous impact on economic losses<sup>17,31</sup>. Prevalence of brucellosis is not clear and is changing continuously because of improper usage of sanitary method, intensification of farming, socio-economic status of farmers and international movement of animals<sup>11,36</sup>. Recent studies pointed out an increased prevalence of brucellosis in dairy livestock of India, becoming geographical hotspot causing an economic loss of US \$3.4 billion per annum<sup>9,26,32</sup>. Lactating animals excrete bacterium into milk throughout their lives means that bacteria are localized in lymph nodes and mammary glands in infected animals<sup>13,14,19</sup>. Though, India is one among largest milk producers in world, there is still a

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huge demand for milk and dairy products. Since growth of dairy industry depends on productive and reproductive health of dairy animals, it is crucial not only to upkeep but also to prevent bovine diseases.

MRT is inexpensive technique for screening and monitoring of brucellosis<sup>2,24,30</sup>. It may give false positive reactions with milk samples such as colostrums or milk at the end of lactation period, milk from cows suffering from a hormonal disorder<sup>19</sup>. Serological diagnostics for brucellosis infection are RBPT, Slow Agglutination Test (SAT), Complement Fixation Test (CFT) for primary screening of brucellosis. However, agglutination techniques may have limitations in sensitivity<sup>2</sup>. Lateral flow immunochromatography showed better sensitivity and specificity compared to RBPT<sup>29</sup>. Existing diagnostics are not well established for field diagnosis and are time consuming; require expensive laboratory with expertise. Thus, there is a need to develop highly specific, sensitive, inexpensive, POC diagnostics for rapid detection of brucellosis. So, present study is aimed to develop and evaluate milk dipstick and iELISA with a portable hand held ELISA reader for the detection of brucellosis at resource-limited areas.

## Materials and Method

**Study site and animals:** A total of 4,998 individual milk and whole blood samples were collected from third and fourth lactating cows from organized dairy farms, Goshalas and villages in Kadapa, Kurnool, Ananthapuram, Chittoor, Prakasam, Krishna, Guntur, West Godavari, and Nellore districts in Andhra Pradesh; Khammam, Kareemnagar, Nalgonda, Sangareddy and Rangareddy districts in Telangana, India. The study samples include Holstein Friesians cows (1057), Jersey (909), Shahiwal (701), Ongole (813), Gir (512), Punganur (311) and Murrah buffaloes (695) as a source for sample collection.

**Sample collection and processing:** A total of 20 ml volumes of midstream milk was collected directly from all teats into a sterile 50ml falcon tube without preservative from selected individual cows. Approximately, 5ml volume of whole blood was collected from jugular vein of animal in Lithium-Heparin coated BD Vacutainer tubes (REF 367820) for serological studies with consent of farm owners and farmers under supervision of a veterinarian.

**Milk Ring Test:** MRT is standard, most common method for identifying infected animals for surveillance

of brucellosis free herds.<sup>21</sup>

**Culture:** Collected fresh milk samples were centrifuged at 3000xg for 10mins. Pellet was placed onto tryptose soy agar (Ref # M290, Himedia) media supplemented with antibiotics<sup>15,25</sup>.

**Antigen Preparation:** *Brucella abortus* strain 99 was obtained from Indian Veterinary Research Institute, Izatnagar, India was grown on soybean casein digest agar medium and harvested as per OIE recommended protocol<sup>23</sup>.

**Development of Dipstick Assay:** Dipstick strips are easy to perform for quick sero-diagnosis of brucellosis due to its robustness, simplicity and are highly suitable for application under field conditions<sup>10</sup>. Capillary action of dipstick resulted in formation of colored bands as shown in Figure 2.

**Development of indirect ELISA:** Protein G-based iELISA using sLPS was carried out with a modified protocol to increase the accuracy<sup>6</sup>.

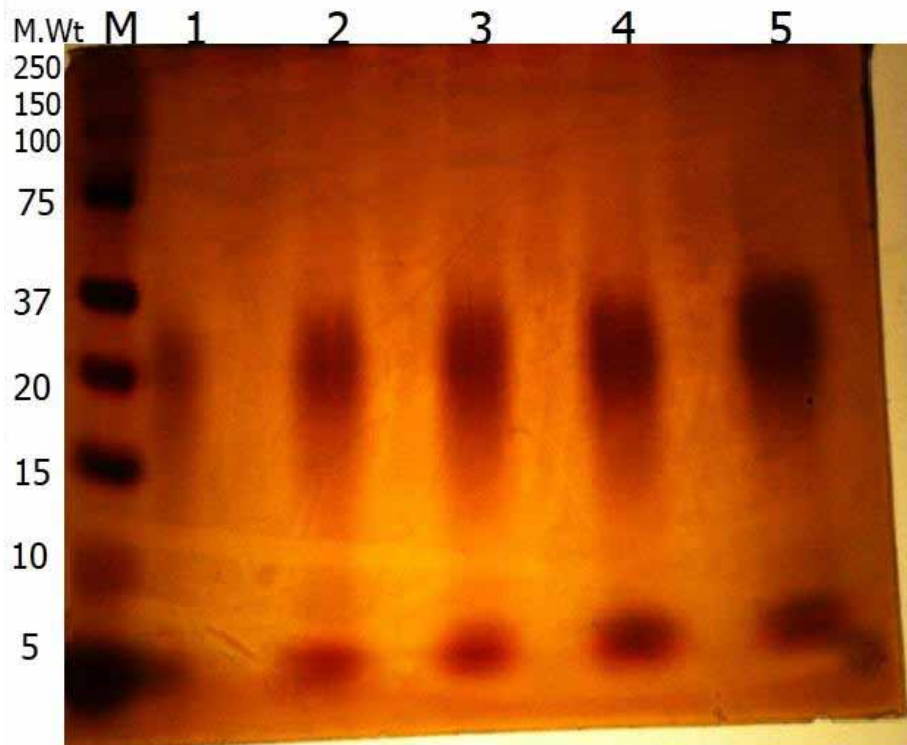
**Hand-held ELISA Reader:** Battery-operated, portable, hand-held ELISA reader is easy to carry from one place to another with external facilities.

**Cut Off Value:** iELISA assay cut off value between positive and negative samples was derived by calculating mean OD values obtained from 450 negative samples plus three times of standard deviation<sup>28</sup>.

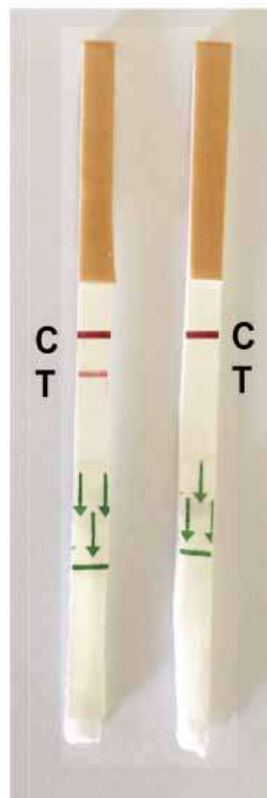
Cut off =  $X + 3 SD$  (X- mean, SD- standard deviation).

**Statistical Analysis:** Collected samples used for validation of milk dipstick and iELISA in comparison with MRT, RBPT, and culture. Calculation of specificity, sensitivity, PPV, NPV and efficiency were carried out using statistical analysis software NCSS 12 and McNemars Chi square test used to calculate significance level and  $p$ -value < 0.05 was used as significant.

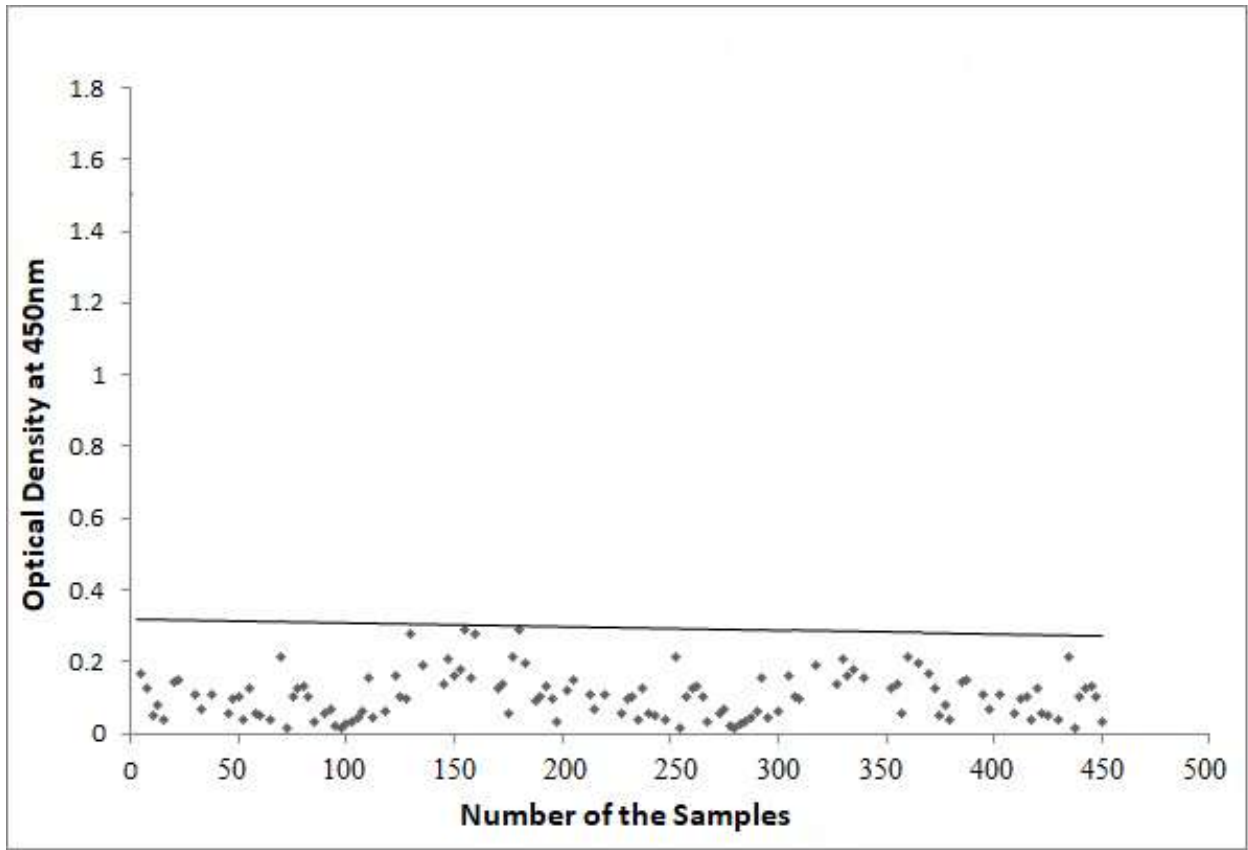
**Results:** Results were presented in figure no 1-4 and table no 1-2. While dipstick showed 87.37%, 99.67% sensitivity and specificity, iELISA displayed 98.23% sensitivity and 100% specificity. Statistical data in terms of sensitivity, specificity, PPV, NPV and efficiency were significantly differing with standard values (Table 2). Chi square statistical value is 54.3028 and the  $p$ -value is <0.00001, so, obtained results are significant at  $p < 0.05$  level.



**Fig. 1:** Silver staining gel image of sLPS obtained from *Brucella abortus* S99 strain. Lane M is Bio-Rad precision plus protein standard marker, Lane 1 to 4 are four different lots of sLPS and lane 5 is concentrated sLPS using lyophilization by pooling all the four lots.



**Fig. 2:** Dipstick lateral flow test strip tested with brucellosis positive and negative samples.



**Fig. 3: Diagrammatic representation of OD values for 450 unvaccinated animal samples for defining the negative cut off value. While X-axis shows the number of animals, Y- axis deals with the OD of 450 negative samples at 450 nm.**

**Table 1. A comparative diagnostic evaluation data of five different diagnostic assays for detection of brucellosis**

Assays	Sample Type	Total No. of Samples					
		Positive	Negative	TP	TN	FP	FN
MRT	Milk	958	4040	285	3929	673	111
RBPT	Serum/plasma	894	4104	299	4007	595	97
Culture	Milk	396	4602	396	4602	-	-
Dipstick	Milk/Whole blood	361	4637	346	4587	15	50
Indirect ELISA	Milk/Whole blood	389	4609	389	4602	-	7

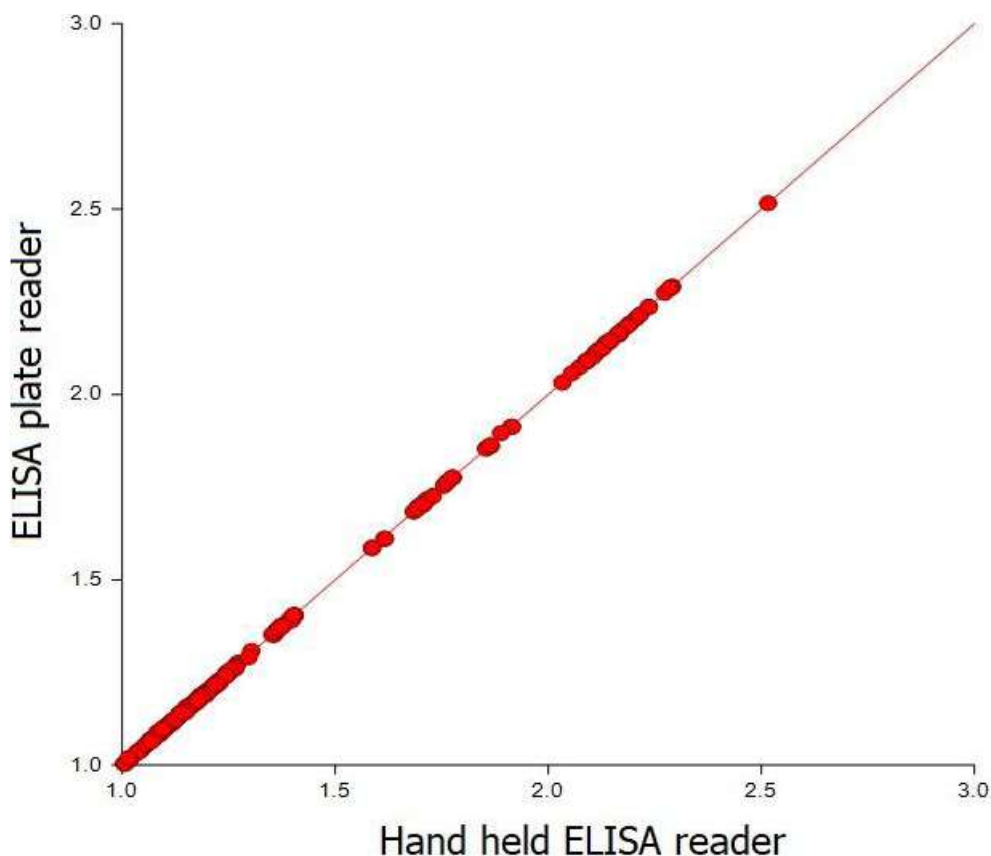
\*Note: TP- True positive (Reactive), TN- True negative (Non-reactive), FP- False positive, FN- False negative.

**Table 2. Statistical analysis of brucellosis diagnostic assays and comparison with different parameters**

Assay	Sensitivity %	Specificity %	PPV %	NPV %	Accuracy %
MRT	71.97 (0.00)	85.38 (0.75)	29.75 (15.27)	97.25 (3.09)	84.31 (0.60)
RBPT	75.51 (0.03)	87.07 (0.63)	33.45 (12.82)	97.64 (2.07)	86.15 (0.49)
Culture	100.00 (0.07)	100.00 (0.31)	100.00 (4.66)	100.00 (1.07)	100.00 (0.28)
Dipstick	87.37 (0.02)	99.67 (0.22)	95.84 (5.01)	98.92 (1.10)	98.70 (0.30)
Indirect ELISA	98.23 (0.30)	100.00 (0.18)	100.00 (4.51)	99.85 (0.48)	99.86 (0.04)

Values are represented in terms of percentage. Values in parenthesis represent 95% confidential intervals.

**Note:** PPV- Positive predictive value, NPV- negative predictive value.



**Fig. 4: The correlation and regression between two ELISA readers**

### Discussion

These are widely used diagnostic assays for detection of *Brucella* specific antibodies in raw milk as well as in whole blood samples<sup>6, 34</sup>. Present study describes difference in accuracy of diagnostic method for detection of *Brucella* specific antibodies in collected samples. Relative performance of different diagnostics and obtained data by these method were shown in table 1. In-house developed method showed high sensitivity and specificity values that are also statistically significant over existing method.

Our results reveal that sensitivity and specificity of MRT was 71.97% and 85.38%, respectively. However, it is limited by milk quality and results may be false negative or false positive because of low ab concentrations, lack of fat-clustering factors<sup>25</sup> and contains colostrums or milk obtained from vaccinated or mastitis cows. Our results are in agreement with study carried out by Vanzini et al., (2001)<sup>35</sup> showed that MRT gives inaccurate results leading to misdiagnosis of brucellosis and its sensitivity and specificity is lower

than that of dipstick and ELISA<sup>22</sup>. Because of this, sLPS-based diagnostics were developed and preferentially used for detecting *Brucella* specific antibodies. RBPT is routinely used for multiple livestock species in endemic countries including India. It is a simple, cost effective, but requires refrigeration of antigen and has limitations of false positive results due to cross reacting antibodies against many gram negative bacteria<sup>7,27</sup>. Therefore, there is a great demand for development of simple tests that can be used in field with higher sensitivity and specificity.

The study proved that developed milk dipstick and iELISA are preferred as alternative method in field since existing method have limitations for individual screening of livestock affected with brucellosis<sup>12</sup>. Use of sLPS as an antigen candidate possible to detect brucellosis very rapidly and accurately and these clinical findings and results obtained were corroborate previous reports<sup>3,6,10</sup>.

### Conclusion

In present study, developed kits are very simple,

effective, inexpensive, user friendly, with high potential for POC diagnosis. Dipstick and iELISA showed 87.37%, 99.67% and 98.23%, 100% sensitivity and specificity respectively in comparison with culture as standard assay. It is proved that developed assays are highly stable, sensitive, specific and is recommended to field veterinarians to use for epidemiological studies and as complimentary diagnostic tools for detection of brucellosis under field conditions for individual dairy cattle or pooled bulk tanks at resource-limited areas.

**Conflict of Interest:** Authors declare no conflict of interest with respect to research, authorship and publication of this article.

**Ethical Clearance:** All experimental procedures were performed with approval of Institute Animal Ethics Committee, Genomix Molecular Diagnostics Pvt. Ltd, Hyderabad, India. All applicable institutional guidelines for care and use of animals were followed with consent of animal owners under supervision of field veterinarian.

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# Effect of Recreational Therapy on Attention and Depression in School Children with Learning Difficulties

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## Abstract

**Background:** Learning difficulty applies to those children who have significantly greater difficulty in learning than the majority of their age and who can't meet the “normal” requirements of a classroom. A study conducted in Chandigarh gave prevalence of learning disabilities of 3-10% among student population. There were more number of boys diagnosed with specific learning disability at a high risk for problems in attention, learning and psychological adjustment along with other associated behavioural problems. Recreational therapy utilizes leisure activities and other interest activities as interventions to address the needs of individuals with disability as a means of recovery and well-being.

**Method:** Forty school children with learning difficulties were selected and randomly divided in two groups. Group A subjects were given recreational therapy 4 times per week for 4 weeks and Group B subjects were given conventional treatment.

**Results:** Statistically significant difference in the Moss Attention Rating Scale (MARS) scores and Glasgow Depression Scale (GDS) scores were seen between the two groups. It indicated that there was significantly less inattention ( $p < 0.0001$ ) and less depression ( $p = 0.0207$ ) in the interventional group subjects.

**Conclusion:** Evidence to support the use of recreational therapy in reducing the depression and increasing the attention in school children with learning difficulties was provided in this study. This study will help in managing the associated problems like inattention and depression.

**Keywords:** Recreational therapy, Learning Disabilities, Mandala art therapy, Clay shape art therapy, School children, Attention, Depression.

**Abbreviations:** Learning Disabilities (LD), Moss Attention Rating Scale (MARS), Glasgow Depression Scale (GDS).

## Introduction

The term ‘learning difficulty’ has been applied to those children who have significantly greater difficulty

in learning than the majority of their age and who can't meet the “normal” requirements of a classroom. It is a non-categorical definition, including those who face difficulties learning one or more of the basic academic skills. Even the children with specific ‘Learning Disabilities’ are included.<sup>1</sup>

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According to a study conducted in Chandigarh, the prevalence of learning disabilities (LD) is reported to be 3-10% among student population. There were more number of boys diagnosed with specific learning disability.<sup>2</sup> It is a very common problem seen in children who mostly gets ignored or underestimated by

parents and teachers. Many people think that the child is notorious or is not interested in studies and hence is having problems; but the fail to register the gravity of the situation. Awareness of this condition among parents is very important so that proper actions are taken towards the well-being of the child.

Recreational therapy in children with learning difficulty is a relatively new concept. According to previous studies, art therapy's effects on social, emotional and behavioural changes in children have been noted.<sup>3</sup> In a child with LD attention is often affected and when in company of same aged children, they feel incompetent. This incompetency may lead to an inferiority complex and depression. Recreational therapy has been reported to have healing effects. Hence we wanted to study the changes in attention and depression due to recreational therapy on children with learning disabilities.<sup>4,5</sup>

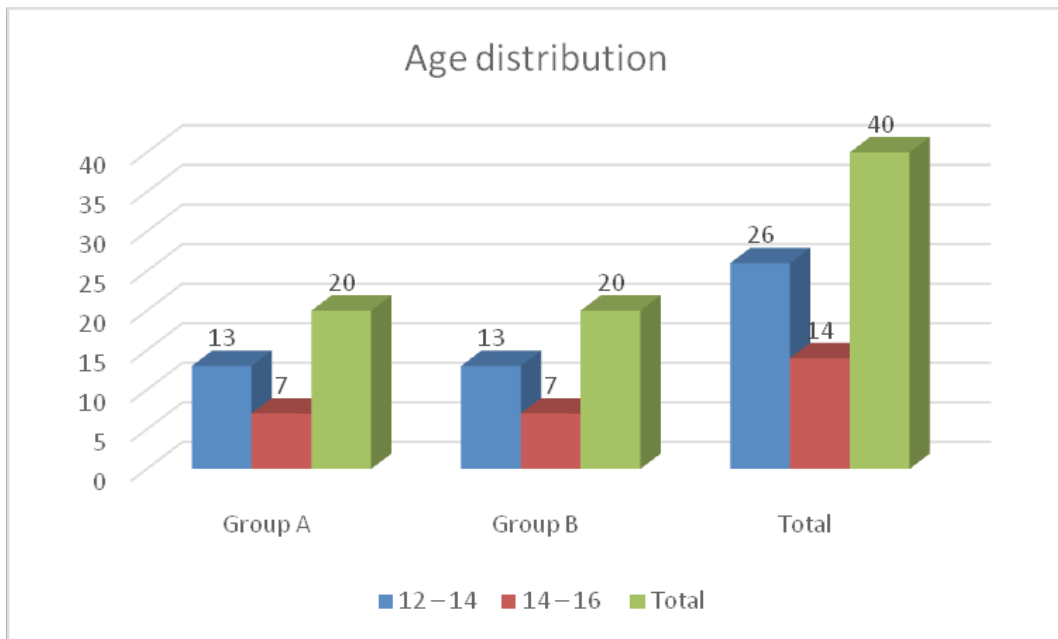
### **Materials and Method**

This study was conducted for the duration of 3 months. 100 school students of age 12 to 16 years were screened out for inattention and depression using learning disability index, of which 40 students were selected for the study. All the subjects were between 12 to 16 years of age with either one of the specific learning difficulty, their attention score was above 50 on MARS and depression score above 13 on GDS prior to the initiation of the intervention. The study was undertaken after obtaining the approval of Protocol committee and the Institutional Ethical committee of KIMS DTU. These subjects were then divided into 2 groups by simple random allocation method. Pre-treatment assessment of their attention and depression was taken with the help of Moss Attention Rating Scale and Glasgow Depression Scale respectively. Subjects in Group A were given recreational therapy intervention while subjects in Group B were given conventional treatment. In recreation therapy, the students were given a printed mandala design and they were asked to colour it and they were

also asked to make clay models of their liking and then name it. These tasks were to be performed within 30 minutes and were given for 4 days per week for 4 weeks. After 4 weeks post interventional scores of MARS and GDS were taken and statistics was done. Guardian's consent of all the participants was taken. Intra group analysis of these values within the group was done using Wilcoxon test and the Inter group analysis between the groups was done by Mann-Whitney test. INSTAT software was used for the interpretation of the data.

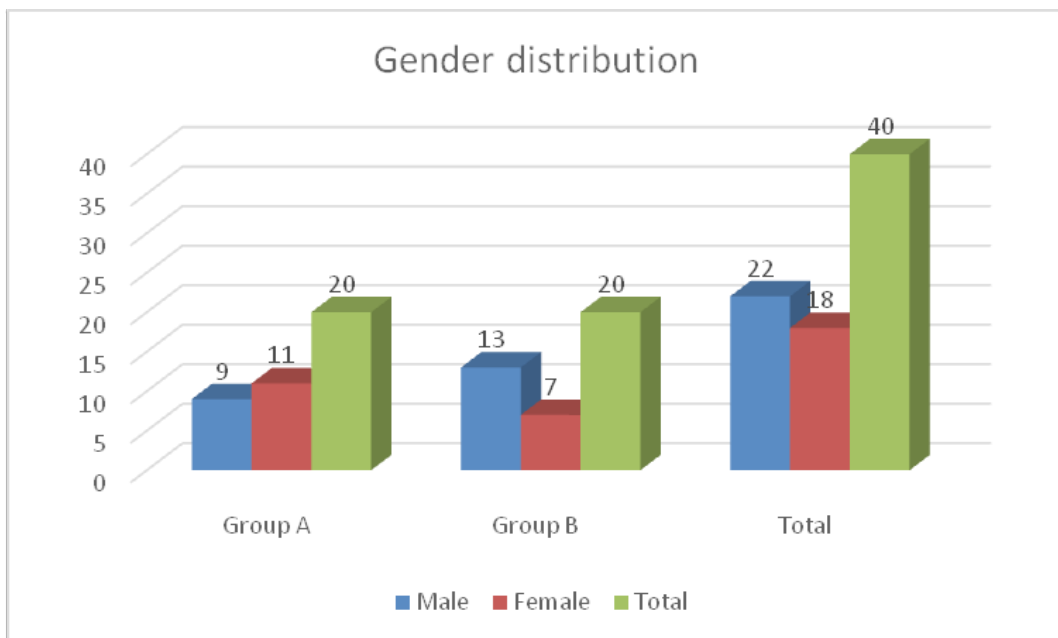
### **Results:**

In the present study pre-interventional mean of MARS was  $74.45 \pm 5.671$  in Group A subjects and  $74 \pm 5.191$  in Group B subjects, whereas post-interventional mean MARS was  $61.6 \pm 7.163$  in Group A and  $72.25 \pm 5.300$  in Group B. Intra group analysis of MARS revealed statistically reduction in post interventional MARS in both groups. This was calculated by using Wilcoxon test. Group A ( $p < 0.0001$ ), Group B ( $p < 0.0001$ ). Pre-interventional mean of GDS was  $14.85 \pm 0.7452$  in Group A subjects and  $14.8 \pm 1.240$  in Group B subjects, whereas post-interventional mean GDS was  $14.8 \pm 1.240$  in Group A and  $14.65 \pm 1.089$  in Group B. Intra group analysis of GDS revealed statistically reduction in post interventional GDS in group A but not in group B. This was calculated by using Wilcoxon test. Group A ( $p < 0.0001$ ), Group B ( $p = 0.2500$ ). Inter group analysis of post interventional values of MARS and GDS scores was done by using the Mann-Whitney test. Post intervention analysis of MARS showed extremely significant difference between both groups ( $p < 0.0001$ ) indicating that the subjects in group A showed less scores on attention scale when compared to subjects in group B. Similarly, post intervention analysis of GDS also showed significant difference between both groups ( $p = 0.0207$ ) revealing subjects of group A had significant decrease in depression scores when compared to subjects in group B.



**Graph 1: Age distribution**

The graph represents the distribution of number of subjects in each group according to their age. According to Fisher’s Exact test, the difference is considered as not significant (p value = 1.2589). Mean age was 15 years.



**Graph 2: Gender distribution**

The graph represents the distribution of number of subjects in each group according to their gender. According to Fisher’s Exact test, the difference is considered not significant (p value = 0.3406).

### Discussion and Conclusion

The current study is aimed to find the effect of recreational therapy on attention and depression in school children with learning difficulty when given

for 4 weeks. 40 subjects were selected based on the inclusion and exclusion criteria and were allotted in 2 groups by simple random sampling method. Objectives of this study were to find whether there is any effect of

recreational therapy on a child's attention and depression if the child is having learning difficulty; and if yes, how does it affect the child's daily activities.

School children between the age group of 12 to 16 years were screened before selecting the 40 subjects. Previously conducted research on children with learning difficulties showed that it was difficult to diagnose learning disability in early ages due to the ongoing development of the child. It was revealed that most diagnosed cases of learning disabilities were at or above the age of 11 years. Similarly, the mean age of the subjects in this study is 15 years.<sup>6,7</sup>

Learning difficulties of all types are most commonly observed in the male gender. A study conducted on British school children also suggests that there was preponderance of males over females among the group with specific reading difficulties but no difference was found in the specific arithmetic difficulties group.<sup>6,8</sup> In the present study equal number of male and female students were screened and out of them, 22 were male students and 18 were female students. When calculated by Fisher's Exact test, there was statistically no difference between the genders.

Children with learning difficulties are also associated with other problems like inattention, depression, psychological adjustment problems with behavioral problems.<sup>9</sup> Attention and depression of all the students was measured prior to the treatment. Attention of the child was measured by Moss Attention Rating Scale which has good utility as a quantitative measure of attention ( $r = 0.80$ ). This is a 22-point questionnaire which was initially used for measuring attention in children with traumatic brain injury.<sup>10</sup> Depressive symptoms of the students were also measured quantitatively by Glasgow Depression Scale which was specifically designed for subjects with learning disabilities. It has a comparatively good reliability than other tools ( $r = 0.97$ ).<sup>11,12</sup>

Treatment for both the groups was started 2 months prior to the exam period as this is the time with maximum stress on a child. In recreational therapy, the subjects were given 2 tasks to perform – 1) To color a printed mandala design and 2) To make a model from clay and name it. Both of these tasks were to be performed within half an hour.

Subjects in Group A were given recreational therapy which included mandala art therapy and clay shape therapy which was given for 4 days per week for

4 weeks. Prior to starting the intervention, the attention and depression of the child was measured using Moss Attention Rating Scale and Glasgow Depression Scale respectively. In mandala art therapy, the subjects were given a printed outline of a mandala design to color for initial 2 weeks; after that they were asked to draw and color the same design for next 2 weeks. Following that they were asked to make any model from clay and name it. According to a previous study the goals of mandala therapy include healing, focusing, stress reduction, and expression of emotions that may be too difficult to discuss verbally.<sup>13</sup> Similarly, clay shape art therapy also focuses on expression of mood and feeling, stretching the imagination, and problem solving.<sup>14</sup> Extremely significant differences in reduction of both the depressive symptoms and inattention of the students was noted after the set treatment protocol.

Group B individuals were given the conventional treatment which included academic assistance by their teachers and normal rehabilitation exercises which focused on the associated developmental coordination disorders or other developmental disorders. When compared the pre interventional and post interventional values of MARS and GDS in this group's subjects there was seen a significant reduction in the values of MARS but not so much difference or reduction in the values of GDS scores.<sup>15</sup>

After intervention for 4 weeks, post interventional measures of the MARS and GDS scores of subjects in both the groups were taken. Reduction in the values of MARS scores was seen in both the groups which indicated increased in the attention of students in both the groups. But Group A subjects showed significant difference in the values of GDS referring to decrease in the depression of those students whereas there was no difference in the GDS scores of Group B subjects indicating no effect on their depressive symptoms.

Intra group analysis of all the parameters revealed statistically increased attention in both the groups ( $p < 0.0001$ ) and decreased in depression in the experimental group ( $p < 0.0001$ ) but no difference in group B ( $p = 0.2500$ ). This was done by Wilcoxon test. Inter group analysis of all values was done using the Mann-Whitney test. Pre interventional values of MARS and GDS between both the groups showed no significant difference stating that before the initiation of intervention, the MARS scores ( $p = 0.7250$ ) and GDS scores ( $p = 0.8066$ ) of all the 40 students were similar. Post interventional

analysis of MARS showed extremely significant difference between both the groups ( $p < 0.0001$ ). post interventional analysis of GDS also showed extremely significant difference between both the groups ( $p = 0.0207$ ).

Statistically there was extremely significant difference in both the values showing significantly more improvement in subjects of Group A when compared to subjects in Group B, hence it can be stated as recreational therapy is more helpful in reducing depression and increasing attention in school children with learning difficulties.

**Conflict of Interest:** The authors of this study do not have any conflict of interests.

**Source of Funding:** This project was self funded by the author (s).

**Ethical Clearance:** The study was undertaken after obtaining the approval of Protocol committee and the Institutional Ethical committee of KIMS DTU.

Informed written consent of all parents was taken as the subjects were minor.

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# Human Papilloma Virus Infection Status and Oral Cancer Incidence in South India–Lack of Evidence and its Current Impacts

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## Abstract

HPV status in relation to occurrence of oral and oropharyngeal carcinomas has been a less explored arena in the Indian Subcontinent. Lack of data on variation in the occurrence of high risk HPVs across India necessitates a region wise update on HPV status. The literature search shows current evidence of overall HPV prevalence to be 3.1 to 73.6% throughout the country and most frequently isolated high risk type was HPV16. The incidence of oral cancer especially posterior tongue associated cancers are on the rise and is becoming more common in non-tobacco users and further studies in this regard might open the way for further insight into head and neck cancers caused by HPVs in India. This brief report summarizes the need for a more detailed analysis in regard to the prevalence data obtained and the methodologies used to arrive at the same.

**Keywords:** *Human papilloma virus, oral cancer, oropharyngeal cancer, prevalence, South India.*

## Introduction

Head and neck squamous cell carcinoma (HNSCC) associated with Human Papilloma Virus (HPV), arise predominantly from mucous membranes in the region of the lingual and palatine tonsils<sup>1</sup>. The major risk factors are related to sexual behaviour and marijuana use<sup>2,3</sup> and occur four times more frequently among men than women in the United States<sup>4</sup>. Persons with Oral Pharyngeal Squamous Cell Carcinoma (OPSCC) in which HPV can be detected intracellularly have a better prognosis than persons with HPV cytonegative OPSCC<sup>5</sup>. Human papillomavirus type 16 (HPV16) is associated with the rapid increase in incidence of oropharyngeal cancer in USA, Sweden, and Australia, where it causes more than 50% of cases<sup>6</sup>.

**Purpose:** The purpose of this communication is to ensure a valid measurable scale on which the HPV Due to lack of organized HPV screening program, insufficient infrastructure and trained manpower and inadequacy in cancer registries, not much data available on the countrywide HPV prevalence and its type

distribution in different cancers in India. Forthcoming introduction of recently developed HPV vaccines in India has given a new urgency to know the prevalence and distribution of various HPV types in different organ sites for the management and monitoring of vaccination program and its impact on prevalence of other cancers<sup>7</sup>. The purpose of this short communication is to emphasize the need for obtaining a reliable evidence to implement the above mentioned programs.

**HPV induced Cervical Cancer Status in South India:** A study done on Indian Population subjected to cervical cancer screening reveals the prevalence of high risk HPVs in this population and the most recorded types are HPV 16 (58%), HPV 18 (16.7%), HPV 33 (2.7%), HPV 35 (5.6%), HPV 45 (5.6%), HPV 58(2.7%) and HPV 52(2.7%)<sup>8</sup>. A case-control study undertaken in Chennai, Southern India reported HPV prevalence as high as 99.4% in their invasive cervical cancer samples<sup>9</sup>

**HPV induced Head and Neck Cancer worldwide:** A recent systematic review of the literature showed oral HPV16 prevalence was 1.3% among healthy individuals



and appeared to differ by geographic region, although significant heterogeneity between studies due to in part to differences in specimen collection, processing and testing limited conclusive interpretation of the data<sup>10,11</sup>. A study done in US population revealed that incidence rates for HPV-positive oropharyngeal cancer have substantially increased among men during the past 3 to 4 decades, while rates have only modestly increased among women<sup>4</sup>. This had been attributed to the changes in sexual pattern among men<sup>12</sup>.

**HPV induced Head and Neck Cancer status in South Indian scenario:** Recent studies conducted in a region of Southern India has demonstrated lack of observance of HPV DNA in Oral cancers experienced by their population and they attribute these findings to varied cultural and religious practices prevalent in the region<sup>13</sup>. A study established that HPV-16 & 18 was the most detectable virus in salivary samples, serum and biopsy cell blocks of the patients with pre-malignant lesions & Oral Squamous cell Carcinomas<sup>14</sup>. The national registry in India on HPV datas have demonstrated that the most common types of High risk HPVs found in this population based on studies available till now are HPV-16 (2.7 to 61%), HPV 18(0.8 to 47.3%), HPV 35 (0,4%) and low risk HPVs 11,6 being 19.6, 11.3 respectively in an available single study (Table 1). The registry also points out that there are no studies available in India to demonstrate prevalence of HPV in oropharyngeal cancers<sup>15</sup>.

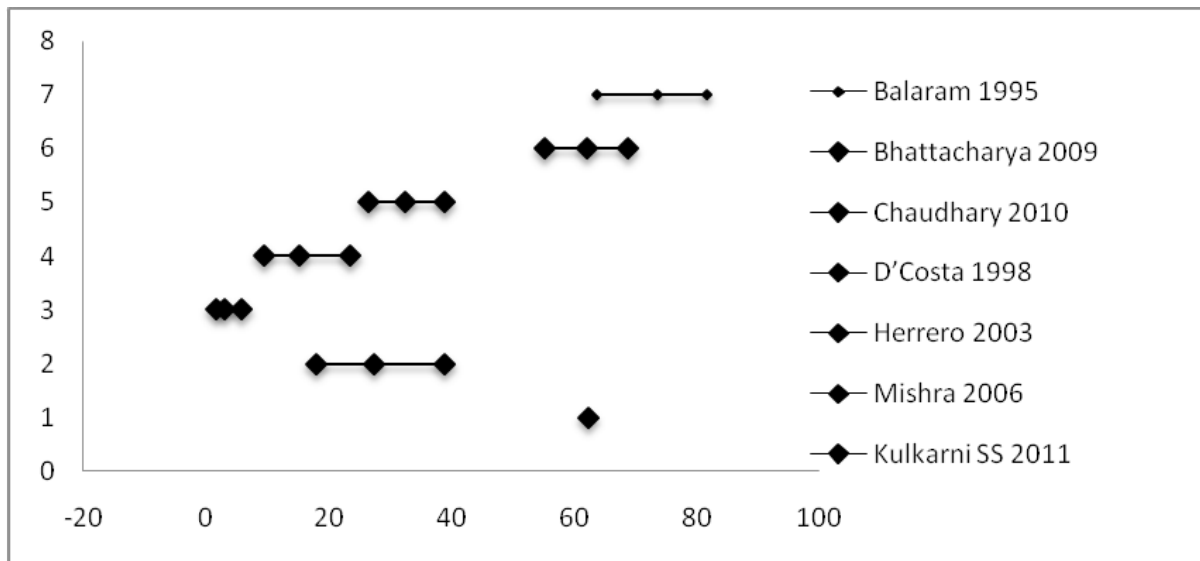
## Discussion

Considering the current data; there is a need for further evidence to clearly demonstrate that HPV induced Oral cancer is not prevalent in the region of Southern India as mentioned in the previous studies<sup>13</sup>. The methodology used for sample collection, the method used for processing and the analysis needs to be standardized in order to come to a uniform conclusion that can be agreed on by all authorities.

Most of the studies done within India have utilized fresh biopsy specimens to obtain material for the PCR studies followed by Paraffin embedded tissue blocks, cytology and salivary rinse. The prevalence percentage obtained from studies that have performed PCR on Paraffin embedded sections as well as one study available on salivary rinse projects a high HPV status showing 73.6, 62.2 and 62.3%. The studies where the PCR was performed on fresh tissue specimens obtained from biopsy sites showed 32.4, 15.2, 3.1 and 27.3% prevalence (Table 2). Further when there is prevalence of HPV type 16 and 18 in salivary samples<sup>16</sup>; the comparable data regarding the non-observability of these viruses in oral biopsy specimens also points out to the need for better method in retrieving these viral particles from the fresh tissues. This is possible by cross checking the various methodologies used in the previous studies.

**Table 1: Current available studies for the prevalence of HPVs in India**

Study	HPV detection method	Number of samples tested	HPV prevalence type	95% CI	Most frequent HPVs prevalent
Balaram 1995	PCR	91	73.6	63.7 - 81.6	Type 6: 13 Type 11:20 Type 16: 42 Type 18:47
Bhattacharya 2009	PCR	193	62.2	55.2 – 68.7	Type 16: 60.1 Type 18: 5.2
Chaudhary 2010	PCR	222	32.4	26.6 – 38.8	Type 16: 33.6
D'Costa 1998	PCR	99	15.2	9.4 – 23.5	Type 16:15 Type 18:0
Herrero 2003	PCR	262	3.1	1.6 – 5.9	Type 16: 3.9 Type 18: 0.8 Type 35: 0.8
Mishra 2006	PCR	66	27.3	18.0- 39.0	Type 16: 18
Kulkarni SS 2011	PCR	255	62.29	-	Type 16: 2.75 Type 18: 21.96



**Figure 1: Forest plot to show the distribution of cases in the 7 available studies**

**Table 2: Various types of samples used for testing and the method used in the previous studies**

Study	Type of Sample	Method Used
Balaram 1995	Paraffin embedded section	PCR
Bhattacharya 2009	Paraffin embedded section	PCR
Chaudhary 2010	Fresh tissues in PBS, Cytology	PCR, HC-II
D'Costa 1998	Cytology	PCR, Southern blot
Herrero 2003	Fresh tissue, cytology, serum	PCR, ELISA
Mishra 2006	Fresh tissues in PBS	PCR,
Kulkarni SS 2011	Saliva rinse	PCR

Our attempt to generate a forest plot (figure 1) with the seven available studies resulted in a picture that emphasized the difference between the seven studies and the similarities between Balaram et al. (1995), Bhattacharya et al. (2009) and Kulkarni SS (2011) which showed an average prevalence to be 66.03 and the methodology utilized were from paraffin embedded sections. The studies done by Chaudhary et al. (2010) and Mishra et al. (2006) on fresh tissue biopsied tissue stored in Phosphated Buffered Saline (PBS) showed the average prevalence of 29.9 giving a varied trail of the situation. The available data shows the need for a pooled in statistical picture that cannot be more emphasized under the current situation.

**Conclusion**

The available studies may not be sufficient to arrive at a conclusive status about the High-risk HPVs in Southern region of India. A study using more

representative samples done using reliable method that would eventually help in a meta-analysis would be beneficial under the current circumstances.

**Conflict of Interest:** Nil.

**Source of Funding:** Self.

**Ethical Clearance:** Obtained

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# Assessment of Knowledge, Attitude and Practice on Immunization among Primi Mothers of Children

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## Abstract

Assessment of Knowledge, Attitude And Practice On Immunization Among Primi Mothers of Children In Poonchery Village, KanchipuramDist, Tamilnadu, India. The Objectives of the study were to assess the existing level of knowledge, attitude and practice on immunization among primi mothers of children and to find out the association between the level of knowledge, attitude and practice on immunization and the selected demographic variables of primi mothers of children. The sampling technique was Non probability Snowball-Sampling technique with 169 samples of primi mothers. There was no significant association between the selected demographic variables. The data collection for the main study was done. The collected data was tabulated and analyzed descriptive and inferential statistics were used. The shows that primi mothers 73.3% had adequate knowledge, 14.7% had moderate knowledge, and 11.8% inadequate knowledge regarding immunization among primi mothers of children. Majority of primi mothers 92.9% had positive attitude, 7.1% had undecided attitude and no negative attitude regarding immunization among primi mothers of children. Majority of primi mothers 91.7% had desirable practice and 8.3% had undesirable practice regarding immunization among primi mothers of children.

**Keywords:** *Immunization, Primi mothers, knowledge, attitude and practice.*

## Introduction

In 1974 the globe health organisation (WHO) launched its expanded programme on protection (EPI) against six most typical preventable childhood diseases viz. Diphtheria, pertusis (whooping cough), tetanus, polio, infectious disease and contagion, from the start of the programme United Nations International Children's Emergency Fund has been providing important support

to Eysenck Personality Inventory<sup>2</sup>. United Nations International Children's Emergency Fund worked with WHO to achieved universal childhood protection of the six Eysenck Personality Inventory vaccines. As a results of international protection coverage accrued from but twenty you have to nearly eighty you curious about 1990. Nearly thirty million kids area unit still not absolutely insusceptible per annum<sup>2</sup>.

Subsequently, in 1985 the Indian government launched the Universal protection Programme (UIP) with a mission to attain protection coverage of all infants and pregnant girl by the 1990's. It become a district of kid Survival and Safe relationship Programme in 1992 and is presently one amongst the key areas below National Rural Health Mission (NHRM) since 2005<sup>4</sup>. The program consists of vaccination for seven diseases – infectious disease, diphtheria, pertussis, tetanus, acute anterior poliomyelitis, measles, and viral hepatitis. viral hepatitis was intercalary to the UIP in 2007. The

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national protection schedule includes of these vaccines that area unit given freed from price to any or all kids of the country below Eysenck Personality Inventory<sup>2</sup>.

Immunization prevents health problem, incapacity and death from vaccine-preventable diseases together with cervical cancer, diphtheria, viral hepatitis, measles, mumps, respiratory disease (whooping cough), pneumonia, polio, retrovirus, diarrhea and tetanus<sup>3</sup>. Global vaccination coverage remains at eighty fifth, with no important changes throughout the past few years. Uptake of recent and under used vaccines is increasing<sup>3</sup>.

**Statement of the Problem:** A descriptive study to assess the knowledge, attitude and practice on immunization among primi mothers of children in Poonchery village, Kanchipuramdist, Tamilnadu, India.

### Objectives:

1. To assess the existing level of knowledge, attitude and practice on immunization among primi mothers of children.
2. To find out the association between the level of knowledge, attitude and practice on immunization and the selected demographic variables of primi mothers of children.

### Operational Definition:

**Assess:** It is the organized, systematic and continuous method of aggregation information from primi mothers of children regarding immunization<sup>6</sup>.

**Knowledge:** Knowledge refers to the obtained reality regarding immunization. It refers to the data on immunization among primi mothers<sup>6</sup>.

**Attitude:** Attitude refers to a plan or opinion regarding immunization<sup>6</sup>.

**Practice:** The particular application or use of a plan, belief or method, as against theories regarding immunization among primi mothers<sup>6</sup>.

**Immunization:** Immunization is that the method whereby someone is created immune or proof against associate communicable disease, usually by the administration of a vaccine. Vaccines stimulate the body's own system to shield the person against ensuant infection or sickness<sup>4</sup>.

**Primi Mother:** A women who has delivered the first child<sup>5</sup>.

**Child:** Child refers to a boy or girl from the time of birth until he or she is an adolescent<sup>5</sup>.

## Material and Method

**Research Approach:** Quantitative, Evaluative approach seems to be the most appropriate approach for this study.

**Research Design:** Non interventional descriptive design was seems to be the most appropriate design for this study.

**Research Setting:** The present study was conducted at Poonchery village in Kanchipuramdist, Tamilnadu, India.

**Sample and Sample Size:** Mothers who were having children either male or female between the age of 0-6 years available at Poonchery village, Kanchipuram District, Tamil nadu, India.

Non probability Snowball-Sampling technique was used to select the mothers of children and the sample size was 169 based on population proportion and the open-epi sample size determination.

### Sample Criteria:

**Inclusion Criteria:** The study includes the mothers of children who are:

- Having less than the age of 5 years.
- Able to understand Tamil or English.
- Available at the time of data collection.
- Willing to participate in the study.

**Exclusion Criteria:** The study excludes the mother and children who were

- More than the age of 5 years.
- Having critically ill children.

**Data Collection Procedure:** Structured interview schedule was used to assess the data of demographic variables and the level of knowledge on foreign body obstructions. Data was collected for a period of one week. The data was collected after proper information and getting informed consent from the mothers.

### Research Tool:

**Part-I:** Selected demographic variables of primi mothers of children such as age of the mother, education,

occupation, source of information, age of the child, sex of the child, number of the children, order of children, immunization status, place of immunization.

**Part-II**

**Part 2(a):** A structured questionnaire is used in this study which includes 10 multiple choice questions. Each correct answer carries “1” (one) mark and wrong answer carries “0” (zero) mark. The maximum score is 10 and minimum score is 0.

**Part 2(b):** A structured 5 point likert scale is used in this study which includes 10 questions. Each Negative statement score interpretation order is 5,4,3,2,1 and Positive statement score interpretation order is 1,2,3,4,5. The maximum score is 50 and minimum score is 10.

**Part 2(c):** A structured checklist is used in this study which includes 5 items. For each desirable answer score of “1” (one) mark is given and undesirable answer score of “0” (zero) mark is given. The maximum score is 25 and minimum score is 5.

**Score Interpretation:**

**Part 2(a):** Standardized structured interview questionnaire to assess the knowledge on immunization.

Score	Percentage (%)	Inference
1-5	<50%	Inadequate Knowledge
6-7	50-75%	Moderately Adequate Knowledge
8-10	76-100%	Adequate Knowledge

**Part 2(b):** Structured 5 point likert scale to assess the attitude on immunization.

Score	Percentage (%)	Inference
1-25	<50%	Negative Attitude
26-35	50-75%	Undecided Attitude
36-50	76-100%	Positive Attitude

**Part 2(c):** Structured checklist to assess the practice on immunization.

Score	Percentage (%)	Inference
1-12	<50%	Undesirable Practice
13-25	51-100%	Desirable Practice

**Analysis and Interpretation:** The study shows that majority of 53% mothers belong to the category of 26-30, 32% mothers belong to the category of 20-25 & 15% of mothers belong to the category of 31-35 years. Most of them 33% were belong to the category of Primary education. Very few 26.1% were belong to Daily wages. Most of them 60% were gains information through the doctor, 39% of mother gain information through Health workers & 1% of mother gains information through the family.

The study shows that majority of 42.1% of children belong to category 2-4 years, 40.8% of children belong to 4-5 years & 17.1% belong to the category of 0-2 years. Most of them 52.6% were female & 47.4% belong to male children. Majority of 91.7% having immunization card, 8.3% of children does not have card. 74% of children were fully immunized & 44% of children were partially immunized. 68.6% of children were immunized in government% & 31.4% of children were immunized in private.

The study shows that majority of 73.3% of primi mothers having adequate knowledge on immunization, 14.7% of primi mothers having moderate knowledge & 11.8% of primi mothers of having inadequate knowledge. Most them 92.9% were primimothers having positive attitude on immunization & 7.1% of primi mothers having undecided attitude on immunization. Most them 91.7% were primimothers having desirable practice on immunization & 8.3% of primimothers having undesirable practice on immunization. Regarding association with demographic variables there is no significant association with the demographic variables like occupation, age of child, sex of child, and place of giving immunization.

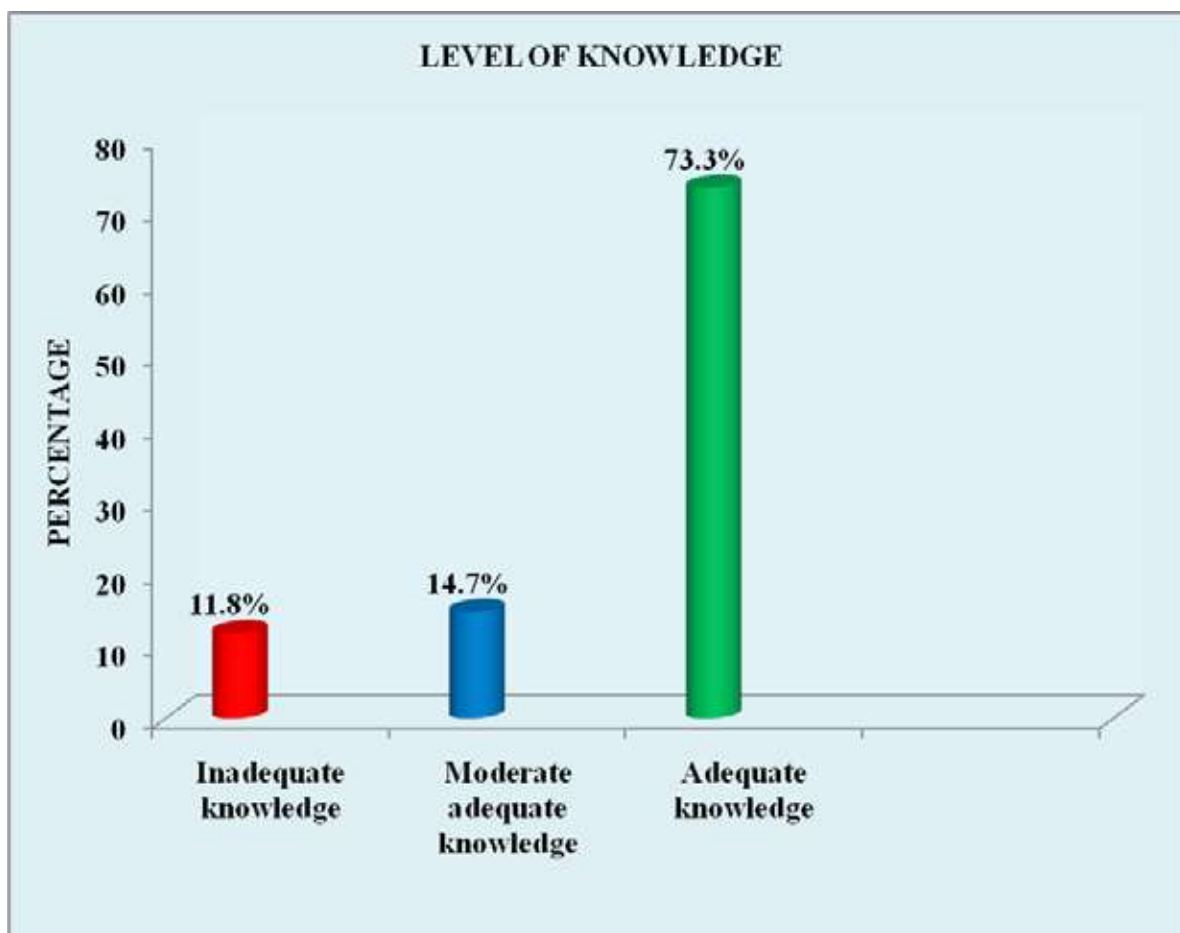


Figure 1: Percentage distribution of knowledge of the primi mother: N=169

Table 1: Association between Attitude on immunization & demographic variables among primi mothers of children. N=169

S.No.	Characteristics	Category	Undecided Attitude		Positive Attitude		P value
			N	P(%)	N	P(%)	
1.	Occupation	Home Maker	7	4.1	118	69.8	(P)3.84> 2.151 (X <sup>2</sup> ) Accepted at 0.05 Level (NS)
		Daily wage	5	2.9	39	23.1	
2.	Sex of Child	Male	5	2.9	84	49.7	(P)3.84> 0.645 (X <sup>2</sup> ) Accepted at 0.05 Level (NS)
		Female	7	4.1	13	7.6	
3.	Place of Giving Immunization	Government	7	4.1	109	64.4	(P)3.84> 0.609 (X <sup>2</sup> ) Accepted at 0.05 Level (NS)
		Private	5	2.9	48	28.4	

### Conclusion

This study concluded that primi mothers 73.3% had adequate knowledge, 14.7% had moderate knowledge, and 11.8% inadequate knowledge regarding immunization among primi mothers of children. Majority of primi mothers 92.9% had positive attitude, 7.1% had undecided attitude and No had negative attitude regarding immunization among primi mothers of children. Majority of primi mothers 91.7% had

desirable practice and 8.3% had undesirable practice regarding immunization among primi mothers of children. The mother’s knowledge, attitude and practice on immunization is a crucial factor for the reduction of morbidity and mortality related to immunization.

**Conflict of Interest:** Nil

**Source of Funding:** Self funding and no external funding.

**Ethical Clearance:** Obtained clearance from institutional human ethical committee on 04.02.2019.

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# Fluorosis: An Endemic Health Disease

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## Abstract

A study is conducted to assess the cases of fluoride affected person in selected gram pachayat, Tonk, Rajasthan. This study is conducted as initiative to conduct action research after wards. In This study symptoms of fluoride has been categorized in three type of fluorosis skeletal (SKF), non skeletal fluorosis (NSKF) and dental fluorosis (DF). In this study villagers between the age group 10-70 years were observed for the presence of fluorosis symptoms by researchers. Conclusion of the study is level of fluoride in the water or food and crops grown in that majorily has caused non skeletal fluorosis, 50% people are affected severely, 2% population study sample has developed severe skeletal fluorosis, 56% sample is affected with dental fluorosis at moderate level among which children are more affected after conducted assessment of fluorosis symptoms in fluoride endemic district, researcher has given health education to study sample and discussed many nutritional and environmental manipulations which can decrease the level of fluoride in human body as well as in ground water level

**Keywords:** Dental Fluorosis, Skeletal Fluorosis, Non Skeletal Fluorosis, Fluoride.

## Introduction

Fluorosis is a disease of oral, skeletal and non skeletal dysfunction which arises due to increase **fluoride level >1.5mg/liter** in ground water and increase fluorine gas in atmospheric air<sup>3</sup>. In North India **Rajasthan** and Gujarat and in South India Andhra Pradesh are **highly endemic** areas. Punjab, Haryana, M.P, Maharashtra are moderately endemic areas. Tamilnadu, West Bengal, Uttar Pradesh, Bihar and Assam are mildly affected endemic area of fluorosis. Fluorosis is essentially Hydrofluorosis except in parts of Gujarat and UP where industrial fluorosis also seen Which is due to fluoric acid compounds. The food and crop which is grown locally among fluoride endemic area is also found to have very high fluoride level (Richa

Miglani,2018). **WHO** has classified FLUOROSIS among 3 categories DENTAL FLUOROSIS, SKELETAL FLUOROSIS, NON SKELETAL FLUOROSIS, In **Non Skeletal Fluorosis** GIT system shows Acute abdominal pain, Diarrhea, Constipation, blood in Stool, Bloating feeling (Gas), Tenderness in Stomach, Feeling of nausea. Nervous system when affected with high fluoride concentration shows **Nervousness & Depression**, tingling sensation in fingers and toes, Excessive thirst and tendency to urinate, Frequently Polydipsia and polyuria control by brain appears to be adversely affected. Some studies reported infertility in humans and menstrual disturbance in women is also observed due to effect of high fluoride level on thyroid gland.

Research Reviews suggests that high fluoride more than 10mg/liter in drinking water and daily activity for prolong period of time can also affect skeletal system which is termed as **Skeletal Fluorosis**<sup>13</sup> causing multiple bone and joint pain, tingling, burning and pricking sensation in limbs, chronic fatigue, muscle weakness. Changes can be observed in spinal column and pelvis. In later stages osteoporosis and bone spur can be developed and crippling Skeletal Fluorosis is also observed due to

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fusion of vertebra and bones. Dental fluorosis occurs due to exposure to fluoride during mineralization; fluoride replaces the hydroxyapatite crystals in teeth and gets deposited as fluorapatite crystals, which becomes clinically visible as dental mottling. Mottling of the teeth is usually seen in younger children who are developing their front teeth. Excessive fluoride also replaces the hydroxyl groups present in the hydroxyapatite crystal of the bone, forming fluorapatite. This has large crystal size due to which the bone becomes brittle and susceptible to fracture risk. Moreover, young bones retain more fluoride than older bones. Clinical manifestations of fluorosis may be aggravated by malnutrition, specifically calcium and vitamin D nutrition status which is evident from the high incidence of crippling deformities in poor residents from endemic fluorosis zones.<sup>[5]</sup> in dental fluorosis tooth enamel starts

**Material and Method**

The Research Design study for the present study is descriptive in nature which emphasize on prevalence of symptoms of fluorosis among the person who are consuming fluoride water for more than 10 years regularly multi stage sampling is done . Village is divided in to Dhani non randomly and then 3 Dhanis are selected randomly among that all person in the age

group 10-70 years are interviewed from self structured questionnaire checklist for identification of fluorosis in an endemic area privacy of all participant is maintained as part of ethical consideration while interviewing . 100 persons were observed for presence of symptom related to fluorosis on the basis of pre validated self structured questionnaire check list given below. A health talk program was organized in which caused of fluorosis, identification of fluorosis,environmental manipulation such as tulsı plant <sup>[2]</sup>,diet modification such as antioxidant rich food and treated water benefits are discussed .

**Findings:** Descriptive Statistics reveals that among all type of **Fluorosis Non Skeletal Fluorosis** has affected severely to 50% villagers,24%villagers are moderately affected,18% villagers are mildly affected with NSKF and 8% have no problem related to NSKF. The Picture of skeletal fluorosis is seen severely in 2% cases which are already diagnosed for fluorosis,17%villagers showed moderate level,73% showed mild level of SKF which is for pain some joints some time and sound coming after movement of those joint and 8%do not have any problem in skeletal system. **Dental Fluorosis** was seen moderately among 56% sample especially in age group 31-50,25% were mild cases,19% were having no dental problems.

**Table 1: Findings of socio-demographic variables**

S.No.	Name of Socio Demographic Variable	Classification	Frequency and Percentage N=100	
1.	Age	a. 10-31	42	42%
		b. 31-50	34	34%
		c. 50-70	24	24%
2.	Gender	a. Male	64	64%
		b. Female	36	36%
3.	Education	a. Illiterate	19	19%
		b. Primary	16	16%
		c. Middle	18	18%
		d. matric	15	15%
		e. Sr. sec.	6	6%
		f. Graduate	9	9%
		g. Certificate/diploma	12	12%
		h. Post graduate	5	5%
4.	Duration of consuming fluoride water	a. 10 years	14	14%
		b. 15 years	22	22%
		c. 20 years	30	30%
		d. 25 years	19	19%
		e. more than 25 years	15	15%
5.	Source of water	a. Well	66	66%
		b. Water plant	12	12%
		c. Pond	22	22%

S.No.	Name of Socio Demographic Variable	Classification	Frequency and Percentage N=100	
6.	Occupation	a. Farming	25	25%
		b. Business	23	23%
		c. Labor	19	19%
		d. Private job	14	14%
		e. Govt. job	4	4%
		f. Dependent	15	15%
7.	History of smoking	YES	44	44%
		NO	56	56%
8.	Conservation of rain water at home	YES	2	2%
		NO	98	98%

### Discussion

Data Suggests That NSKF is more prevalent among villagers. adults in age group 31-50 have developed dental fluorosis as well as non skeletal fluorosis .skeletal fluorosis is seen in elderly in complicate stage .only a few persons after leg deformity diagnosed with history of fluorosis significance related to consumption of fluoride drinking water more than 20 years and source of water well and pond suggests that these are the major contributory risk factor for fluorosis.

### Conclusion

Researcher conclude that people who are drinking fluoride water more than 10 years will develop fluorosis symptoms which will turn in to life threatening issues paraplegia, sclerosis, osteoporosis. .use of filtered water and environmental manipulation<sup>[2]</sup> can decrease the fluoride level in ground water.

**Conflict of Interest:** Researcher was not having resources to solve their problem but they realise that fluorosis is a big burden on rural community of tonk district,Rajasthan .

**Source of Funding:** By self

**Ethical Clearance:** Informed consent has been taken up by all participants and sarpanch has given permission to conduct the study .

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# Incidence and Recurrence of Dental Caries after Repeated Application of Topical Fluoride Gel on Permanent Dentition of School Children of a School-based Dental Program in Nerul: A Retrospective Study

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## Abstract

**Introduction:** Fluoride is a known caries preventive agent. According to previous literature, a school based preventive program using fluoride gel could be effective in reducing the level of dental caries in children. There are very few studies that have been done in India in this regard. So, a retrospective study was planned to evaluate the preventive program of application of Acidulated phosphate fluoride (APF) gel on permanent teeth of school going children of 10-11 years till 15-16 years for 5 years.

**Material and Method:** The caries experience of the children was recorded using decayed, missing, filled teeth (DMFT) index using World Health Organization (WHO) criteria by investigator 1. Fluoride application of Acidulated Phosphate Fluoride 1.23% APF gel (Fluorovil, Vishal Dentocare Pvt. Ltd, Ahmedabad, India) for 4 minutes was carried out biannually by single trained investigator 2. This was done from 2010-11 till 2016-17. This data for 5 years was recorded and analysed retrospectively using centre records. After data collection, statistical analysis were done using (Statistical Package for Social Sciences) SPSS version 20.0. Results and Discussion: The DMFT post fluoride application was significantly lower than DMFT value pre fluoride application. No side effects were reported by this school based program.

**Conclusion:** This study results prove that APF gel application is an appropriate measure that can be recommended for other school-based programs. It is a safe and feasible caries preventive measure.

**Keywords:** Fluoride, Dental Caries, Prevention, School Dental Health.

## Introduction

Dental caries is a bacterial disease which progresses when acids that are produced by bacterial action on dietary

fermentable carbohydrates diffuse into the tooth and dissolve the hydroxyapatite crystal of the enamel.<sup>1</sup> Some of the factors which cause dental caries are acidogenic bacteria (mutans streptococci and lactobacilli), salivary dysfunction, and dietary carbohydrates. On the other hand protective factors like salivary calcium, phosphate and proteins, salivary flow, and fluoride in saliva balance, prevent or reverse dental caries.<sup>1</sup>

Fluoride works primarily via topical mechanisms which include inhibition of demineralization of hydroxyapatite crystal of enamel<sup>2</sup> increased re-

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mineralization at the crystal surfaces (the resulting re-mineralized layer is very resistant to acid attack: fluorapatite crystal)<sup>2</sup>. Low but slightly elevated levels of fluoride in saliva and plaque provided from topical fluoride help to prevent and reverse caries by the above mechanisms.<sup>3</sup> According to a recent literature review, the level of fluoride incorporated into dental mineral by systemic ingestion is insufficient to play a significant role in caries prevention.<sup>3</sup>

Method of topical fluoride application are in the form of toothpastes, mouthrinses, gels. Another review stated that there was moderate quality evidence of a large caries-inhibiting effect of fluoride gel in the permanent dentition.<sup>4</sup> The caries-preventive effect of fluoride gel on the primary dentition, was also large, but based on low quality evidence.<sup>4</sup>

Dental caries affects the quality of life of children, with decreasing number of hours at school and poor performance. A school based preventive program using fluoride gel would be effective in reducing the level of dental caries in children. There are very few studies that have been done in India in this regard. So a retrospective study was planned to evaluate the preventive program of application of APF gel on permanent teeth of school going children of 10-11 years till 15-16 years. The study was carried out at Mahatma Gandhi Mission Higher Secondary School (Marathi medium) and Mahatma Gandhi Mission Primary and Secondary School (English medium) Nerul, Navi Mumbai.

### **Material and Method**

The objectives of this study are to assess caries using DMFT index at baseline (2012) and to assess any incidence and recurrence after five years after topical fluoride application. (2017)

**Study Participants:** A retrospective study was conducted at Mahatma Gandhi Mission Higher Secondary School (Marathi medium) and Mahatma Gandhi Mission Primary and Secondary School (English medium) Nerul, Navi Mumbai. Prior written parental informed consent was obtained in 2012 for all students. Before starting this study, ethical clearance was obtained from the Institutional ethics review committee.

Data was collected from past dental records from 2012 of school children who are presently in the class of 9<sup>th</sup> and 10<sup>th</sup>. All there cords of 200 students studying in English and Marathi medium of Mahatma Gandhi

School, Nerul who were of 10-11 years of age in 2012 were evaluated. Census method of sampling was done.

#### **Inclusion Criteria:**

- Participants of the school who regularly got fluoride treatment done at dental centre regularly.
- Participants who were of the age group 10-11 years in 2012.

#### **Exclusion Criteria:**

- Participants not willing to co-operate with the oral examination over five years.
- Children undergoing orthodontic treatment

**Caries diagnostic criteria and examination:** The caries experience of the children was recorded using decayed, missing, filled teeth (DMFT) index using World Health Organization (WHO) criteria.<sup>5</sup> After drying the tooth with compressed air, the investigator performed a visual examination and when in doubt used a WHO probe gently to check presence of decay, filled tooth. All permanent teeth whose occlusal surfaces were visible were considered for examination. Allexaminationswas done by investigator 1 in 2012 just after adoption of the centre of the department, following which fluoride application was started.

Fluoride application of Acidulated Phosphate Fluoride 1.23% APF gel (Fluorovil, Vishal Dentocare Pvt. Ltd, Ahmedabad, India) for 4 minutes was carried out biannually by single trained investigator 2. All applications were done by investigator 2 who was blinded to the study and its objectives. The fluoride application was done in the fully equipped dental centre (with dental chair) at Nerul School. After cotton roll isolation, the investigator 2 dried teeth with compressed air from 3-way syringe. APF gel was applied in well fitted flexible disposable trays. It was kept in the oral cavity for 4 minutes. Suction was also used. The child was instructed to bend their head forward during the application of APF via trays. The investigator 2 monitored the entire fluoride application procedure carefully, wiping any excess saliva. The excess gel was wiped off with gauze post removal of the tray. Also children were instructed not to eat, drink or rinse for at least 30 minutes post procedure. Also for every visit biannually oral hygiene instructions were explained to the child, for proper maintenance of oral hygiene post fluoride treatment.

**Follow Up:** The fluoride treatment was done. After 5 years of repeated fluoride application by investigator 2 and DMFT recording by investigator 1, the records were used for this retrospective study. Therefore, DMFT records of 2012 were to be evaluated, when the school program had started and in 2017 post 5 years of follow up.

**Statistical Analysis:** After data collection, statistical analysis were done using (Statistical Package for Social Sciences) SPSS version 20.0. Descriptive statistics were done. Normality was checked using Shapiro–Wilk test. The data was not normal therefore non parametric test was used. Wilcoxon Signed Ranks test was used to assess pre and post fluoride application changes in DMFT. A p value less than 0.05 was considered as statistically significant.

**Results**

After excluding dropout and incomplete records a total of 175 children records were examined in this study. Table 1 showed amongst total study group 59.4% males and 40.6% females.

Table 2 showed the results of Wilcoxon Signed Ranks test which was used to assess pre and post fluoride application changes in DMFT. The DMFT post fluoride application was significantly lower than DMFT value pre fluoride application.

**Table 1: Descriptives: Gender**

Variable	Frequency	Percent
Male	104	59.4
Female	71	40.6

**Table 2: Comparison of DMFT pre and post fluoride application:**

Variable	Pre fluoride application Mean (S.D.)	Post fluoride application Mean (S.D)	P value
DMFT	1.86 (1.64)	0.17 (0.47)	<0.01*

Wilcoxon Signed Ranks test; p<0.05 is statistically significant

**Discussion**

This study was done to evaluate the effectiveness of APF as a caries preventive agent at community level. In this study, the satellite centre which was adopted in 2012 and all children of 10-11 years were subjected to fluoride application (APF gel) with oral hygiene instructions bi annually. They were evaluated for caries recurrence or incidence of new lesions till 2017, with a 5 year follow up period. This age group was chosen, as only permanent dentition was to be evaluated in this study and according to previous literature teeth are at the maximum risk of developing dental caries up to 4 years post eruption into the oral cavity.<sup>6,7</sup>

Therefore the effect of topical fluoride application as a caries preventive agent can be evaluated on taking 10-16 years age group in school going children. A school based preventive program using fluoride gel would be effective in reducing the level of dental caries in children. There are very few studies that have been done in India in this regard. So, this retrospective study was done to evaluate the preventive program of application

of APF gel on permanent teeth of school going children of 10-11 years till 15-16 years.

Fluoride as caries preventive agent has been used in various studies in the past.<sup>1-4</sup> A recommendation of fluoride application in six to eighteen years in children showed moderate-risk patients should receive fluoride varnish or gel applications at six-month intervals to show maximum benefit of caries inhibitory effect of fluoride on tooth.<sup>8</sup> This is in accordance with results obtained in our study where topical fluoride (APF gel) professionally applied showed reduction in caries level after regular application for 5 years.<sup>4,8</sup> The results obtained in this study are in contrast to another fluoride school program done in India.<sup>9</sup> This could be due a longer follow up period, with fluoride application of 5 years in our study.

In this study, APF gel used was around 2.5 ml which is much lower than a single dose for acute poisoning (1 mg/kg body weight).<sup>9</sup> The various precautionary measures adopted were proper fitting trays, use of suction, a well-qualified investigator to carry out fluoride application and the position of child during

fluoride application (bent forward). No side effects were reported by this school based program. Thus APF gel is as effective as using Fluoride varnish or fluoride mouth rinse in school based programs.<sup>10,11</sup>

The various drawbacks in this study include 12% school dropouts. As some students left school during 5 years follow up and their records were incomplete. Also, sampling could not be done properly.

### Conclusion

With all these aspects in mind, this study results prove that APF gel application is an appropriate measure that can be recommended for school-based programs. It is a safe and feasible caries preventive measure. Such programs can be carried out in other schools, adopting this model to reduce the level of dental caries in school going children.

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# Evaluation of Balance Control and Pattern of Muscle Activation from Functional Perspectives Across the Ages— An Observational Study Protocol

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## Abstract

**Background:** The exponential rise in falls related to ageing is due to degeneration of sensorial system, decrease in muscle force and changes in the pattern of muscle activation. The proposed study will be conducted to examine the activation of various muscles of trunk and lower extremity during different balance control tasks.

**Objective:** Assessment of balance control and pattern of muscle activation among the various age groups

**Method:** 500 healthy individuals will be selected on the basis of selection criteria and categorized as per their age from 30-40 years, 41-50 years, 51-60 years, 61-70 years and 71-80 years in various groups. CoP excursion and EMG analysis of trunk and lower limb musculature during different balance control tasks. SPSS 25.0.0.0 will be used for Statistical Analysis.

**Conclusion:** The study will be beneficial for understanding the balance deficits and muscle activation pattern across ages.

**Keywords:** Aging, Balance, Center of pressure, EMG, Muscle activation.

## Introduction

“Population ageing is a triumph of humanity but also a challenge to society”<sup>(1)</sup> There is rapid increase in the proportion of the individuals of age  $\geq 60$  years than any other age Group across the Globe. The increased life expectancy and rapid growth of the elderly population has led to strong need for understanding of the physiological changes that occur across the lifespan. Among the several events affecting the health of the elderly, a fall is a major event resulting in a number of functional, psychological and social impairments.<sup>(2)</sup>

WHO Global report on falls prevention in older age, stated that this age group was estimated to be 688 million in 2006, projected to grow to almost two billion by 2050, by that time the total number of elderly will exceed the number of children  $\leq 14$  years. Moreover, the oldest segment of population, aged 80 and over, particularly

prone to falls and its consequences is the fastest growing within older population expected to represent 20% of the older population by 2050.<sup>(3)</sup>

The number of studies has been conducted to postulate the effects of ageing and posture-control system. Increased displacement and velocity of centre of pressure (CoP) are key characteristics of disturbed postural control system, resulting in impaired balance and consequent falls in elderly than in young and middle aged adults which is most evident in the dynamic activities of daily living.<sup>(4)</sup>

The exponential rise in Falls related to ageing is due to degeneration of sensorial systems (vestibular, visual and proprioceptive), decrease in muscle force and changes in the pattern of muscle activation are among the most cited factors. Many studies revealed that increased balance impairment in elderly is associated with the



altered pattern of muscle activation in comparison to the Young adults during various tasks reflecting the need for balance control. <sup>(5)(6)</sup>

Considering the fact that ageing alters the efficiency of muscles and their pattern of activation, the proposed study will be conducted to examine the activation of various muscles of trunk as well as lower extremity during different measures of balance control.

#### **Aims and Objectives:**

1. To evaluate centre of pressure (CoP) changes and postural sway during steady state balance activities across different age groups.
2. To investigate centre of pressure (CoP) changes and postural sway during dynamic balance activities (Proactive and reactive state) across different age groups.
3. To determine the activation of core muscle and muscles of the lower limb during steady state balance activities across different age groups.
4. To analyse the activation of core muscle and muscles of the lower limb during Dynamic balance activities (Proactive and reactive state) across different age groups

**Study Design:** The Present study is an observational cross-sectional study which will be conducted in Research Laboratory at Department of Physiotherapy, Punjabi University, Patiala for a duration of 3 years.

**Participant Recruitment:** 500 Individuals will be consecutively selected by the simple random sampling and based on the selection criteria which includes the subject of age ranging from 30-80 years in Patiala, Punjab and which will be further divided into 5 groups: 30-40 years, 41-50 years, 51-60 years, 61-70 years and 71-80 years. The participants who conform to any following conditions will be excluded: (1) Fracture or lesion in lower limbs in the previous 6 months; (2) History of recent spinal or lower limb surgery; (3) Neuropathies or neurological problems; (4) Absent knee extensor reflex or positive Babinski response; (5) Corrected visual acuity worse than 20/100 or presence of a field defect; (6) Sensory deficit in the lower limb; (7) Use of medications that might interfere with normal postural control; (8) Musculoskeletal problem interfering with the capacity to maintain an upright stance; (9) Acute illness.

**Sample Size:** The calculated sample size was 41.45, 37.23, 40.04, 28.90, 38.56 for the age group of 30-40 years, 41-50 years, 51-60 years, 61-70 years, 71-80 years respectively, on the basis of sample size estimation formula<sup>(7)</sup> ( $E = \frac{2\sigma}{\sqrt{n}}$  where E = Error( $\pm 1$ );  $\sigma$  = Standard deviation,  $n = 4\sigma^2/E^2$ ). However, to bring uniformity in number of subjects in each age group and to avoid gender bias a sample size of 100 subjects (50 males, 50 females) will be recruited for the study. Additionally, the larger sample size will minimize bias in estimating balance control across the ages.

**Ethical Considerations:** Ethical approval (letter no. 066 dated 16/08/2018) has been taken from the institutional ethical committee of Punjabi University, Patiala. The nature, purpose, aims and objective, significance and need to carry out this research was precisely explained to committee.

#### **Outcome Measures:**

1. Balance Control
2. Muscle Activation pattern

#### **Instrumentation and Procedure:**

**Measurement of Balance Control:** Balance control will be measured in terms of Excursion of CoP and postural sway in various positions, which will be recorded by **DIERS PEDO-SCAN (Force Platform)**, an assembly of arrays which are capable of precise, high-frequency measurements of foot pressure, CoP Movement, CoP Sway, Roll Over Characteristics, Foot Rotation, Foot Area(m<sup>2</sup>), contact Time, Weight Distribution, Foot Type. Considering the aims of the study, investigators will be interested in recording the anterior, posterior and lateral movement of CoP and postural sway during the different balance control tasks.

**Measurement of Muscle Activation:** The Muscle Activation pattern will be evaluated by using **wireless 6 channel surface EMG** by **DIERS** for core musculature and muscles of the lower extremity (listed in Table below). The **DIERS surface EMG** helps to record and analyse the muscular activity simultaneously while performing the static and dynamic balance control activities for a duration of 30 seconds using Butter worth low pass filter ranges from 20Hz-400Hz. The software calculated RMS at 200ms time frame will be considered for the evaluation process.

**Table 1: List of muscles to be examined in the study**

Region	Muscle	Function
Ankle	Gastrocnemius/Soleus	Ankle Plantar Flexor
	Tibialis Anterior	Ankle Dorsiflexor
Knee	Quadriceps (Vastus Medialis)	Knee Extensor
	Hamstring (Semimembranosus)	Knee Flexor
Hip	Gluteus Maximus	Hip Extensor
	Gluteus Medius	Hip Abductor
Core Muscles	Rectus Abdominis (Both Sides)	Trunk Flexor
	Erector Spinae (Both Sides)	Trunk Extensor
	External Oblique (Both Sides)	Trunk Flexor

The Electrode used will be Blue AMBU sensor N which is having a highly conductive wet gel, offset connector and superior adhesion to make sure optimal signal during short- to medium-term applications. Electrode placement will be according to SENIAM<sup>(8)</sup> project in 2000 or SENIAM recommendations for sensor locations are available here [http://seniam.org/sensor\\_location.htm](http://seniam.org/sensor_location.htm).

**Balance Control Tasks:** Cogitating the functional perspective, the team of principal investigator and co-investigators has selected static and dynamic balance control tasks. These tasks includes (1) Steady state, (2) Proactive or Anticipatory Posture and (3) Reactive posture<sup>(9)</sup>. Measurement of Balance control and muscle activation pattern will be performed in following three different forms independently.

**Steady State Posture:**

1. **Rhomberg<sup>(10)</sup>:** Eyes Open: Participants will be instructed to stand Upright and barefoot, staring at the mark on the wall and keeping the feet positioned which are shoulder width apart for 30 seconds.
  - 1.1. **Eyes Closed:** Standing in an upright position with the closed eyes subjects will be instructed to keep their feet together and maintain the position for 30 seconds.
  - 1.2. **Semi-Tandem Stance:** The subjects will stand in an upright position with right foot in front of

the left for 30 seconds while gazing the mark mounted on the wall.

- 1.3. **Single leg Stance:** The subject will stand on right leg for the duration of 30 seconds in an upright position while gazing on the black mark on the wall.

2. **Proactive or Anticipatory Posture Control: Functional Reach:** Participants will be instructed to stand with shoulder 90° flexed against the wall in an upright position with their feet together, without taking any support and try to reach forward. Horizontally a 150 cm yardstick will be mounted on the wall at level of acromion process. Succeeding to this the test, participant will be instructed to resume the starting position again after duration of 30 seconds.
3. **Reactive Postural Control: Sit to Stand:** The subjects will be instructed to sit upright with back unsupported and arms resting on the armrest. Chair will be adjusted to maintain Hip, Knee, Ankle 90°. Participant is instructed to stand from sitting position, simultaneously maintaining the upright posture while keeping arms by the side of their body and fixing the gaze at the mark on the wall. Following which participant will be instructed to resume the sitting position without looking back, uncrossing his/her hands till the command given by the investigator. The duration of 30 seconds: (5 sec seated, 20 secs upright, 5 secs seated).

**Table 2: Summary of Experimentation**

Experiment	Clinical Task	Outcome	
		Force Platform	Muscle Activity
For Steady State	1. Romberg Eyes Open Eyes Closed 2. Single Leg Standing 3. Semi Tandem Standing	1. Postural Sway 2.Center of Pressure (Antero-Posterior/Lateral)	1. Surface EMG (RMS values) over the muscles mentioned in Table 2.
For Proactive/ Anticipatory State	Functional Reach (Anterior and Lateral Direction)		
For Reactive	Sit to Stand		

**Statistical Analysis:** All statistical analyses will be performed using Statistical Product and Service Solutions (SPSS 25.0.0.0 latest version, updated on 26/4/2018) and Microsoft excel 2019. The descriptive analysis will be done for demographic variables, CoP, Postural Sway and EMG Activity. Comparison of muscle activation patterns between the different age groups will be carried out with ANOVA for excursion of CoP. Univariate and forward step regression finds the relationship of age with changes in postural sway and muscle activation patterns. Moreover, determining the gender differences in estimation of balance control will be analysed by the Multivariate forward stepwise regression.

**Significance of Study:** The study will indicate centre of pressure (CoP) changes and postural sway during steady state balance, across the ages, which will be further helpful to know whether aging affects the balance control during static positions such as sitting, standing, romberg, single leg stance, tandem stance etc. It will also suggest centre of pressure (CoP) changes and postural sway during dynamic balance activities (Proactive and reactive state) in relation with aging. This will provide better understanding regarding impact of aging on postural adjustments during functional tasks such as rising from a seated position. The findings of the study will provide database about the muscle activation patterns of core muscle and muscles of the lower limb during steady state and dynamic balance activities across different age groups. This will be helpful for identifying the differences between young and older individuals with respect to pattern of muscle activation from functional perspectives. The outcome of the study will also provide the gender based information in context to balance control across the ages (30 to 80 years)

## Conclusion

The study will be useful in understanding the balance deficits among elderly population and therefore in devising the preventive strategies so as to address a common problem of falls, which is a serious problem, demanding the attention from health care providers.

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## Conflict of Interest: Nil

The author(s) declare that there is no conflict of interest.

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# Dental Stem Cells Beyond Dentistry

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## Abstract

Stem cells are unspecialised cells that can give rise to one or more different types of specialized cells. Stem cells differ from other kinds of cells in the body. Regardless of their source, all stem cells have three general properties: they are capable of renewing and of dividing themselves for long periods; they are unspecialized; and they can give rise to specialized cell types. Tooth derived stem cells or dental stem cells also represent a promising source of cells for regenerative medicine. This review highlights and upgrade the knowledge of current and future perspective of the regenerative application of dental derived stem cells in areas beyond tooth and tooth related regeneration.

**Keywords:** Dental Follicle Precursor Cells (DFPCs), Human adult dental pulp stem cells (ADPSCs), Periodontal Ligament Stem Cells (PDLSCs), Stem cells from human exfoliated deciduous teeth (SHEDs), Stem Cells of Apical Papilla (SCAPs).

## Introduction

Dental stem cells or tooth derived stem cells are categorized according to the location from which they are isolated and represent a promising source of cells for regenerative therapy. Originally, as one kind of mesenchymal stem cells, they are considered as an alternative of bone marrow stem cells. They share many commonalties but maintain differences. Stem cells of the orofacial region have been categorized as the Mesenchymal stem cells (MSCs)/Adult stem cells (ASCs)/Tissue stem cells (TSCs). Mesenchymal stem

cells (MSCs) are a prospective source of adult stem cells (with neuroectodermal origin and mesodermal origin) for regenerative medicine as they are extraordinarily plastic and when expanded into colonies which retain their multilineage potentiality. MSCs are able to differentiate into cells of mesodermal origin like chondrocytes, adipocytes, osteocytes, etc as well as give rise to representative lineages of the three embryonic layers<sup>1</sup>. Studies have identified several source of multipotent mesenchymal progenitor cells, known as dental stem cells. Considering their original function in development of tooth structures, many applications of these cells in dentistry have aimed at regeneration of tooth structure; however, the application in other than tooth structures regeneration has been attempted extensively. The availability from removed teeth or discarded teeth can be an innate benefit as a source of autologous cells. Their origin from the neural crest results in exploitation of numerous other applications. This property highlights current and future perspectives of the regenerative applications of tooth derived stem cells in areas beyond tooth regeneration.

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**Source of Dental Derived Stem Cells:** Five different human dental stem/progenitor cells have been isolated and characterized:

1. Human adult dental pulp stem cells (ADPSCs) (Gronthos et al., 2000)<sup>1,2</sup>
2. Stem cells from human exfoliated deciduous teeth (SHEDs) (Miura et al., 2003)<sup>1,2</sup>
3. Periodontal Ligament Stem Cells (PDLSCs) (Seo et al., 2004)<sup>1,2</sup>
4. Stem Cells of Apical Papilla (SCAPs) (Sonoyama et al., 2008)<sup>1,2</sup>
5. Dental Follicle Precursor Cells (DFPCs) (Morsczeck et al., 2005)<sup>1,2</sup>

### Use of Dental Stem Cells

**Dentistry:** The dental derived stem cells are widely used in interdisciplinary dentistry for craniofacial regeneration<sup>3</sup>, dentin regeneration, periodontal regeneration, cementum regeneration, pulp regeneration<sup>4</sup>, cleft lip and palate, salivary gland regeneration, TMJ reconstruction, whole tooth regeneration<sup>5</sup>, also used in research dental cancer therapy<sup>6</sup>, Forensic dental profiling, Correlation and collection of Ante-mortem and Post mortem data<sup>7</sup>.

**Osseous Regeneration:** Dental derived stem cells have an (DPSC) exhibit an osteogenic differentiation profile. Upon differentiation into preosteoblasts, DPSCs deposit an extracellular matrix that eventually forms mineralized woven bone<sup>8</sup>. Due to the superior efficiency in producing bone on comparing with Bone marrow stem cells BMSCs, DPSCs are considered one of the best candidate for bone regeneration<sup>9</sup>.

In a clinical study, bio complexes prepared from DPSCs and collagen sponges were used in repair of human mandible and exhibited impressive results. In conjunction with other biomaterial platforms, DPSCs has shown to have osteogenic differentiation capacity. The topography of scaffolds was also reported to play a crucial role in clinical regeneration. Recently the role of tooth derived stem cells from dental pulp in bone regeneration around dental implants was investigated, and around titanium implants comparative study performed with BMSCs and periosteal cells showed that DPSCs exhibit the highest potential of osteogenic differentiation which as a source for tissue-engineered bone<sup>10</sup>. All type of tooth derived stem cells: Human

adult dental pulp stem cells (ADPSCs); Stem cells from human exfoliated deciduous teeth (SHEDs); Periodontal Ligament Stem Cells (PDLSCs); Stem Cells of Apical Papilla (SCAPs); Dental Follicle Precursor Cells shows greater potential of osteogenic differentiation compared to BMSCs<sup>11</sup>.

**Hepatocyte Differentiation:** Hepatocytes are the chief functional cells of the liver. Roughly 80% of the mass of the liver is contributed by hepatocytes. Hepatocytes are the main cellular component of the liver, comprising 70-80% of the total liver mass. The tooth derived stem cells from the pulp showed the potentiality to differentiate into hepatocyte like cells<sup>12</sup>. More recently, DPSCs have provided strong evidence to support a role in the treatment of irreversible liver diseases, providing hope for a future cure.

**Neural Regeneration:** DPSCs stand out as strong candidates as a source of neural stem cells, when compared with BMSCs, which have a low differentiation efficiency. Considering the origin of dental pulp, it is evident that DPSCs exhibit intrinsic neuro-glial characteristics and capable of differentiating into both neural cells and vascular endothelial cells. Consistent with this observation, recently DPSCs was demonstrated to have glial origins<sup>13</sup>. Studies have attempted neural regeneration with dental pulp-derived cells (DPCs) earlier than those with DPSCs. Nosrat et al<sup>14</sup> demonstrated that DPC grafting promotes survival of damaged motor neurons in spinal cord injury. In a subsequent report, several neurotrophic factors like glial cell line-derived neurotrophic factor (GDNF), brain-derived neurotrophic factor (BDNF), and nerve growth factor (NGF) were shown to be secreted from DPCs, which in turn facilitated survival of sensory and dopaminergic neurons. This neurotrophic effect was confirmed using in vitro models of Alzheimer's and Parkinson's disease<sup>15</sup>. DPCs have also used in regeneration of peripheral nerves injuries. Importantly, although these studies were performed using DPCs, DPSCs are expected to exhibit similar properties<sup>13</sup>. The secretion of neurotrophic factors from transplanted DPSCs has been suggested to provoke a kind of chain reaction that induces neighboring cells to differentiate and secrete other neurotrophic factors important to the repair the injury site<sup>14</sup>. In addition, DPSCs directly inhibit the activity of several axon growth inhibitors and also prevent apoptosis of neurons, astrocytes, and oligodendrocyte. As another example of CNS regeneration, many studies have proposed stem cell therapy using tooth derived stem cells as a cure for

stroke in a rodent model<sup>14, 15</sup>. On the other hand, SHEDs also potentially differentiate into dopaminergic neuron-like cells<sup>11</sup>.

**Corneal Reproduction:** A sheet of tissue-designed DPSC was transplanted on the corneal bed securing the human amniotic film. Healthy uniform corneal epithelium was formed after three months of healing. Additionally Stem cells from third molars were isolated and showed the potential of differentiating into keratocytes, which are cornea stroma cells. Epithelial cells from the oral mucosa have likewise been researched with regards to visual surface remaking<sup>16</sup>. Taking after optic nerve injury, intravitreally transplanted DPSCs have been additionally answered to advance recovery of retinal ganglion axon<sup>4</sup>.

**Treatment of Diabetes:** Diabetes is one of the most common long-lasting endocrinal sicknesses which is related to the pancreas (islet cell). Both type 1 and type 2 (disease where blood sugar swings wildly) may be successfully managed by transplantation of islet cells. The ability of DPSCs into islet-like cell groups (ICAs) has been explored, suggesting that in vitro cultured ICAs can release insulin and C-peptide in a glucose dependent manner<sup>17</sup>. Carnevale et al also reported that human amniotic fluid stem cells and hDPSCs into insulin-producing cells, suggesting their possible ability to differentiate as a nonpancreatic, low-harmful source of cells for islet regeneration<sup>18</sup>. The body-structure-related relevance of this technology was proved with the generation of islet-like cell groups together coming from both DPSCs and SHEDs<sup>5,11</sup>. The potentials of DPSC and SHEDs into all functional endocrine and exocrine subsets of pancreatic cells were confirmed in a separate study, and person with blood sugar disease/related to blood sugar disease were shown to be helped (to reduce) upon transplantation of DPSCs<sup>17</sup>. Finally, the transdifferentiation human PDLSCs cultured in Matri gel into (related to the pancreas) islet cells has been demonstrated<sup>19</sup>.

**Myocardial Infarction:** Myocardial infarction (MI) remains one of the cardinal causes of mortality worldwide. Several studies have investigated the possibility of using DPSCs for the treatment of MI. For example, Gandia et al used human dental pulp stem cells (hDPSCs) in a rat myocardial infarction model in 2008, reported an increase in the number of vessels and decrease in the size of infarct, concluding that hDPSCs secrete multiple proangiogenic apoptotic factors including

VEGF<sup>20</sup>. In 2009, the overall capability of stem cells to differentiate into cells with a cardiac phenotype was evaluated including BMSCs, adipose tissue stem cells, and DPSCs<sup>21</sup>.

**Ischemic Diseases (Angiogenesis):** Angiogenesis is characterized as the physiological procedure through which fresh recruits vessels shape from previous vessels. Vessel advancement in body is an extremely intricate and dynamic procedures, for example, debasement of the cellular layer and the extracellular network (ECM), tube development, endothelial cell expansion and relocation, and development into useful veins<sup>22</sup>. As of late, a high vasculogenic subfraction of DPSCs was disconnected from the dental mash which demonstrated various endothelial begetter cells<sup>23</sup>. In like manner SHED have likewise been shown to have the capacity to create endothelial progenitor cells<sup>[11]</sup>. Concerning paracrine enlistment of angiogenesis, DPSCs were beforehand exhibited to express various platelet determined development calculate (PDGF), fibroblast development figure (FGF) vascular endothelial development consider (VEGF), furthermore could prompt the tube arrangement of umbilical vein endothelial cells invitro<sup>24</sup>. Along these lines, DPSCs may speak to an appealing foundational microorganism hotspot for tissue designing and could be a treatment for angiogenesis, for example, stroke, endless injuries, and myocardial dead tissue.

**Future Perspective:** Skeletal muscle differentiation of DPSCs has been reported for the treatment of muscular dystrophy<sup>25</sup>. In addition, several studies have attempted to differentiate DPSCs into salivary gland cells<sup>26</sup>. Overall, studies indicate that DPSCs are more preferable than BM-MSCs for mineralized tissue regeneration<sup>27</sup>. However, differentiation of DPSCs into skeletal muscle has been reported for the treatment of muscular dystrophy<sup>25</sup> along with differentiation of DPSCs into salivary gland endothelial cells. As for the recovery of salivary glandular function with irradiation, a study reported that DPSCs differentiated into dental pulp endothelial cells(DPECs) that promotes healing of radiation damage in the irradiated salivary glands can only be speculated as potential mechanisms at present time<sup>26</sup>.

## Conclusion

Tooth derived stem cells have innate advantages and represent as a viable source of adult stem cells. They are considered as an alternative of BMSCs but

the different characteristics from difference in origin make them unique in the utilization as a cell source for regenerative therapy. Dental stem cell have a high proliferative potential to proliferate into: Odontogenic, Osteogenic, Chondrogenic, Adipogenic, Neurogenic, myogenic tissues, etc and have shown their possibility as a cell source for non tooth structures, such as bone, nerve, muscle, liver, and pancreas, etc. Dental stem cells exhibits multifactorial potential such as multi-differentiation ability, high proliferation rate, high viability, easy accessibility and easy to be induced to distinct cell lineages. However, although numerous breakthroughs in stem cell research have been made so far, their applicability and success in clinical trials remains to be ascertained. Solid research of stem cells must be performed before scientists leap into the clinical trials. Technologies using Ips and MSC cells could be the new era of personalized medicine. The heterogeneity among patient factors and the biology of different stem cell types reinforces the need for an individual-targeted approach to stem cell therapy and other cell-based treatments.

**Ethical Clearance:** Not required

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**Conflict of Interest:** Nil.

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# Relationship between Maxillary Molar Root Tips and Maxillary Sinus Floor Using CBCT

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## Abstract

**Introduction:** Maxillary Sinus is a triangular-shaped paranasal sinus located close to the nose and maxillary posterior teeth. It is the largest of the four paranasal sinuses and is responsible for the resonance of voice and also in the dissipation of any unwanted forces preventing injury to maxillofacial bones. Overtime pneumatization of the maxillary sinus takes where age is a significant factor. Tooth loss may also lead to loss of bone, which in turn causes reduced bone density and insufficient bone quantity and quality for the placement of implants.

**Materials and Method:** CBCT scans were gathered and analyzed to establish a relationship between the maxillary posterior root tips and the sinus floor. We had collected 30 CBCTs from the Department of Oral Medicine & Radiology, Saveetha dental college, Chennai. The distances of the root tip of the maxillary first and second molar to the sinus floor were measured. Statistical analysis was done on the collected data.

**Results:** Mean and standard deviations of the distance of each root tip of maxillary first and second molar from the maxillary sinus floor were obtained. No significant statistical difference was found between the respective roots of maxillary first and second molars.

**Conclusion:** Knowledge regarding the relationship between posterior root tips of the maxilla and the sinus is needed to prevent any unwanted complications during dental procedures

**Keywords:** CBCT, maxillary sinus, maxillary molar.

## Introduction

The maxillary sinus is one of the first of the paranasal sinuses to develop, its pyramidal in shape and completes its growth around 20 years of age with the eruption of the maxillary third molar.<sup>1</sup> Maxillary sinus has an average

volume 15cc and protrusion of the maxillary posterior root tips maybe seen in some cases which can lead to various implications during surgical and orthodontic procedures and is essential for clinicians to be aware of the apical position of the teeth in relation to the maxillary sinus.<sup>2</sup> Pneumatization is a physiologic process that occurs in all paranasal sinuses leading to an increase in the volume of the sinus. With age pneumatization of the maxillary sinus occurs. Especially following extraction of posterior maxillary teeth, marked reduction in bone density is seen accompanied by disuse atrophy of the bone accelerating the pneumatization of the maxillary sinus.<sup>3</sup>

A periapical lesion or a periodontal lesion in relation to the maxillary molars or premolars may reach the sinus leading to sinusitis. Endodontic treatment and

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extractions of maxillary posteriors may also lead to penetration into the sinus in some cases leading to an oroantral communication,<sup>3,4</sup> due to high caries index of maxillary first molar it is more prone to be extracted, and the possibility of an oroantral communication is marked.<sup>5</sup> OPG and IOPA are commonly used radiographic imaging modalities to visualize the maxillary sinus but being two dimensional; it has its limitations. CBCT has been a more preferred choice of imaging due to its ability to provide clear images without any overlapping of anatomic structures and also its ability to visualize distinct elevations along the floor of the maxillary sinus extending between the roots of teeth commonly called as hillocks or septa.<sup>6</sup>

This study aimed to establish a relationship between the maxillary sinus floor and the apices of the maxillary teeth roots using dental CBCT, thereby to provide clinicians with a protocol while working on posterior maxillary teeth. Though several studies have been done on the same note, we have not observed an adequate number of studies in the Indian population.

### Materials and Method

We obtained the CBCT scans for the study from the Department of Oral Medicine and Radiology, Saveetha

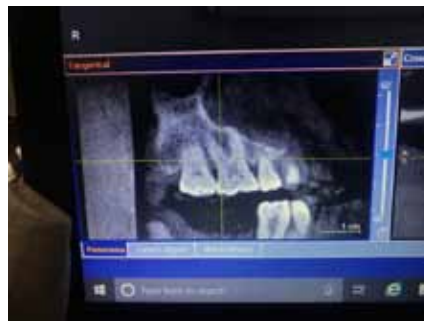
dental college. A total of 30 scans was collected. Out these 12 were men and 18 were female, and the average age was 31.8. CBCTs were all obtained during routine investigations for several procedures, among which scans with no pathology or missing teeth in the maxillary region were selected. Exclusion criteria include root canal treated maxillary posteriors, fractures, periapical lesions or patients who have undergone orthodontic treatment. Inclusion criteria consisted of patients without any periapical lesions in the maxillary posterior region, healthy maxillary bone with no break in the continuity of the bone and patients with vital maxillary posteriors. All CBCT scans obtained were analysed and lines were drawn using the GALILEOS Viewer by DENTSPLY Sirona USA, Field of view size was 8x8cm and 400 Hm resolution, to measure the distance of the apices of the maxillary 1<sup>st</sup> molars and maxillary 2<sup>nd</sup> molars. All root tips were grouped based on their relation to the maxillary sinus floor, as follows: Group 1: Root tips away from the sinus floor. Group 2; anyone root tips in contact with the sinus floor; Group 3: All root tips of the molar in contact with the sinus floor; Group 4; Root tips into the maxillary sinus.(Fig1) Unpaired T-tests were used to compare measurements between maxillary sinus floor and mesial, distal and palatal root tips of the maxillary molars. Statistical analysis was done using SPSS V.23.



Group 1



Group 2

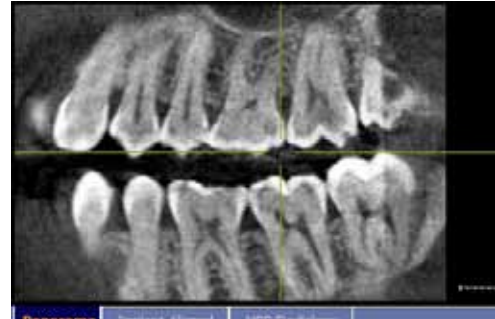




Group 3



Group 4



**Fig 1: CBCT Cropped panoramic images showing the relationship of maxillary root tips to the maxillary sinus**

**Results**

Mean and standard deviations of the distance of each root tip of a maxillary first and second molar from the maxillary sinus floor were obtained and are given in the table below.

A significant 41% of the 1<sup>st</sup> molars and 43% of the 2<sup>nd</sup> molars were classified under group 1. About 24% of the 1<sup>st</sup> molars and 20% of the 2<sup>nd</sup> molars had their root tips into the sinus.

**Table 1: Mean distatances of Mesiobuccal root of maxillary molar to sinus**

Mesiobuccal Root	1 <sup>st</sup> Molar	2 <sup>nd</sup> Molar
Group 1	1.94±1.40	1.5±0.39
Group 2	0.67±0.62	0.55±0.56
Group 3	2.58±1.60	0
Group 4	1.05±0.66	0.92±0.4
Mean	0.74267	0.592

**Table 2: Mean distancies of Distobuccal root of maxillary molar to sinus**

Distobuccal Root	1 <sup>st</sup> Molar	2 <sup>nd</sup> Molar
Group 1	1.77±1.47	1.71±0.71
Group 2	1.02±0.14	1.01±0.16
Group 3	0.25±0.55	1.31±0.62
Group 4	0.8±0.44	1.18±0.66
Mean	0.801333	0.716667

**Table 3: Mean distancies of Palatal root of maxillary molar to sinus**

Palatal Root	1 <sup>st</sup> Molar	2 <sup>nd</sup> Molar
Group 1	1.51±0.75	1.64±1.08
Group 2	1.41±0.40	1.02±0.14
Group 3	1.24±0.41	1.47±0.30
Group 4	1.01±0.73	1.32±0.40

No significant statistical difference (P>0.05) was found between mean distances of each root of 1<sup>st</sup> and 2<sup>nd</sup> molar.

## Discussion

The relationship of the maxillary sinus to the posterior maxillary teeth plays a major role in treatment planning. This study was conducted to establish a relationship of roots of maxillary first molar and roots of the maxillary second molar to the floor of the maxillary sinus. Pneumatisation of the sinus and bone loss following extractions is a significant concern during prosthetic replacements.

Practitioners must be aware of the bone loss that follows extraction and the length of bone available for implant placements to prevent perforation of the sinus floor<sup>5</sup>. Oro antral spread of infections maybe associated with the relationship of the root tips of posterior teeth to the sinus floor. Cases of orbital abscess accompanied with periapical inflammation have been reported following root canal treatment of maxillary molars.<sup>7</sup> Hence, while planning for root canal treatment or endodontic surgery of maxillary molars, the proximity of the root tips to the sinus must be assessed to prevent any unwanted oroantral communication. A similar complication may also arise during periodontal or implant therapy. It has also been proven that usage of periapical radiographs for assessment of perforations of the maxillary sinus is not recommended<sup>8</sup> Advanced imaging modalities such as CBCT are currently being used to understand and analyze the anatomy of the maxillary sinus and the relationship of maxillary posterior root tips to the sinus floor. From various CBCT analysis, it can be inferred that Maxillary sinus floor thickening maybe seen in some instances due to infiltration of microorganisms and toxins from periapical lesions. These pathogens may spread the porous maxillary bone or through blood or lymph node.<sup>9-11</sup> Also, Interestingly Huang and Brundsvold reported a case of maxillary sinusitis following periodontal treatment of a maxillary first molar with deep pockets and bone loss.<sup>12</sup>

CBCTs obtained were analyzed and classified into groups based on their relationship of the root tips to the sinus floor. All root tips were grouped based on their relation to the maxillary sinus floor, as follows: Group 1: Root tips away from the sinus floor; anyone root tips in contact with the sinus floor; Group 3: All root tips of molar in connection with the sinus floor; Group 4; Root tips into the maxillary sinus. In our study, similar to what was reported by Jung<sup>9</sup>; Group 1 was found to be the majority among the classes with 41% and 43% for 1<sup>st</sup> and 2<sup>nd</sup> molars respectively in their study. The mesial

roots of the maxillary first and second molars were found to be closest to the sinus floor with an average mean distance of 0.742mm and 0.592mm from the sinus floor. On the whole, the buccal roots were found in closer proximity than the palatal roots. ANOVA test was done to compare the roots of the maxillary first and second molars and paired T-tests were done to compare each root tip to the sinus. It was also seen that 24% of the root tips of the maxillary first molar and 20% of the root tips of the maxillary second molar perforated or extended into the maxillary sinus.

## Conclusion

Good knowledge regarding the relationship of the maxillary posterior root tips and the maxillary floor is necessary for treatment planning. On statistical analysis, no significant difference was found between the root tips of the maxillary molar root tips and the sinus floor suggestive that ideally equal care and precautions have to be taken while periodontal, orthodontic, endodontic or any surgical procedures to prevent any infection of sinus or development of an oroantral communication. Given the unpredictability of the relationship of the sinus with the maxillary molar root tips, clinicians must be aware and should take necessary precautions and also calls for a need for accurate pre-operative analysis and treatment planning. Though study size was small in our study, very few studies have been conducted on an Indian population, and extensive studies on the topic may provide more information on the various relations of the maxillary molars to the maxillary sinus floor.

**Conflict of Interest:** No conflict of Interest.

**Source of Funding:** Research is entirely self funded.

**Ethical Clearance:** Study was cleared by the Institutional Review Board and informed consent obtained from all subjects

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# To Study the Effect of Rotator Cuff Exercises on Tennis Elbow

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## Abstract

**Aims and Objectives:** To study effects of Rotator Cuff Strengthening Exercises in Patients with Tennis Elbow. **Sample size:** 30 patients (15 in each group). **Study Design:** Randomised Contro Trial. **Sample and Sampling Method:** 30 patients were randomly selected and assigned in 2 groups, as Group 1(control group), Group 2 (Interventional group) in equal numbers The total subjects of 30 were included in the study the inclusion & exclusion criteria were **Inclusion Criteria:** Athletes complaining of elbow pain, Both male and female athletes, Age group 18-40 yrs, Subjects willing to participate. **Exclusion Criteria:** Subjects with pain in any other region, Subjects with shoulder, elbow, wrist, cervicothoracic surgery.

**Result:** There was no significant difference is found in the ages of both the group. Mean pain on VAS in group A it was  $4.66 \pm 1.77$  and in group B it was  $7.13 \pm 1.30$ .

**Conclusion:** The inferences from the present study suggest that Rotator Cuff strengthening protocol is significantly effective in Reducing pain,Improving functional activity.

**Keywords:** PRTEE, Lateral Epicondylitis, Rotator Cuff, Tennis, Elbow, EMG, Inflammation, Varus Torque, Theraband.

## Introduction

Lateral epicondylitis or lateral epicondylalgia, known colloquially as tennis elbow, shooter's elbow or simply lateral elbow pain, is a condition where the outer part of the elbow becomes sore and tender<sup>1</sup>. Since the pathogenesis of this condition is still unknown, there is no single agreed name<sup>1,2</sup>. While the common name "tennis elbow" suggests a strong link to racquet sports, this condition can also be caused by sports such as swimming and climbing, the work of manual workers and

waiters, as well as activities of daily living<sup>1,2,3,4</sup> Tennis elbow is a painful condition affecting the tendinous tissue of the origins of the wrist extensor muscles at the lateral epicondyle of the humerus, leading to loss of function of the affected limb<sup>3,4</sup>. Therefore it can have a major impact on the patient's social and professional life<sup>5,6</sup>. Pain around the lateral epicondyle is known by a variety of names and was described as periostitis, extensor carpi radialis brevis (ECRB)-tendinosis and epicondylalgia<sup>7,8,9,10</sup>. The most commonly used names are "tennis elbow" and "lateral epicondylitis". The use of the terms "periostitis" and "epicondylitis" was questioned over time, as histological studies failed to show inflammatory cells (macrophages, lymphocytes, and neutrophils) in the affected tissue<sup>11,12,13</sup>

Microscopical studies by Nirschl et al showed mainly fibroblastic tissue and vascular invasion that led him to describe the condition in 1999 as "angiofibroblastic tendinosis". These findings left the researchers to conclude that a more appropriate term for the condition is

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“lateral elbow tendinosis”, which defines a degenerative process characterized by an abundance of fibroblasts, vascular hyperplasia, and unstructured collagen<sup>14,15</sup>. The term tendinosis or tendinopathy implies the absence of chemical inflammation. It has been postulated that tendinosis or tendinopathy is acquired by overuse of a hypovascular zone, which leads to subsequent neovascularisation<sup>16</sup>.

The need for this study is to check the efficacy of strengthening rotator cuff muscles in the treatment of lateral epicondylitis. The role of the rotator cuff in the treatment of lateral epicondylitis is not that well studied. Also to study the effect of weakness of the rotator cuff on the upper limb biomechanics leading to overuse of the Extensor Carpi Radialis Brevis<sup>37</sup>. More stress is placed on the treatment of elbow. Understanding the pattern of injury and the underlying causes in the whole kinematic chain will lead to a better treatment plan. Hence to stress the role of rotator cuff strengthening, this study is performed.

**Aims and Objective:** To determine the effects of Rotator Cuff Strengthening on Pain & Functional Activity.

**Source of Data:** Physiotherapy Center Seawoods Polyclinic, Seawoods Navi Mumbai.

**Method of Collection of Data:** Thirty Players of 18-40 years of age with the h/o pain in lateral epicondyle & diagnosed with lateral epicondylitis were taken and screened by using a questionnaire given for their inclusion in the study and assessed for pain & Functional Activity using Visual Analog Scale (VAS) and muscle strength. Patients were randomized into two groups. Group B (15 patients will receive conventional treatment and Group A (15 patients will receive rotator cuff strengthening along with good scapular control and conventional treatment).

The players were explained about the respective procedures which they would be undergoing for a period of 4 weeks and were made to sign a consent form before their participation in the study.

**Sample Size:** 30

**Sampling Design:** Simple Random Sampling

**Study Design:** Randomised Control Trail

**Study Duration:** 6 Weeks

**Outcome Measures:** Pain, functional scale, muscle strength

**Tools Used:**

- Therabands
- VAS Scale
- Mirror
- Dumbbells
- General assessment form for collecting the demographic data of the subjects
- PRTEE [Patient Related Tennis Elbow Evaluation]

### Methodology

**Procedure:** Thirty Players of 18-40 years of age with the h/o pain in lateral epicondyle & diagnosed with lateral epicondylitis were taken and screened by using a questionnaire given for their inclusion in the study and assessed for pain & Functional Activity using Visual Analog Scale (VAS) and muscle strength. Patients were randomized into two groups. Group B (15 patients will receive conventional treatment mainly electrotherapeutic modalities, elbow exercises taping) and Group A (15 patients will receive rotator cuff strengthening along with good scapular control and conventional treatment).

The players were explained about the respective procedures which they would be undergoing for a period of 6 weeks and were made to sign a consent form before their participation in the study. The protocol was followed for 10 sittings six days a week. After that, a home exercise program was given to both the study as well as the experimental group. The home program for the study group included

**Isometric wrist extensor and flexor training:**

**Active elbow range of motion exercises:** The home program for the experimental group included.

Isometric wrist extensor and flexor training, Active elbow range of motion exercises, Strengthening of the infraspinatus, supraspinatus, subscapularis along with scapular muscle rhomboids, serratus anterior levator scapulae and trapezius using therabands.

**Dependent Variable:** PRTEE Scale and VAS

**Independent Variable:** Rotator cuff strengthening the program.

**Control Variable:** Age between 18-40 yrs



**Data Analysis:****Table 1: Gender wise distribution of patients**

Gender	Group A	Group B	$\chi^2$ -value	p-value
Male	11(73.33%)	11(73.33%)	0.00	1.00 NS,p>0.05
Female	4(26.67%)	4(26.67%)		
Total	15(100%)	15(100%)		

**Table 2: Comparison of PRTEE Score in both the groups at pre and post-test****Descriptive Statistics:**

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pre Test	Group A	15	69.46	10.51	2.71
	Group B	15	63.86	14.53	3.75
Post Test	Group A	15	25.86	8.15	2.10
	Group B	15	46.06	11.91	3.07

**Table 3: Student's unpaired t test**

	t	Df	p-value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Pre Test	1.20	28	0.237NS, p>0.05	5.60	4.63	-3.88	15.08
Post Test	5.41	28	0.000S, p<0.05	-20.20	3.72	-27.83	-12.56

**Discussion**

The short term results of this prospective randomized study in athletes with lateral epicondylitis showed that treatment with rotator cuff strengthening with therabands and conservative management showed significantly reduced pain during activity and improved function<sup>1</sup>. The aim of our study was to compare the effectiveness of adding rotator cuff strengthening to the conservative approach. To try to limit bias patient they evaluated treatment. The patient recorded the amount of lateral epicondylitis pain on a PRTEE score and VAS. Patient satisfaction with treatment was also assessed [satisfied/not satisfied]

Lateral epicondylitis is a troublesome condition to treat and frequently brings athletic careers to an end<sup>2,3</sup>. Response to initial therapy is common, but so is relapsed (18% to 50%) and/or prolonged, moderate discomfort (40%)<sup>5</sup>. Keutenn and coworkers reported that 53% of athletes had to stop their sporting career due to chronic recurring lateral epicondylitis however we cannot exclude that some of these patients had other defects as well<sup>6</sup>. In tennis players, about 39.7% have reported current or previous problems with their elbow<sup>6,7</sup>. Less

than one quarter (24%) of these athletes under the age of 50 reported that the tennis elbow symptoms were "severe" and "disabling." While 42% over 50 identified severe and disabling symptoms<sup>9</sup>. More women (36%) than men (24%) considered their symptoms to be severe and disabling and in which Tennis elbow is more prevalent in individuals over 40, where there is about a 4-fold increase among men and 2-fold increase among women<sup>8,9</sup>. Observations of the patterns of activation and joint kinematics of novice tennis and advanced players, using kinematic data in conjunction with a computer model, have revealed substantial eccentric contractions of the extensor carpi, which are likely the cause of repetitive microtrauma leading to tennis elbow injuries and Adopting the technique seen in advanced players probably helps limit the eccentric contractions and reduces the likelihood of injury<sup>21,22</sup>. Tennis grip size was believed to play a crucial role in the past<sup>24,25</sup>. However, based on fine-wire electromyography studies in which muscle activity in extensor carpi radialis longus and brevis, extensor digitorum communis, flexor carpi radialis, and pronator teres were measured, tennis racquet grip size (1/4) above or below because of relatively very few studies evaluating the effectiveness

of shoulder muscle strength particularly rotator cuff in the development of lateral epicondylitis<sup>26,28</sup>. In one study conducted by Aguinaldo AL, and Chambers H studied the correlation of throwing mechanics with elbow valgus load in adult baseball pitchers<sup>52</sup>. They concluded that Valgus torque at the elbow during baseball pitching is associated with 6 biomechanical variables of sequential body motion and a condition of late trunk rotation, reduced shoulder external rotation, and increased elbow flexion appeared to be most closely related to valgus torque<sup>29,32</sup>. Sidearm pitchers appeared to be more susceptible than overhand pitchers to reduced elbow valgus torque<sup>32,33,34</sup>.

Injuries or adaptations in some areas of the kinetic chain can cause problems not only locally but as distal links must compensate for the lack of force and energy delivered through the more proximal links<sup>51</sup>. This phenomenon, called catch up is both inefficient in the kinetic chain and dangerous to the distal link because it may cause more load or stress than the link can safely handle, these changes may result in anatomical or biomechanical situations that increase injury risk, perpetuate injury patterns or decrease performance<sup>32,34,36</sup>. These deficits in the kinetic chain must be identified and corrected as part of the treatment and rehabilitation process<sup>36,37</sup>.

**Ethical Clearance:** It has been obtained by DATTA MEGHE ethical committee, DMIMS, SAWANGI MEGHE WARDHA.

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# Relationship between Occupational Stress and Resilience

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## Abstract

Occupational stress or stress related to workplace refers to stress experienced as a direct result of an individual's occupation, or job. Stress completely disturbs the physical, psychological and financial balances of an employee as well as employers. Due to stress employers cannot expect anticipated outcome from employees who are burnt out, drained or stressed, resulting in loss of their drive, determination, clarity and innovative thinking. Resilience is not just one's capability to recover from stress, but also ability to adjust in the face of difficult situations. There is an inverse relationship exists between stress and resilience.

**Keywords:** Occupational Stress, Employee, Employer, Organization, Resilience, Work load.

## Introduction

Occupational stress is the detrimental response that happens at physical and mental level, when there is mismatch between the prerequisites of the job and the abilities of the worker<sup>[29]</sup>. Occupational stress refers to stress on the job and it arises within a person when he faces problems in his occupation<sup>[8]</sup>. The organizational structure, employer and employees are involved in the prevalence of occupational stress and the consequent burnout responses of an individual. Occupational stress affects the organization in terms of productivity, profit, disruptions in normal operations. The employees are also affected due to bad physical and mental health<sup>[31]</sup>.

### Occupational Stress:

**The definitions provided by different authors for stress are as follows:** Occupational stress arises when there is mismatch between the requirements of the job and the capabilities of the person. It affects mental and physical health of an individual.<sup>[6]</sup>

Occupational stress is defined as the detrimental responses that develop in an individual. This phenomenon usually takes place when the job's requirements surpass the abilities, necessities or resources of the employee<sup>[18]</sup>

Workplace stress is the negative responses given out by the body and mind when it cannot handle the conflict between demands raised by the job he is performing

and the command an employee has over meeting these demands<sup>[23]</sup>.

Stress can be either beneficial or detrimental. Good stress is regarded as "eustress". Eustress motivates us to perform better. When this eustress goes beyond a limit, it causes distress and hampers the performance of the individual<sup>[34]</sup>.

**Stress Reactivity:** The categorization of stress reactivity as a three-phase process is mentioned in<sup>[27]</sup>. This process is termed as the general adaptation syndrome

**Phase 1: Alarm Reaction:** As result of stress, the body is affected and starts showing the symptom of exposure to stressor. The level of resistance is weakened if the stressor is more powerful. The result would be burns of high degree of severity, increased heart rate and temperature of the body etc.

**Phase 2: Stage of Resistance:** If Resistance supervenes and the stressor is in accord with adaptation of the condition, The physical symptoms related to the alarm stage have almost vanished and resistance level increases above the normal.

**Phase 3: Stage of Exhaustion:** After body has adjusted to the continued acquaintance to the stressor, finally adaptation energy is exhausted, the indicators of the alarm reaction come again. The symptoms of the

alarm reaction come again, but at this instant they are irreversible and the individual expires.<sup>[8]</sup>

**Causes of Work Stress:** A list of six causes of work stress has been established<sup>[7]</sup>

- (1) Job Conditions
- (2) Role Stress
- (3) Interpersonal Factors
- (4) Career Development
- (5) Organizational Structure
- (6) Home-work Interface

**a. Role Overload:** Role overload is defined as a situation when the individual is engulfed with too many tasks and assignments to be fulfilled. The individual is restrained from performing well due to the unavailability of resources<sup>[17]</sup>.

Role overload occurs when an individual is confronted with a situation to perform several roles concurrently but lacks the resources to complement the demands posed by them. The role expects the individuals to complete the tasks within a short period of time<sup>[30]</sup>.

The study has examined the impact of role overload on Job stress, Job satisfaction and Job Performance of married working women. The respondents of this study were 150 married working women. Role overload was positively related with stress and negatively related with job satisfaction and job performance<sup>[19]</sup>.

A study conducted to analyze the impact of role overload on teachers working in a university. The teachers are subject to huge amounts of stress due to the present scenario of heavy presence of technology integration in the educational sector. They are expected to extend their roles and keep performing to produce the desired results. The female teachers face a lot of pressures as they have to balance between family and work life. They are exposed to huge levels of stress. The outcomes of the study were that the significant predictor of job stress was role overload.<sup>[20]</sup>

**b. Physical Environment:** Physical environment deals with the health and safety of the individuals working for the organization. The Korean Occupational Stress Scale questionnaire states that work area

should maintain high standards of cleanliness and be free from pungent odours. Work area should have the adequate amount of lighting. The seating position should be comfortable for the employees so that they can stretch for long hours depending on the requirements of the job. The working environment should have precautionary equipment to protect the employees from any unexpected accidents<sup>[26]</sup>.

A study has been conducted to investigate the various factors of stressors among the employees of IT sector. Working in a safe and healthy physical workplace environment will ensure that the employees perform to their maximum level and improvise the productivity of the organization. The individual can suffer from health issues due to poor lighting, uncomfortable seating positions, exposure to toxic gases and erratic work schedules.<sup>[31]</sup>

The physical environment helps in maximizing the employees' performance and satisfaction, improving social relations and health of the employees. The below factors motivates an individual to deliver better performance<sup>[1]</sup>.

- a. Sound:** Sound in form of noise hampers job performance and causes stress to the employees.
- b. Temperature:** The body finds it difficult to adapt to extreme climatic conditions. The temperature of the workplace has to suit the body needs for the individual to work comfortably.
- c. Air:** Air in the workplace should be purified so that the individuals do not face breathing difficulties. It should be free from any type of strong odours.
- d. Light:** Workplace with improper and insufficient lighting might affect the efficient and quality of work of the employee. The work area should be properly illuminated.
- c. Role Responsibility:** A study conducted at Ghana Ports and Harbours Authority (GPHA), Takoradi. He has done an analysis of the stress factors among the workers of that organization. The outcomes of the investigation were that the employees felt that the organization was not concerned about their employees. The organization must take measures to resolve issues related to stress.

He states that the people working in the organization have to shoulder two types of responsibility.

- a. **Responsibility for people:** Responsibility for people triggers a lot of stress for people working as team managers, Human resource managers. Responsibility related to people usually calls for lot of meetings with different kinds of people, interacting with clients, listening to the grievances of the employees and the team members, resolving conflicts etc.
- b. Responsibility for things such as budgets, equipment etc. The person is responsible for these tangible equipments. He needs to take care of the inventory management, purchase and maintenance of the equipments<sup>[15]</sup>.

The role of multi-tasking sometimes increases the stress level of the employees and leads to bad performance. This qualitative study examines the perceived stress among graduate students by taking the various roles and responsibilities shouldered by them and the kind of social support they receive to overcome stress. The respondents answered questions related to their personal and academic life, their encounter with these stressful situations and different ways of dealing stress. The respondents felt that they had to struggle between varied responsibilities. They experienced stress due to their inability to strike a balance between both the sides. As the respondents did not receive the adequate social support in their new environment forcing them to quit.<sup>[13]</sup>

There is high level of stress prevailing among the employees working in BPO industry. It has also studied the impact of stress on employee turnover intention. The increased stress levels are impacting the performance of the employees, which, in turn affects the productivity of the organization. The employees were not able to cope up with the stress levels and this has led to increased attrition levels. The cost of replacing an existing employee increases the cost incurred to the company. The results depicted that occupational stress was caused due to role uncertainty/ambiguity, role boundary, role responsibility, and the physical environment<sup>[22]</sup>.

- d. **Social Support:** The link between occupational stress and social support (SS) was examined among the nurses working in hospitals. They found that Social Support significantly influences occupational

stress in hospitals nurses. They have suggested that the management should focus on lowering stress faced by the nurses who are married and those who have worked for many years in the same organization.<sup>[12]</sup>

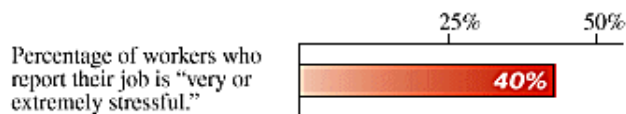
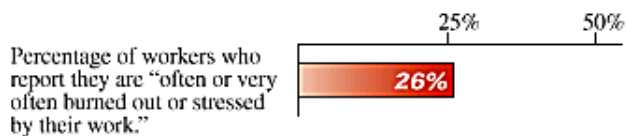
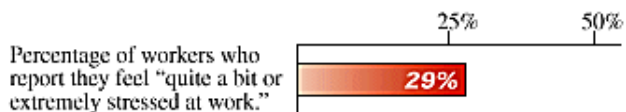
A study has been conducted to examine the effect of the support provided by the people around them on occupational stress. This study was carried out among the nurses in Iran. The outcomes of the study found that there was a significant relationship between stress and social support. The support obtained from their peers and their superiors helped them to manage stress effectively.<sup>10]</sup>

Healthcare professionals undergo a lot of stress because of working environment around them. This study analyzes the influence that job demands, social support, job control and recognition have on the possibility that a worker will undergo stress. The results of the study show that a low emotional demand has more effect on reducing the likelihood of stress than low family demands. The companies should provide a accommodating work environment to the employees.<sup>[32]</sup>

- e. **Job control:** The investigation of the impact of job control on stress revealed that job control was a primary cause of stress and its outcomes either directly or by how it is influenced by other job elements like contentment, demands placed by job, concerns about future. 170 office workers participated in this study. The outcomes show that job control can influence stress, but demands placed by the jobs and concerns related to the job increases the levels of stress.<sup>[21]</sup>

The investigation study of the role of job demands and control on job stress and its relationship with demographic characteristics of Iranian prison staff concludes that the stress levels experienced by them was high due to high job demand and low job control.<sup>[9]</sup>

Depreciating levels of job control has ill effects on the mental health of a person. The researchers have conducted a longitudinal study of a national sample of working Australians. They have suggested that organizations should implement policies which can increase the levels of job control and thereby leading to better mental health of the employees.<sup>[24]</sup>

**Survey by Northwestern National Life****Survey by the Families and Work Institute****Survey by Yale University**

Source: [29]

Studies show that job stress is high among faculty members of universities due to high workload and occupational characteristics. Thus, these individuals have higher physical and mental occupational stress and less organizational commitment [11]

**Resilience:** Resilience is defined as "The capability to cope better than expected in the face of significant difficulty or threat" [33]. Resilience is one of the most important human abilities that results in effective adaptation to risk factors [3].

**Relationship between Resilience and stress:** A study was conducted in the year 2017 and investigated the correlation between occupational stress and resilience. The study highlighted that stress is common in all occupations and concluded that occupational stress can be reduced by increasing resilience level among faculty members. [2]

Resilience is described as a trait imbibed in the personality of an individual to nullify the negative effects of stress [35]. Resilience allows the individual to benefit from his adaptive skill, transform stressful situations into an opportunity for learning and growing, and consequently control stress. [4]. Resilient people use personal and social resources to reduce the negative effects of stress [5]. Occupational stress and resilience exhibits a significant and inverse relation. It is in consensus with the study conducted by Shakerina et al. [28]. The study results contradict the results obtained in the study by Mahdiah et al. [14] Previous studies state that people with high resilience levels have less chances of developing burnout. [16]

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# Assessment of Practice and Attitude of Mothers in Using Over the Countermedication in a Selected Rural Area of Kanchipuram District, Tamil Nadu

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## Abstract

Over the counter medication is a problem that exists world-wide. The objective of the study are assess the practices and attitude regarding over the counter medication among mothers and association of the practice scores of over the counter medication with their selected demographic variables and association of the attitude scores of over the counter medication with their selected demographic variables. A sample size is 100. A study was conducted to assess to mother using the over the counter medication and find out the association of the practice scores of over the counter medication with their selected demographic variables and association of the attitude scores of over the counter medication with their selected demographic variables. Majority of the sample are not using over the counter medication. The association between the practice and demographic variable has a significant of age, religion, educational qualification, occupation, type of family, income, no of children, usual source getting health related information. The association between the attitude and demographic variable has a significant of age, religion, educational qualification, occupation, head of the family, income, no of children, usual source getting health related information have you ever taken over the counter medication.

**Keywords:** *Over the counter medication, Practice, Attitude, Mother, OTC = Over the counter medication, health related information.*

## Introduction

Over the counter medication are drugs that are bought without a doctor's prescription. People around the world tend to treat the disease, almost 50% either wait for the problem to run its course or use a home remedy. About 25% visit a physician use a prescribed

medicine previously obtained of the same condition. The remaining 25% turn to the over the counter medications<sup>1</sup>.

Self-care and over counter medication will increase in the future for a number of factors. These factors include: socio-economic factors; lifestyle; ready and increased access to drugs and self-care products; increased and prohibitive costs of health services; change in the pattern of diseases; the increased potential to manage certain illness through self-care; the increased knowledge and awareness about health; and diseases; public health and environmental factors; and demographic and epidemiological situations . Survey and diary studies of medicine taking behavior indicated that 70% to 80% of illness is managed by self-care without the intervention of the physician<sup>1</sup>.

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The consumption of medications can be considered an indirect indicator of the quality of health care services. Children and adolescents are strongly susceptible to the irrational use of drugs with and without medical control. Kids are more susceptible to cough and cold, this being infectious, if the mother or caretaker of the baby has cold, the baby will almost catch it, therefore it is very important for all the people around the baby to protect themselves from catching cold, to protect the baby getting it. Changing weather is another big cause of catching cold; protect the child from cold and sudden change in temperature. Do not give cough syrups without doctor's prescription. Although many cough and cold syrups are available on the counter, these should be administered only as prescribed by doctor. Cough syrups mostly induce sleep and hence may become addictive and some syrup affecting the liver if taken in excess<sup>3</sup>.

A study carried out by student of Manipal College of Medical sciences done in Pokhara, Western Nepal found that 59% had taken self medication including OTC drugs. The common reasons for self medication are mild illness, previous experience of illness. Similarly a study conducted in a rural village in Philippines revealed that antibiotics are routinely given in self medication for non severe childhood diarrheal illness<sup>4</sup>.

A descriptive study conducted on OTC medicines. Cross sectional study design was used. All the mothers of under five aged children visiting the Friends of Shanta Bhawan at the child OPD and had taken OTC medicines during last 6 months for child. The respondents took OTC for fever, cough and cold. 65% of respondents used OTC medicines because the pharmacy is near from their homes and 48% used it due too easy to get the medicine as compared to visit to doctors or hospital<sup>2</sup>.

### Objectives:

1. Assess the practices and attitude regarding over the counter medication among mothers.
2. Association of the practice scores of over the counter medication with their selected demographic variables.
3. Association of the attitude scores of over the counter medication with their selected demographic variables.

### Method

**Research Approach:** Non-experimental research approach was used.

**Research Design:** A Descriptive research design was used.

**Research Setting:** The study was conducted at Pooncheri, Kanchipuram (DT), Tamil Nadu.

**Population:** Married women who fulfill the sampling criteria.

**Sampling Technique:** The non- probability, purposive sampling technique was used for the study.

**Sample Size:** Sample size  $n = DEFF * NP(1-p)1/[d2/z2/2*(n-)+p(1-p)]$ .

Population size (for finite population correction factor or fpc)(N): 160

Hypothesized% frequency of outcome factor in the population(p): 50%+/-5

Confidence limits as% of 100 (absolute +/-%)(d)5%

Design effect (for cluster surveys-DEFF): 1

Confidence Level 95%

Sample Size =100

**Data Collection Instruments:** Demographic variables proforma, Practice and Attitude questionnaire were used. Practice questionnaire is 14 item questionnaire, to assess the practice of mother using over the counter medication. Attitude questionnaire is 9 item questionnaire, to assess the attitude of mother using over the counter medication..

**Scoring and Interpretation:** Their practise to self-medication was assessed using seven statements rated on a checklist grading on a five-point scale which was scored as: Never=0; rarely=1; Sometimes=2; frequently=3; everytime=4. The minimum score obtainable was 14 and the maximum 56. The mid-point (28) was used as the cut-off. A score of >28 was graded as practise is there, whereas <28 was graded as practise is less. Interpretation are Less than practice=0-14, Moderated practice=15-28, Much practice=29-42, Well practice= 43-56. Their attitude to self-medication was assessed using seven statements rated on a Likert grading on a five-point scale which was scored as: strongly disagree=0; disagree=1; neutral=2; agree=3; strongly agree=4. The minimum score obtainable was 9 and the maximum 36. The mid-point (18) was used as the cut-off. A score of <18 was graded as negative attitude, whereas ≥18 was

graded positive attitude. Interpretation are Less than inadequate=0-9, Inadequate =10-18, Moderate=19-27, Adequate=28-36.

**Data collection procedure:**

Data was collected over one week.

**Results**

**Table 1: Frequency Distribution and Percentage of practice of mothers in using over the counter medication. (N=100)**

- Majority of the practice score are moderately practice 79% and less practice 21%. There is no practice of much practice and well practice.

Interpretation	Frequency	Percentage
Less practice	21	21%
Moderately practice	79	79%
Much practice	Nil	Nil
Well practice	Nil	Nil

**Table 2: Frequency Distribution and percentage of attitude of mother in using over the counter medication. (N=100)**

- Majority of the attitude score are inadequate 59% and moderate 1%. There is no attitude of adequate.

Interpretation	Frequency	Percentage
Less than inadequate	40	40%
Inadequate	59	59%
Moderate	1	1%
Adequate	Nil	Nil

Majority sample age (49%) belongs to age group of 29-38 years as minority (0%) were in the age group of >49years. Majority of religion (75%) belongs to Hindu as minority (0%) were in other . Majority of the educational qualification(43%) is belongs to primary education and whereas minority (0%) belongs to post graduate. Majority of occupation(79%) is belongs to house wife and whereas minority (0%) belongs to Professionals and Shop and market-sales worker. Majority of the type of family (78%) belongs to nuclear family and whereas minority (0%) belongs to extended family.Majority of head of the family (99%) were father whereas minority has rest of others(0%). Majority of income (52%) belongs to 10001-20000 and minority (1%) belongs to Above 20001 . Majority of no. of the children (54%) belongs to 2 and minority (0%) belongs to more than

3. Majority of usual source getting health related informations (77%) belongs to books and minority (0%) belongs to health care worker . Majority of taken over the counter medication (99%) belongs to not at all and minority (0%) belongs to Occasionally and every time .

**Discussion**

The aim of the study was Assessmentof practice and attitude of mothers in using Over The Countermedicationin a selected rural area Kanchipuram district, Tamilnadu. The study consist of 100 samples that fulfilled the inclusion criteria were selected for the study by using convenient sampling method. The structured & standardized questionnaire was used to assess the practise and attitude of mothers in using over the counter medication. The findings of the study was discussed in this chapter with reference to the objectives of the study.

A cross sectional survey was conducted on 200 participants randomly selected from the coastal regions of south India. Each participant underwent a face to face interview with the help of a structured questionnaire the result reported self-medication use by 71% of the subjects, which ranged from a frequency of at least one time to a maximum of 5 times and above. Lack of time (41.5%), minor illness (10.5%) and quick relief (10%) were cited as the most common reason for self-medication use. The majority of the participants (93.5%) were not aware about the side effects of sm. Findings revealed females and people living in urban areas are more likely to use self-medication than males and people in rural areas<sup>5</sup>.

A descriptive study was conducted about self-medication among children and adolescents in Germany to investigate the prevalence and correlates of self-medication .17 450 children aged 0–17 years participated in the 2003-2006 German health interview and examination survey for children and adolescents. The result was 25.2% of participants reported self-medication. Self-medication accounted for 38.5% of total medicine use and included all medication classes. These clustered among drugs acting on the respiratory system (32.1%), alimentary tract and metabolism (21.6%), skin (14.2%) and nervous system (11.3%), as well as homoeopathic preparations (8.6%). Vitamin preparations were most frequently used with a weighted user prevalence of 4.7% followed by cough and cold medicines 4.4% and analgesics 3.7%<sup>6</sup>.

**Limitation:** The researcher found that there was limitation in the study.

- The mother who are all having above 18 years are not permitted to the study.

### Conclusion

On the basis of conducted research it can be concluded the Assessment of practice and attitude of mothers in using Over The Counter medication has an important determination of early prevention from complication.

**Source of Funding:** Self.

**Conflict of Interest:** Nil.

**Ethical Issues:** Department clearance was obtained from Department of Child Health Nursing, Chettinad College of Nursing. UG committee clearance was obtained from UG Research Screening Committee. Institutional Human Ethics Committee clearance was obtained from Chettinad University. Formal permission was obtained from the Principal, Chettinad College of Nursing. Formal consent was obtained from the study samples before collecting the information. Confidentiality of the study was maintained.

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# A Study to Assess the Effectiveness of Nursing Directives on Knowledge Regarding Lifestyle Modification among Diabetes Mellitus Patient Admitted at Dhiraj General Hospital, Waghodia Vadodara

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## Abstract

**Background:** Diabetes mellitus is characterized by hyperglycemia and disturbance of the carbohydrate, fat and protein metabolism that is associated with absolute or relative deficiencies of insulin action or secretion.

### Objectives:

1. Assess the pre existing level of knowledge of patients with Diabetes mellitus regarding lifestyle modification.
2. Administer nursing directives on knowledge regarding lifestyle modification.
3. Evaluate the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetic patient.
4. Find out the association between pre-test knowledge score with selected demographic variables of patients diagnosed with diabetes mellitus.

**Material and Method:** A pre- experimental one group pre-test, post-test design was used for the study. 70 diabetes patients were selected by using Non-Probability Convenient sampling. Nursing directives was administered to every sample after the pre-test. Post-test administration was done on the 7<sup>th</sup> day after pre-test. Data was collected through self –structured questionnaires

**Results:** Among 70 patients in pre-test(94.3%) had inadequate knowledge, (5.7%) had moderate knowledge and none of them were had adequate knowledge In Post-test (58.6%) of had the moderate knowledge and (41.4%) having adequate knowledge. And none of respondent was in the inadequate knowledge. The mean of pre test knowledge score was (7.75), sd (1.79) and the mean percentage were (39.05%). The mean of post test knowledge score was (15.63), sd (1.42) and the mean percentage were (77.16%). From the entire socio-demographic variable only 4 variable that is age, gendre, education, occupation was associated with pre-test knowledge score The mean difference of pre and post level of knowledge is 7.88 which show the effectiveness of nursing directives. The paired t calculated value of knowledge is 29.588 at 0.05 level of significance which is more than table value of “t” test.

**Conclusion:** The result of the present study shows that there is a great need for the diabetic patients to update their knowledge regarding lifestyle modification.

**Keywords:** -Knowledge, Effectiveness, Diabetic patients, diabetes mellitus.

## Introduction

Diabetes mellitus is an issue of universal health problem affecting human societies at all stages of

development. Around the world at least 30 million diabetic patient; the majority of them are lack even the rudiments of care. The Hindustan times newspaper

stated that the total number of people suffering in the country (India) as a whole is estimated at 15.2million<sup>1</sup>.

Diabetes mellitus is a chronic condition that arises when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produce. Failure of insulin production, insulin action or both lead to raised glucose levels in the blood (hyperglycemia). This is associated with long-term damage to the body and the failure of various organ and tissue.<sup>2</sup>

One of the greatest challenges faced by the modern world is Diabetes mellitus (DM). The physical, social and economic factors involved in the management of diabetes are a continuous strain for the health sector and the government agencies. It is expected that approximately 366 million people will be affected by Diabetes mellitus by the year 2030.<sup>3</sup>

Diabetes is a disorder characterized by hyperglycemia or elevated blood glucose (blood sugar). Our body function best at a certain level of sugar in the blood stream. If the amount of sugar in our blood runs too high or too low, then we typically feel bad. **Diabetes is the name of the condition where the blood sugar level consistently runs too high.** Diabetes is the most common endocrine disorder. 16 million Americans have diabetic, yet many are not aware of it. Americans have a higher rate of developing diabetes during their lifetime. Diabetes has potential long term complication that can affect the kidney, eye, heart, blood vessels, and nerves.<sup>4</sup>

**Need for the Study:** Diabetes is key to management, except, possibly when the patient is ill with like secondary disease. The expert patient pilot Centre, the heart of Birmingham teaching primary care trust, has addressed the issue who has with diabetes mellitus. Diabetes specialist nurses alongside management and group discussion, health education, education sessions for the person about diet, exercise, drugs, education are include as norm for diabetic patient for lifestyle modification.<sup>5</sup>

Lifestyle modification has resulted in changes in the way people obtain advice about health and using the internet are now common way of accessing health information and also from the radio, television, promotional agencies. So patient with diabetes therefore target-setting and determining priorities for managing their condition are important aspects of care or their worsening progression can be slowed. The target for

glycated hemoglobin (hbA1C) for those with type 1 diabetes is 7.5% and below for those with type 2. Blood pressure is known to be a factor in diabetic progression. Total cholesterol should be below 5mmol/l, with an HDL of greater than 1.0 and LDL less than 3. These targets may be set through diet for lifestyle modification<sup>6</sup>

Diabetes patients must have knowledge about medication, its effects and side effects, diet, exercise, disease progression, prevention strategies and blood glucose monitoring techniques. A crucial element in secondary prevention is self-care. That is the diabetic patient must take a major responsibility for his/her own care with medical guidance. Providing an appropriate knowledge and skills to a diabetic patients is the prime responsibility of a nurse.<sup>7</sup>

**Statement of Problem:** “A study to assess the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetes mellitus patient admitted at Dhiraj General Hospital Waghodia, Vadodara.”

#### **Objectives:**

- Assess the pre- existing level of knowledge regarding lifestyle modification among diabetes mellitus patient.
- Administer Nursing directives on knowledge regarding lifestyle modification among diabetes mellitus patient.
- Evaluate the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetes mellitus patient.
- Find out the association between pre-test knowledge and selected demographic variables of patients diagnosed with diabetes mellitus.
- Hypothesis

**H<sub>1</sub>:** There will be a significant difference between pretest and posttest knowledge score of Patients regarding lifestyle modification after administration of nursing directives.

**H<sub>2</sub>:** There will be a significant association between pre-test knowledge score and with selected demographic variables

#### **Methodology**

**Research Design:** The research design used for the study was Pre-experimental research design

**Setting:** The main research project was conducted at Dhiraj General Hospital of Vadodara city.

**Sample:** The 70 participants included in this study. The sample for the study was selected by non-probability sampling technique according inclusion criteria as availability of sample. **Inclusion criteria:**

1. Patients with diabetes mellitus who all are admitted in wards.
2. Patients who are available during the period of data collection.

**Exclusion criteria for sampling:**

1. Patients those who are suffering from gestational DM.
2. Patients who are acutely ill.

**Tool for data collection**

**This consists of two parts:**

**Section 1:** Demographic variables such as Patients age, Gender, occupation, education qualification, source of information of diabetic mellitus.

**Section 2:** Self-structured questionnaire will be used to assess the knowledge regarding lifestyle modification among patient with diabetic mellitus at Dhiraj General Hospital Waghodia, Vadodara.

**Scoring interpretation of knowledge:**

- Adequate knowledge - >67%
- Moderately adequate knowledge - 34-66%
- Inadequate knowledge - < 33%

**Data collection procedure**

The formal permission was obtained for the approval of the study from concerning authorities. The data collection done within a given period of 1 week.

The investigator selected the subject and established the rapport by explaining purpose of the study, the co-operation required and the anonymity assured before obtaining verbal consent. Initially the demographic tool, self structured questionnaire, administered to the sample to know existing level of knowledge regarding lifestyle modification. After 7 days post test was administered to assess the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetes patient.

**Statistical Design:** Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (chi square and paired t test) was applied to test the study hypothesis

**Findings:**

**Section 1:** Analysis of pre-test & post test knowledge score of patient regarding lifestyle modification.

**Table 1: Distributions of pre test knowledge score of diabetes patient regarding lifestyle modification.**

Sr. No.	Knowledge Score	Frequency	Percentage
1	Inadequate	66	94.3%
2	Moderate	4	5.7%
3	Adequate	00	00%

**Table 2: Distributions of post test knowledge score of diabetes patient regarding lifestyle modification.**

Sr. No.	Knowledge score	Frequency	Percentage
1	Inadequate	00	00%
2	Moderate	29	41.4%
3	Adequate	41	58.6%

**Section 2: Effectiveness of health teaching programme**

**Table 3: Comparison of pre test and post test knowledge score of diabetes patient**

Variable	Pre test	Mean	Mean Difference	Std. Deviation	t- Value
Knowledge Regarding Lifestyle Modification	Pre-test	7.7571	7.8858	1.7972	29.588
	Post-Test	15.6329		1.4217	



**Section 3: Association between pre test knowledge score with socio-demographic variables.****Table 4: Association between pre test knowledge score and socio-demographic variables**

Sr.No.	Variable	0-10	11-20	$\chi^2$	D.F.	Level of significance
1	<b>Age in Years</b>			8.07	3	8.07>7.815 S
	41-45	11	0			
	46-50	14	1			
	51-55	15	1			
	>56	26	2			
2	<b>Educational Status</b>			13.125	3	13.125>7.815 S
	Illiterate	7	3			
	Primary	7	0			
	Secondary	27	1			
	Graduate	25	0			
3	<b>Gender</b>			5.52	1	5.52>3.84 S
	Male	37	3			
	Female	29	1			
4	<b>Occupation</b>			8.71	3	8.71>7.815 S
	Farmer	10	1			
	Business	29	2			
	Govt. employ	10	0			
	Private employ	17	1			
5	<b>Source of Information</b>			4.318	3	1.75<7.815 NS
	Society and friends	14	0			
	Mass media	4	0			
	Family member	39	2			
	Any other	9	2			

**Discussion**

The finding of the study based on its objectives

**Assess the pre existing level of knowledge regarding lifestyle modification among diabetes mellitus patient.**

Out of 70 diabetes patients (94.3%) had inadequate knowledge, (5.7%) had moderate knowledge and none of them were had adequate knowledge. In the pre-test level of knowledge. Thus the investigator assumes there is the need of imparting knowledge.

**Administer the nursing directives on knowledge regarding lifestyle modification among diabetes mellitus patient.**

Out of 70 diabetic patient in post-test level of knowledge were (58.6%) having adequate knowledge and (41.4%) having moderate level of knowledge. So

investigator assumes that the levels of knowledge were increased in the post test.

**Evaluate the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetes mellitus patient.**

Out of 70 diabetic patients had improved the level of knowledge regarding lifestyle modification after administering the nursing directives. The results were shown in post test. The (58.6%) having adequate knowledge and (41.4%) having score the moderate level of knowledge. So researcher assumes that the level of knowledge of effectiveness of nursing directives regarding lifestyle modification had increased.

**Find out association between pretest knowledge and selected demographic variable of patient diagnosed with diabetes mellitus.**

From the entire socio-demographic variable only four variables that is Sex, education, occupation and age were associated with pre test knowledge score and only source of information was not significant with pre test knowledge score.

**There will be significant difference between pre test and post test knowledge score of Patients regarding lifestyle modification after administering the nursing directives.**

The pre test means score of knowledge of diabetes patients is 7.75 and post test mean score of knowledge is 15.63. The mean difference of pre and post level of knowledge is 7.88 which show the effectiveness of nursing directives. The paired t calculated value of knowledge is 29.588 at 0.05 level of significance which is more than table value of "t" Hence, hypothesis H<sub>1</sub> is accepted.

**There will a significant association between pre-test knowledge and selected demographic variables.**

Socio-demographic variable are age of diabetes patients with  $\chi^2$  value 8.07, gender of diabetes patients with  $\chi^2$  value 5.52, occupation 8.71, education 13.125 so, for this variable hypothesis is accepted. The non significant demographic variable is Source of information. So, for this variable research hypothesis H<sub>2</sub> partially accepted.

### Conclusion

One of the factors increasing diabetes patients was lack of lifestyle modification among them so it is important that health care provider should provide the knowledge regarding lifestyle modification to the diabetic patient.

This study was undertaken to assess the effectiveness of nursing directives on knowledge regarding lifestyle modification among diabetic patient. The study involves one group pre- test post-test pre experimental design with non probability convenient sampling technique, 70 samples of diabetic patients were selected on the basis of inclusion and exclusion criteria. A conceptual framework used for this study was modified "Ludwing Von Bertalanffy general system model." Analysis of obtained data was planned based on the objectives and hypothesis of the study, both descriptive and inferential statistics were used for the analysis of the data. The data is interpreted in the forms of tables and graphs.

**Recommendations:** Based on the findings of the present study recommendation offered for the future study:

- The similar study can be conducted in different settings.
- The similar study can be conducted on staff nurses.
- The similar study can be conducted on mothers to assess the knowledge & attitude regarding lifestyle modification.
- The similar study can be conducted in large sample.

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**Conflicts of Interest Disclosure:** The authors declare that there is no conflict of interest statement

**Source of Funding:** Source of Funding was managed by researcher own funding.

**Ethical Clearance:** Ethical clearance for this dissertation was obtained from the ethical committee SVIEC of Sumandeep Vidyapeeth University.

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# Assessment of Mycobacterium Tuberculosis Sensitive Antibiotics from the Isolation of LJ Media

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## Abstract

Pulmonary tuberculosis (PTB) is the major public health air borne disease of India. Socio-economic burden of this disease is also high due to its morbidity and mortality. Patients become resistant to antitubercular antibiotics due to not selecting proper antibiotics and non continuity of antibiotics. Our study tried to find out the most sensitive antibiotics for treatment as antituberculin antibiotic. AFB microscopy positive (ZN stain microscopy positive) sputum samples were collected and tested for culture and sensitivity tests. The results showed that most effective antibiotic is Rifampicin followed by Isoniazid. Both male and female may equally affect by this disease but higher age groups are in more at risk in comparisons with children.

**Keywords:** PTB, AFB, ZN stain, Culture, sensitivity.

## Introduction

Tuberculosis is most common worldwide public health burdening air borne disease. Every year 9.6 million new TB (tuberculosis) infection or cases are reported and 1.5 million deaths are reported worldwide as per the article of Raviglione M. and Sulis G<sup>1</sup>. World Health Organization (WHO) declared TB as “Global Emergency” this shows that how WHO is concern about TB,<sup>2</sup>. India also is a high risk country for TB which contributing 32% of global TB mortality,<sup>3</sup>. This indicates how India is important for study of TB and severity of TB in India. In 2015 India reported 217 lakh new TB cases and 36 lakh deaths due to TB. In 2017, India reported highest burden of TB as well as multi drug resistant TB<sup>4</sup>. Jammu & Kashmir also burdening the TB to India like other states<sup>5</sup>. The National TB control programme i.e RNTCP (Revised National Tuberculosis Control Programme) facing problems due to its hilly-

plane routes or communications ways. Government of India aims to eliminate the TB or target <1 case of TB out of 10 lakh populations from India<sup>6</sup>. This is possible only after proper research, planning and implementation. Our study tried to find out the proper antibiotic or to select most suitable antibiotic for the treatment of the patients.

*Mycobacterium tuberculosis* is the TB causing bacteria. The Cell wall of this bacterium contains mycolic acid which makes it different from other bacteria. The bacterium was discovered by Robert Koch in 1882. The most common symptoms of pulmonary TB are cough (two weeks, more or any duration), fever (more than 2 weeks), weight loss (more than 1.5 kg in a month), and night sweating etc<sup>7</sup>. As this disease is an airborne disease it can spread easily to the immuno-compromised peoples.

## Methodology

Our study included the districts Anantnag, Budgam, Baramulla, Pulwama, Kupwara, Kargil, Leh and Srinagar of Jammu & Kashmir of India. Morning sputum samples were collected from the suspected patients who were clinically diagnosed as TB by treating physicians. Smears were prepared and stained with ZN (Ziehl-

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Neelsen) stain after found positive under microscopic oil immersion field cases were included for our study for culture & sensitivity tests. Fresh sputum samples were collected and inoculated in LJ (Lowenstein-Jensen) medium and incubated at 37°C temperature. The culture growths were read after 5-7 days of inoculation (image 1) and thereafter weekly up to 8 weeks. Further the growths were processed for solid antibiotics sensitivity tests or drug sensitivity tests (image 2). The antibiotics included for this study were first line antibiotics i.e. SHRE or streptomycin, isoniazid, rifampicin and ethambutol. The tests were performed at IRL (Intermediate reference laboratory) Jammu.

Total 126 (one hundred twenty six) numbers of positive AFB (Acid fast bacilli) patients were enrolled for our study bacterial growths were isolated from LJ media and confirmed by different biochemical tests. No extra-pulmonary cases were included for the study. Both sex and all age groups were included in this study. After successfully completion of solid DST the data were analyzed.

## Results

68 (sixty eight) numbers of male and 58 (fifty eight) numbers of female positive patients were found during our study. The male positivity rate is 53.96% (68/126)

and female positivity rate is 46.03% (58/126). Only 1 (one) female reported within the age range 0-10 years and no male case was found within this range. 4 (four) male and 10 (ten) female were reported within the range of 11-20 years. 12 (twelve) male and 13 (thirteen) female of 21-30 years, 12 (twelve) male 5 (five) female of 31-40 Years, 7 (seven) male 7 (seven) female of 41-50 years and 33 (thirty three) male 22 (twenty two) female of 51-above years cases reported (Figure 1).

The culture & sensitivity results showed that streptomycin was sensitive for 57 (fifty seven) male and resistant for 11 (eleven) male whereas streptomycin was sensitive for 50 (fifty) female and resistant for 8 (eight) female (Figure 2). The analysis of isoniazid showed it was sensitive for 66 (sixty six) male and 56 (fifty six) female again isoniazid was resistant for 2 (two) male and 2 (two) female (Figure 3). Rifampicin was not resistant for any patients i.e. it was sensitive for 68 (sixty eight) male and 58 (fifty eight) female (Figure 4). The antibiotic ethambutol was found sensitive for 66 (sixty six) male and 55 (Fifty five) female which was resistant for 2 (two) male and 3 (three) female (Figure 5). 15.38% (4/26) patients were found with resistance to more than one antibiotic. Out of which 11.53% (3/26) were resistance to streptomycin and isoniazid and 3.84% (1/26) was resistance to streptomycin and ethambutol.



**Image 1: Mycobacterium Tuberculosis growth on LJ media**



Image 2: Solid drug sensitivity test (DST) for Mycobacterium Tuberculosis

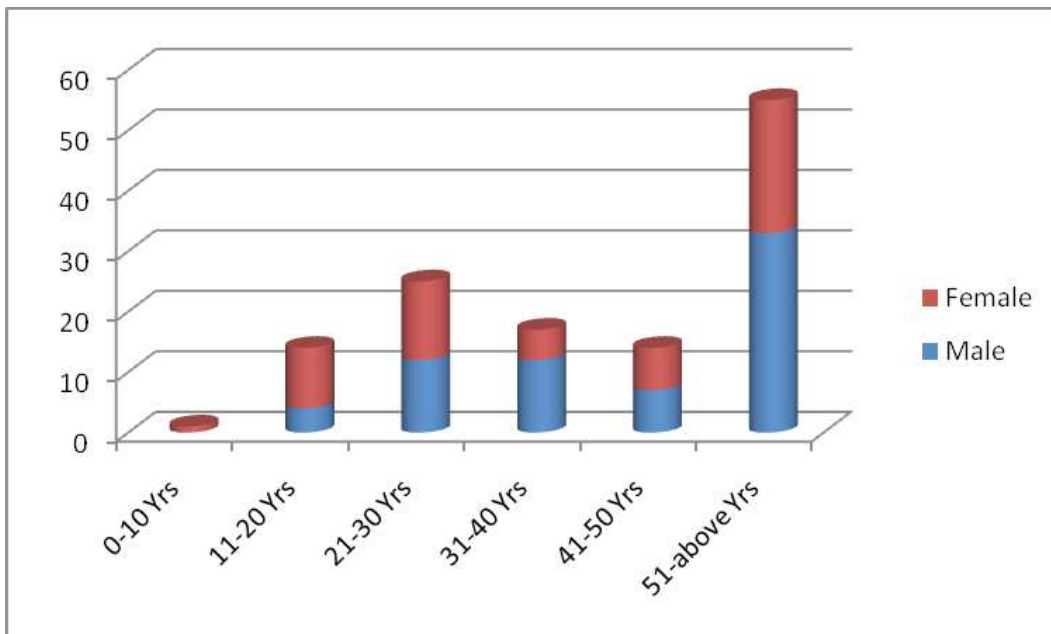


Figure 1: Age and sex wise distribution of patients

### Streptomycin

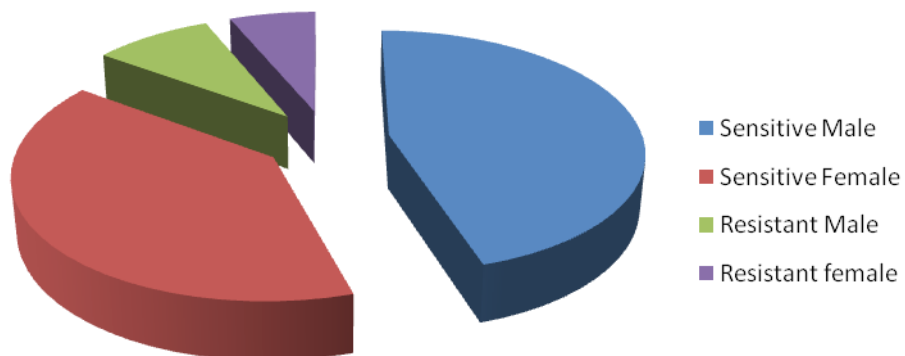


Figure 2: Sex wise streptomycin DST results

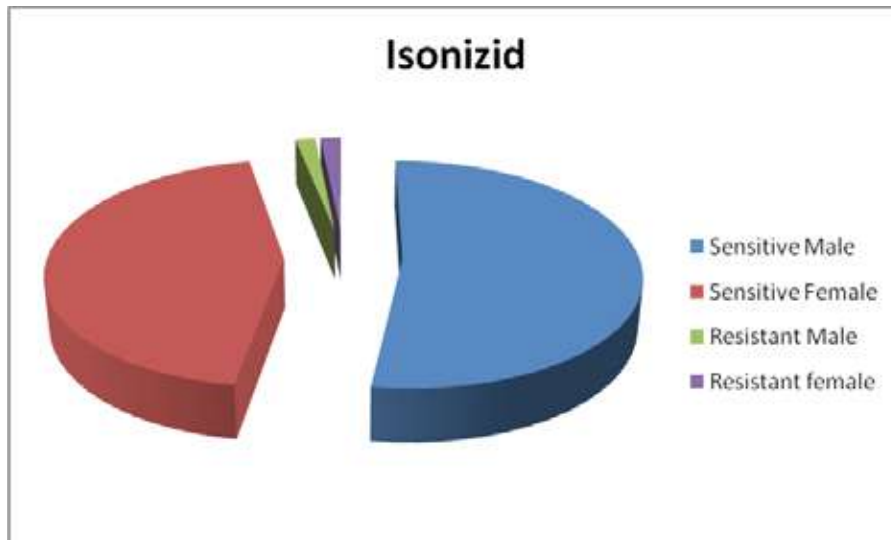


Figure 3: Sex wise isonizid DST results

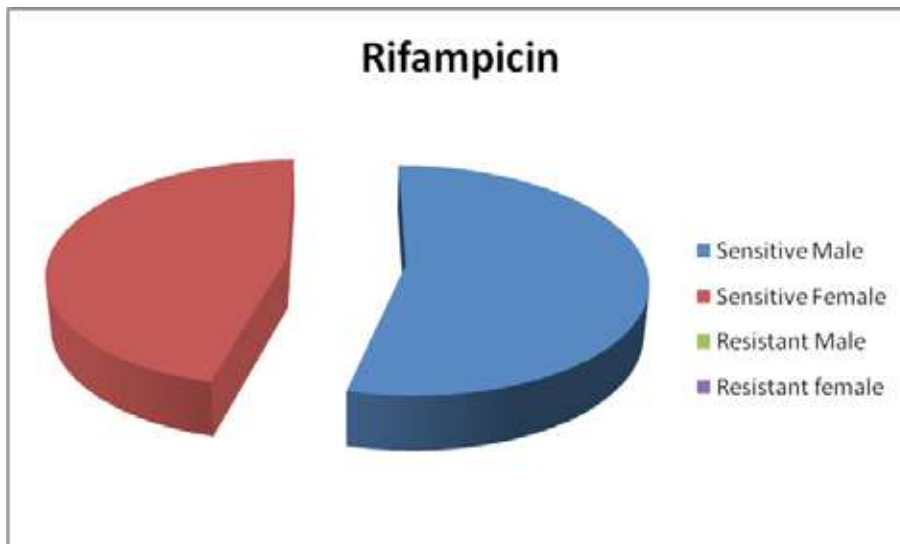


Figure 4: Sex wise rifampicin DST results

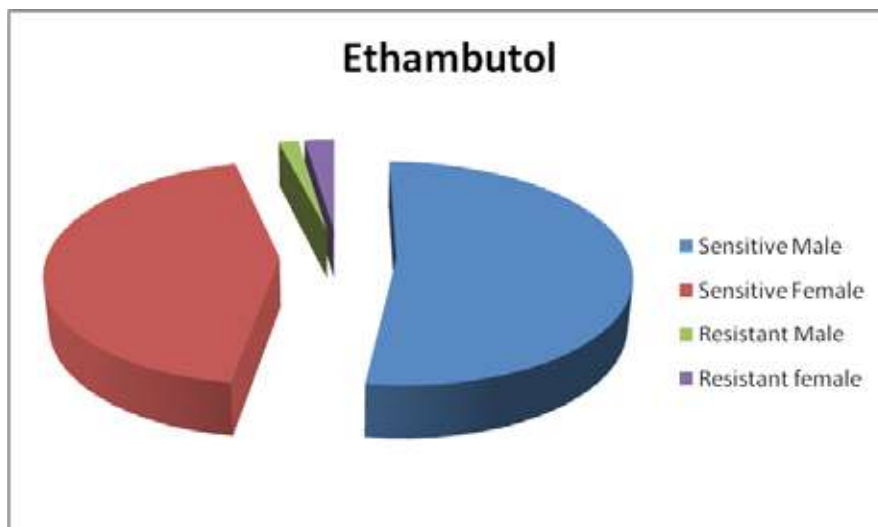


Figure 5: Sex wise ethambutol DST results

## Discussion

There are various studies which reported the prevalence of pulmonary TB and its severity in Jammu & Kashmir<sup>8,9</sup>. Our study also reported 126 (One hundred twenty six) numbers of positive cases in a quarter. Which itself indicates the severity of pulmonary TB in study areas. Male patients were higher than female patients and cough was common in all patients which were similar with Datta BS et al., (2010)<sup>10</sup>. The test results showed that higher age groups are high in risk in comparisons' with children. Chakraborty A. et al., in 2014 also found maximum cases age range groups were within 30-50 years. They were also enrolled maximum males patients in comparison with females<sup>11</sup>.

In a study by Mathuria JP et al., in 2013 found rifampicin as resistant 16.2% from Varanasi, Uttar Pradesh, 7.1% from Sawai Madhopur, Rajasthan and 25% from Buxar, Bihar which was completely opposite with our study as no resistance of rifampicin reported by our studies<sup>12</sup>. But if we compare their data with their other first line antibiotics results showed that rifampicin resistance is lower. Another studies by Dam T et al., (2005) found 27.03% rifampicin resistant and 14% multi drug resistant i.e. resistant to rifampicin and isoniazid<sup>13</sup>. The comparative study with Sinha P et al., (2017) also showed dissimilarities as they got only 28.9% isolates sensitive to all first line antibiotics but we got 79.36% (100/126) isolates sensitive to all first line antibiotics<sup>14</sup>. In our study 73.07% (19/26) patients were found resistant to streptomycin followed by ethambutol 19.23% (5/26) and isoniazid 15.38% (4/26) another study by Menon S et al., (2012) found streptomycin resistant to 70%, followed by isoniazid 53.2% and ethambutol 21.7%<sup>15</sup>. Kalo D., et al., in 2017 found first line mono drug resistant patterns as follows Isoniazid 38.9%, streptomycin 28.3%, ethambutol 29.5% and rifampicin 16.9% and in our study it was streptomycin 57.69% (15/26), ethambutol 15.38% (4/26) and isoniazid 3.84% (1/26)<sup>16</sup>.

In our study all the samples were tested before antibiotics but as streptomycin is commonly advised by physicians in other diseases too that may be one of the cause for found streptomycin resistant in 19 (nineteen) cases out of 26 (twenty six) resistant patients. This is also clear that the sensitivity/resistant pattern may varies patient wise, places wise etc. So, it will be good for culture & sensitivity tests for each and every case.

## Conclusion

Every year we are celebrating world TB day on 24<sup>th</sup> March to aware the people about TB to control, to minimize the risk, to inform the people about the facilities available in health facilities etc<sup>17</sup>. But still the cases are arising. Government of India or RNTCP, India is planning to eliminate TB by 2025<sup>18</sup>. To control the disease each and every samples must process for culture & sensitivity to find out the proper antibiotics before treatment, DST laboratory must be introduce at least one in every districts, all patients must complete the full drug course, proper nutrition, awareness etc are also equally important. We all health workers, NGOs, media, food & nutrition department, environmental department etc. all must cooperate to Health department to full fill the TB elimination target.

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from Institutional ethical committee, IRL, Jammu.

**Source of Funding:** Self.

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# Level of Stress and Coping Strategies among Institutionalised and Non-Institutionalised Elderly

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## Abstract

**Objective:** The objective of the study is to assess and compare the level of stress and coping strategies experienced by the institutionalized and non-institutionalized elderly.

**Methods:** A descriptive comparative research design and convenient sampling was used in this study, with this technique the researcher selected 70 sample from community (Nayarambalampanchayath) and 70 samples from two old age homes. Demographic Proforma, Sheldon Cohen Perceived Stress Scale and the Deakin Coping Scale were used to assess and compare the level of stress and level of coping.

**Result:** Among institutionalized elderly people 18.6% are having no stress, 32.9% are having mild stress. 37.1% are having moderate stress and 11.4% are having severe stress. Among non institutionalized elderly 37.1% are having no stress, 55.7% are having mild stress, 7.1% are having moderate stress and none of them having severe stress. While considering level of coping among institutionalized elderly people 21.4% members coping strategies are not effective, 50% are having effective coping strategies and 28.6 are having most effective coping strategies. Among institutionalized elderly 18.6 are having not effective coping strategies, 62.9% are having effective coping strategies and 18.6% having most effective coping strategies. There is a significant correlation between stress and coping among institutionalized elderly.

**Conclusion:** The feeling of loneliness along with the natural age related decline in physical and psychological functioning makes elderly prone to psychological disturbance, so institutionalized elderly feels more moderate and severe stress than non institutionalized elderly.

**Keywords:** Assess, stress, coping strategies, institutionalized elderly, non institutionalized elderly.

## Introduction

Old age is the closing period in the life span. It is a period when people “move away” from previous, more desirable period of ‘usefulness’. Age sixty is usually considered the dividing line between middle and old age.<sup>1</sup>

The status of the elderly had changed in the present family system. Earlier aged members were having

supreme power and their experience and wisdom were utilized to solve important family issues. However, younger members of the family are the product of changed social system. This conflict in the value pattern makes elderly people, particularly those who are retired from service and other occupations, mentally isolated from the family. The feeling of loneliness along with the natural age related decline in physical and psychological functioning makes them prone to psychological disturbance, In some cases elderly members of relatively rich family or aged persons who have nobody to look after takes shelter in old age homes.<sup>2</sup>

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While we hope that the Indian family continues to be stronger than in most countries and provides caring

environment for the elderly, it can't be the basis of our ability to support the elderly. India need to take a serious look at the need of the elderly in a more pragmatic and holistic manner.<sup>3</sup>

Today the old age homes are indispensable as they are needed Institutionalization of elderly people continues to be a national problem. On the one hand because of the low number of institutions which are not capable to take over the increased number of elderly, and on the other hand due to lack of needed funds for adequate endowment of this institution. Many of the elderly people's pensions are ridiculously small and not meeting the possibilities to satisfy the basic needs, without counting the fulfillment of some wishes or desires of the elderly. Regardless of location or cost, many older adults cannot access services due to discriminatory attitudes and practices based on age, gender, race, ethnicity, language, sexual orientation, gender identity and expression, physical, psychological, or cognitive disability, or other diversity factors-or forego using available services that are not culturally appropriate or physically accessible.<sup>4</sup>

Ageing is a progressive generalized impairment of function resulting in the loss of adaptive response to stress and growing risk of age associated disease.<sup>5</sup>

The purpose of the study was to compare the level of stress and coping strategies among institutionalized and non institutionalized elderly and also the association between selected demographic variables and stress and coping strategies.

### Methodology

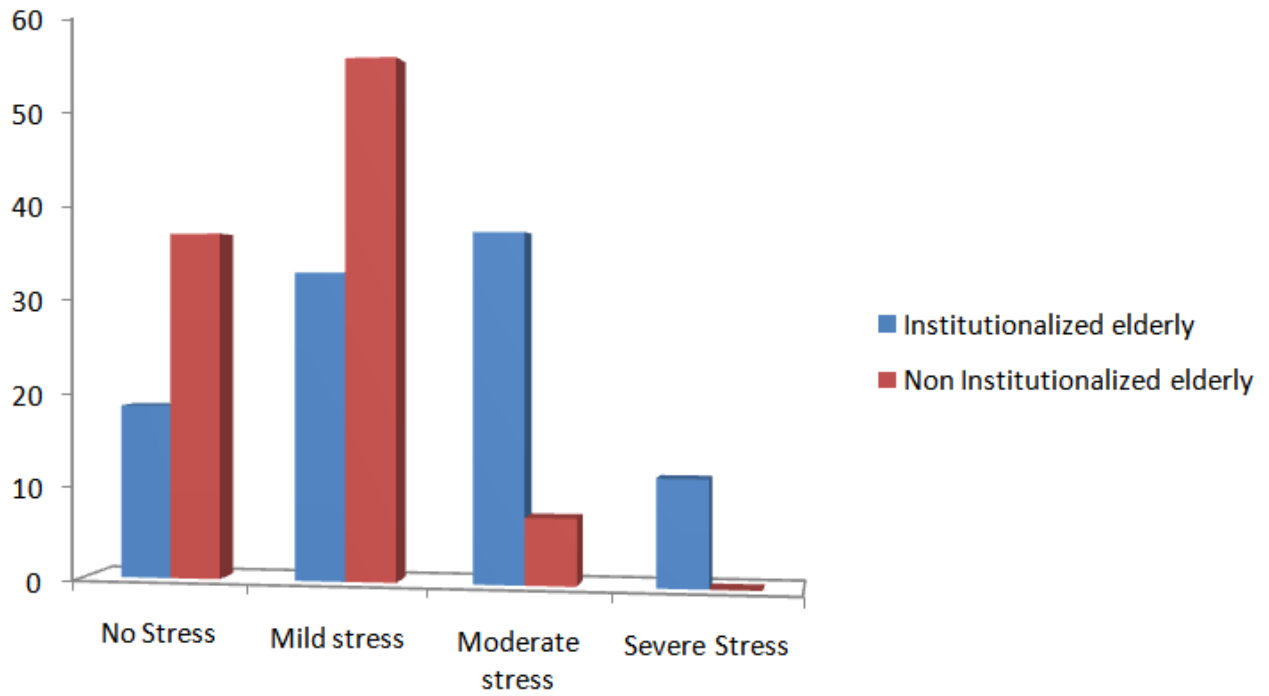
A Comparative study is conducted in Ernakulum district owing to the highest population Elderly, 70 elderly people residing in 3 old age homes in Ernakulum district and a group of 70 elderly living with their families from different areas in Ernakulum namely Nayarambalam were randomly selected for the study. To study the background details of the selected subject the investigator formulated a questionnaire .A perceived stress scale was used to study the pattern of stress experienced by them. It consisted of 10 items. All questions were given with 5 options and each option was ranked according to the scores they were assigned. A Deakin coping scale was used to assess the level of coping among two groups. It consisted of 19 items with 5 options and each options were ranked according to the scores they were assigned. The investigator sought

permission from the Director of the selected old age homes for conducting the study among the inmates in the selected old age homes. After prior appointment the investigator met the inmates of old age home and interviewed them. They were helped to mark their responses appropriately. The investigator met the non-institutionalized elderly in Nayarambalampanchayath after getting permission from Panchayath Predient. The purpose of the study was explained to them and they were also given detailed instructions for filling up the questionnaire. The data obtained and consolidated and scored, analysed.

### Results

#### Description of Sample According to Demographic

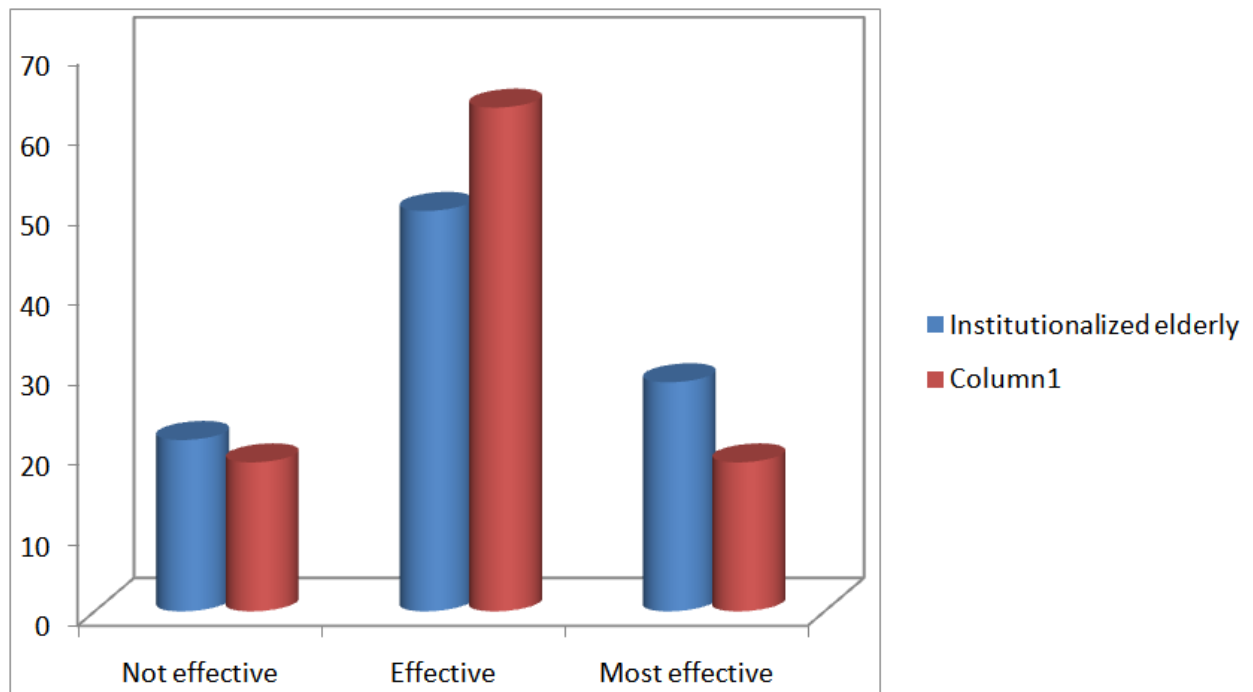
**Data:** In this study most of the institutionalized and Non institutionalized elderly were in age group of 60-69 years (45.7% and 61.4% respectively), and some of them were in 70-79 years age group(57.1% and 17.1% respectively). While considering their gender 72.9% of institutionalized elderly were females and 58.6 % of non institutionalized elderly were females. 58% of institutionalized elderly and 74% of non institutionalized elderly were having only privary level education. Most of the institutionalized and non institutionalized elderly belongs to not having any job category(57.1% and 42.9% respectively) but in non institutionalized elderly45.7% were having business now also. While considering marrietal status 62.9% of institutionalized elderly and 98.6% non institutionalized elderly were married. Sourse of income was the main problem for most of the elderly,78.6% of institutionalized elderly depends others for income were in non institutionalized elderly only 10% were depending on others for their income and 61.4% having pension. Among Institutionalized elderly 72.9% of their living period is below 5 years and while considering their reason for living in institution,67.1% of them came because there is no one to look after them and 15.7% persons came by their own decision. 21.4% of Institutionalized and 17.1% of non institutionalized elderly having both diabetes and hypertension. 52.9% of institutionalized and 58.6% of non institutionalized elderly are suffering from other diseases especially heart diseases,vision problems,respiratory diseases .95.7% of institutionalized elderly having stress where as 34.3% of non institutionalized elderly having stress. Most of the institutionalized elderly depends prayer to cope with stress (60%), were as 74.3% non institutionalized elderly were coping with stress by talking with others.



**Figure I. Level of stress among institutionalized and non-institutionalized**

**Elderly:** Figure 1 shows that among institutionalized elderly people 18.6% are having no stress. 32.9% are having mild stress. 37.1% are having moderate stress and 11.4% are having severe stress and

among non institutionalized elderly 37.1% are having no stress, 55.7% are having mild stress, 7.1% are having moderate stress and none of them having severe stress.



**Figure II. Level of Coping strategies among institutionalized and non-institutionalized Elderly**

Figure 2 shows that while considering level of coping strategies among institutionalized elderly people 21.4% members coping strategies were not effective,50% are having effective coping strategies and 28.6 are having most effective coping strategies. Among institutionalized elderly 18.6 are having not effective coping strategies,62.9% are having effective coping strategies and 18.6% having most effective coping strategies

**Table 1. Correlation between stress and coping among institutionalized elderly**

Variables	R Value	P Value
Stress and Coping	.310	.009

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Above table shows that there is a significant correlation between stress and coping among institutionalized elderly.

**Table 2. Correlation between stress and coping among Non institutionalized elderly**

Variables	R Value	P Value
Stress and coping	.281	.018

\*. Correlation is significant at the 0.05 level (2-tailed).

Above table shows that there is a significant correlation between stress and coping among non institutionalized elderly

**Table 4: Coping strategy of institutionalized and non institutionalized elderly**

Variables	T Value	df	P Value
Coping	.513	138	.609

There is no significant difference in level of coping between institutionalized and non institutionalized elderly.

**Table 5: Association between Gender,education and marrietal status with level of stress among institutionalized and non institutionalized elderly**

Variables	Categories	Category of Stress				Chi Square Test	df	P Value
		No Stress	Mild Stress	Moderate Stress	Severe Stress			
Gender	Female	22	39	24	7	5.286	3	.152
	Male	17	23	7	1			
Education	Primary	31	45	26	8	5.386	9	.799
	Secondary	6	14	5	0			
	Predegree	11	1	0	0			
	Degree	1	2	0	0			
Occupation	Coolie Worker	18	25	10	3	6.346 <sup>a</sup>	9	.705
	Government Job	2	5	0	0			
	Business	2	2	1	0			
	No Job	17	30	20	5			
Marriatal Status	Married	31	51	27	4	11.886	9	.220
	Un Married	6	11	3	4			
	Widow	0	0	2	0			

Above table shows that there is no significant association between selected demographic variables like gender,education, occupation and marital status

with level of stress among institutionalized and non institutionalized elderly.

**Table 6: Association between Gender, education and marital status with level of coping among institutionalized and non institutionalized elderly**

Variables	Categories	Level of Coping			Chi Square Test	df	P value
		Not Effective	Effective	Most Effective			
Gender	Female	20	52	20	.788	2	.674
	Male	8	27	13			
Education	Primary	26	62	22	8.187	6	.225
	Secondary	2	15	8			
	Predegree	0	1	1			
	Degree	0	1	2			
Occupation	Coolie Worker	13	30	13	13.761 <sup>a</sup>	6	.032
	Government Job	0	3	4			
	Business	2	0	3			
	No Job	13	46	13			
Marrietal status	Married	21	66	26	6.096	6	.413
	Un Married	5	12	7			
	Widow	2	1	0			

Table 6 shows that there is a significant association between occupation and level of coping among institutionalized and non institutionalized elderly and there is not having any significant association with other demographic variables like Gender, education and marital status

**Discussion**

Older adults are the most rapidly growing segment of the population, in India life expectancy at birth are increased by about 20 years in the past 5 decades. The 1<sup>st</sup> of October every year is celebrated as “World elder’s day” globally.<sup>6</sup>

Aging is a universal process. In the words of Seneca “old age is an incurable disease”. But more recently Sir James sterling Ross Commented” you do not heal old age, you protect it, you promote it and you extend it. These are in fact the principles of Preventive Medicine. A man’s life is normally divided into five main stages namely infancy, childhood, adulthood and old age. In each of these stages an individual has to find himself in different situations and face different problems. The old age is not without problems. In old age physical strength deteriorates, mental stability diminishes; money power becomes bleak coupled with negligence from the younger generation.<sup>7</sup>

A descriptive research was conducted in SRM College Of Nursing, Kattankulathur, Tamil Nadu

with Purposive sampling technique . A sample 100 was selected. The data were analyzed by the means of descriptive and inferential statistics. The study results for the psychological problems of elderly persons reveals that majority 60% of them were had moderate level of psychological problems and 43% of the elderly persons were had at fair level of coping strategies. The present study concluded that there was negative correlation found between Psychological problems and Coping strategies. It means if their coping increases psychological problems decreases .<sup>8</sup>

In the present study over all data shows that among institutionalized elderly people 18.6% are having no stress.32.9% are having mild stress.37.1% are having 11.4%are having severe stress and among non institutionalized elderly 37.1% are having no stress,55.7% are having mild stress,7.1% are having moderate stress and none of them having severe stress while considering level of coping strategies among institutionalized elderly people 21.4% members coping strategies were not effective,50% are having effective coping strategies and 28.6 are having most effective coping strategies. Among institutionalized elderly 18.6 are having not effective coping strategies,62.9% are having effective coping strategies and 18.6% having most effective coping strategies. There is a significant correlation between stress and coping among non institutionalized and non institutionalized elderly (r valu is .310 and p value is .009 and r value is .513 and p value

is .609 respectively) and is a significant association between occupation and level of coping among institutionalized and non institutionalized elderly .

### Conclusion

Aging is a universal phenomena but it is not experienced uniformly by the elderly. The common changes of old age are physical and psychological which bring disabilities. They face number of problems such as dependency, ill health, absence of social security, loss of social role and recognition and non availability of opportunities for creative use of leisure. Falls and consequent injuries in older people are a significant public health problem among older adults in Kerala<sup>9</sup>. With the emergence of nuclear family, urbanization, influence of western culture and changes of lifestyle there is no space for elders in the family and may go for institutionalization. Institutionalization is emerged to improve the caring of aged and lack of personales to care for them. Lack of proper facilities and funds made the institutionalization stressful. Institutionalized are living in a disciplined manner which lacks their freedom and privacy, which also contribute to stress. In the case of non institutionalized elderly the presence of family members helped decrease the effects of stressful situations by building up their strengths and comforting them in times of need. Communication with family members also helps in reducing stress.

### Acknowledgement

**Conflicts of Interest:** Nil

**Ethical Clearance:** Got approval to conduct this study from ethical committee of amrita institute of medical sciences and institutional scientific research committee. Patient consents had taken from all the patients.

**Source of Income:** Self fund

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# Quality of Sleep among Diabetes and Non-Diabetes—Pilot Study

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## Abstract

Almost everyone has trouble sleeping once in a while, but if occasional episodes of sleep escalate into an unhealthy night time routine, and it will hamper the productivity and sap the patients quality of life<sup>1</sup>.

**Objective:** Of this pilot study was to compare the quality of sleep among patients with and without diabetes.

**Methodology:** Quantitative approach with a descriptive design was used. A non-probability convenience sampling technique was used to select samples in this study. A semi-structured questionnaire prepared by the investigator was used to collect the socio-demographic and clinical data from the subjects. A standardized Pittsburgh Sleep Quality Index tool was used to compare the sleep quality among 37 diabetic and 37 non-diabetic subjects.

**Results:** The study findings shows that in both diabetic (DM) and non-diabetic (NDM) subjects majority of the subjects 75.7% and 43.2% respectively were of the age group of 56-65 years. In both the groups majority were male (DM-24 and NDM – 27). The results also showed that among the groups most of the subjects were had high school education, were employed, and were married and had a monthly income >Rs.15,000. Among diabetic subjects 22(59.4%) were hypertensive whereas among non-diabetic subjects 9(51.35%) were hypertensive. The study findings revealed that, majority of the subjects with diabetes had poor sleep quality 78.4% (29), whereas among non-diabetic subjects only 51.4% (19) subjects reported poor sleep quality and the quality of sleep among non-diabetic subjects were better than diabetic subjects at (p=0.014).

**Conclusion:** As a healthcare practitioner, the health care providers should focus their attention to the quality of sleep of their patients and should take initiative to make the people to aware about the importance of sleep in their day to day life to live healthy.

**Keywords:** *Diabetes Mellitus, Quality of Sleep, Non-diabetes.*

## Introduction

It is a long time Diabetes was discovered but no one really knows about its exact history. This silent epidemiology is still a health concern with an increasing prevalence. According to international Diabetes federation, in 2025 the number of patients with type 2 diabetes will be 40 million with an increase of 80%. More than 3 million people have diabetes in Iran, which triples every 15 years. Increasing number of diabetes cases is more serious in the Middle East and is due to the economic changes, compliance with western customs and the aging population<sup>2</sup>.

Diabetes can be a debilitating disease associated with reduced quality of life, severe complications, shorter life expectancy, and increased economic burden. Much effort has been devoted to identifying factors associated with the increased risk of developing type 2 diabetes and improved prognosis of people with type 2 diabetes to improve the lives of millions of Americans. Disturbed sleep has recently been proposed as a novel risk factor<sup>3</sup>. A range of sleep disorders are common among people with type 2 DM, including sleep apnoea, insomnia, periodic limb movements, in which sleep apnoea is the most common reported sleep disorder<sup>4</sup>.



There is evidence that approximately one third of people with diabetes suffered from sleep problems whilst it was only 8.2% in control group without DM<sup>5</sup>. In another study more than half of the people with type 2 DM were poor sleepers<sup>6</sup>. One more study also shown that using the Pittsburgh Sleep Quality Index as the validated tool for measuring quality of sleep, lower score of PSQI (52%) were reported by people with type 2 diabetes<sup>7</sup>. Evidences showed that poor sleep quality among people with type 2 DM is associated with longer duration of diabetes, poor glycemic control, normal body mass index and hypertension<sup>4</sup>. Hypertension is extremely common in patients with diabetes<sup>8</sup>. Another study investigated the association of sleep duration daytime nap duration with deaths and major cardiovascular events. And its results shows that estimated total sleep duration of 6-8 hours per day is associated with the lowest risk of death and the major cardiovascular events and both short duration (<6 hours) and long duration (>8 hours) are associated with increased cardiovascular events and death<sup>9</sup>.

Studies also reported that high prevalence of poor sleep quality among people with type 2 DM has a negative impact on glycemic control. A good sleep

quality should be considered as an important component in the prevention and management of type 2 DM<sup>4</sup>. To date, there is a lack of case-control studies investigating quality of sleep among persons with and without type 2 diabetes. We investigated whether differences in sleep quality exist between persons with type 2 diabetes and non-diabetic controls.

### Methodology

A quantitative approach and a comparative descriptive design was used. The data was collected from 74 patients attending OPDs of Amrita Institute of Medical Sciences and Research Centre Kochi by using non-probability convenient sampling technique. The setting was selected because of the easy accessibility of the group, familiarity of the setting. The researcher explained the purpose of the study and obtained an informed consent from each subject. The tool for data collection include; Tool I- Socio-demographic data and clinical data and Tool II- Pittsburgh Sleep Quality Index (PSQI) to assess the quality of sleep among patients with diabetes and without diabetes. Data analysis was performed using descriptive and inferential statistics.

## Results

### Section I: Description of socio-demographic and clinical variables of the subjects

Age:

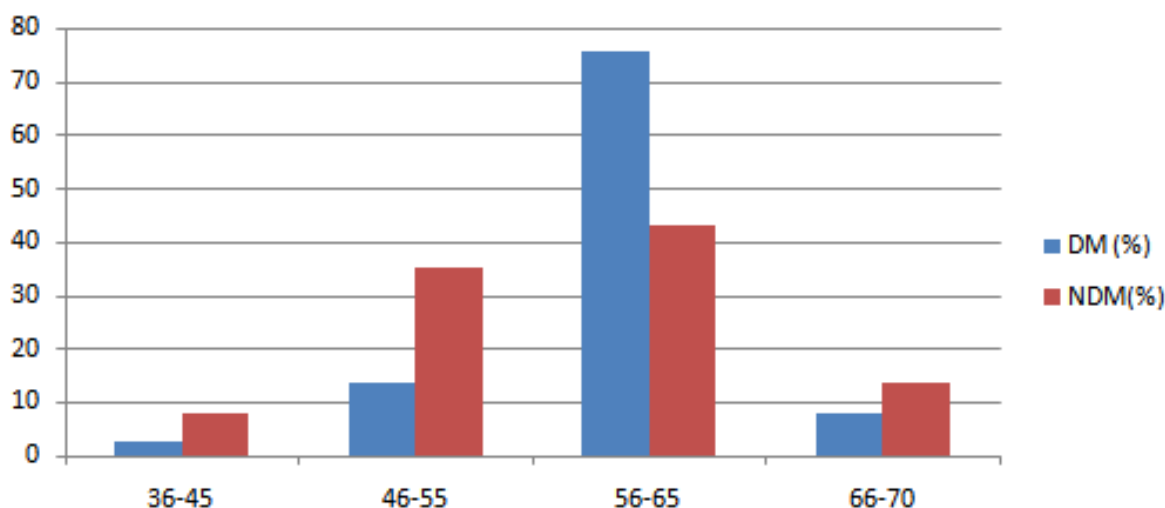
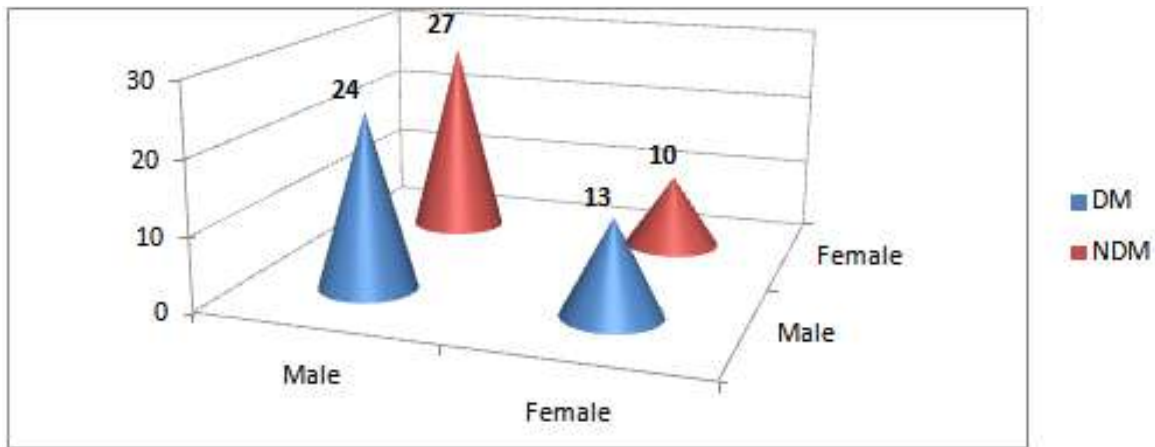


Figure 1: Bar diagram showing distribution of subjects based on age

Figure 1 indicated that in patients with diabetes mellitus majority 28(75.7%) of the subjects w belonged to the age group of 56-65 years and in patients without

diabetes mellitus also most of the subjects 16(43.2%) were of the age of 56-65 years.



**Figure 2: Conical bar diagram showing the gender distribution of subjects with and without diabetes mellitus**

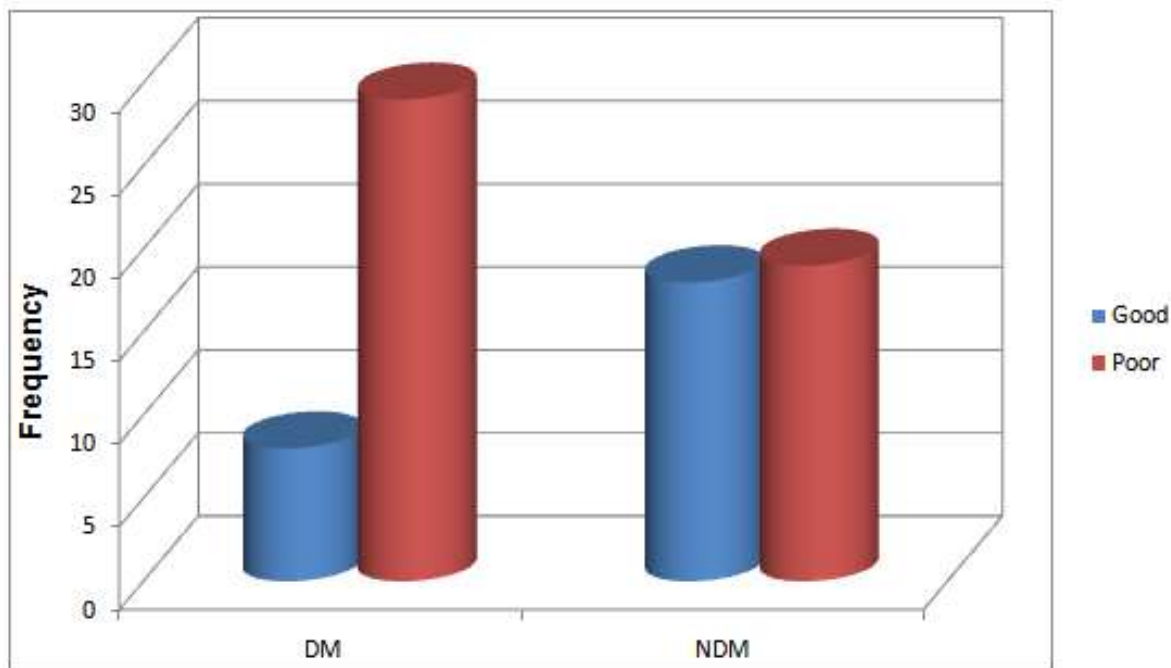
The data presented in figure 2 indicated that, in gender wise distribution in both diabetic and non diabetic subjects the majority were males. (13) 35.1% diabetic subjects and (10) 27% non diabetic subjects were female.

Among the subjects with high school education level 51.35% had DM and 45.94% were NDM, and 27.02% subjects were graduated and 97.29% of the subjects were married in both the groups. However, 72.97% of

the subjects with DM were employed whereas only 54.05% were employed among NDM subjects. Majority of the subjects had a monthly income > Rs 15,000/- in both the groups.

Considering the BMI 20 (54.1%) among diabetic subjects and 15(40.5%) non-diabetic subjects were overweight. And in the case of Neck Circumference 32 (86.5%) diabetic and 29 (78.4%) non-diabetic subjects had a high neck circumference.

**Section II: Comparison of Quality of sleep among patients with and without Diabetes**



**Figure 3: Cylindrical bar diagram showing comparison of sleep quality among subjects with and without diabetes mellitus**

In figure 3 the cylindrical bar diagram depicted that majority of the subjects with diabetes mellitus (29) 78.4% reported poor sleep quality whereas non-diabetes

mellitus subjects only (19) 51.4% showed poor sleep quality.

**Table 1: Comparison of sleep quality among diabetic and non diabetic patient**

Group	Quality of Sleep				Chi-square	df	p
	Good		Poor				
	f	%	f	%			
DM	8	21.6	29	78.4	5.929	1	0.014*
NDM	18	48.6	19	51.4			

\*significant (p<0.05)

The data presented in table1 revealed that among the diabetic patients (29) 78.4% had poor quality of sleep whereas in non-diabetic patients (19) 51.4% had poor quality of sleep. So the results shows that the quality of sleep among non-diabetic subjects were better than diabetic subjects at (p=0.014).

**Section IV: Association of sleep quality with selected clinical variables**

Among 37 diabetic subjects, 21 subjects were sleeping less than 6 hours per night and majority 20 (95.2%) had poor quality of sleep whereas 16 subjects sleeping 6-8 hours per night, only 9 (56.3%) had poor quality of sleep. There is a significant association between sleep duration and quality of sleep at p value 0.012. However in the case of non-diabetic subjects 27 subjects had a normal sleep duration of 6-8 hours per night and only 10 subjects were sleeping less than 6 hours per night. Among that 10 subjects 9 (90%) had poor quality of sleep. There is also a significant association found between sleep duration and sleep quality at p= 0.008. When looking into the sleep duration and sleep quality, the sleep quality of non-diabetic subjects is better than the diabetic subjects.

**Discussion**

The present study investigated the quality of sleep and its compared among patients with diabetes and without diabetes. The results of the present study indicated that (29)78.4% subjects with diabetes have poor quality of sleep and only (19)51.4% non-diabetic subjects have poor quality of sleep and the quality of sleep among non-diabetic subjects were better than diabetic subjects at (p=0.014). Clinical researches has shown that up to one third of patients with DM suffered

from concomitant sleep disorders, as compared with 8.2% of controls without DM. In another study, more than half of the patients with type 2 DM are likely to report being “poor sleepers”, according to a research poll conducted at University of Pittsburgh. The patients with type 2 DM were more likely to have low Pittsburgh Sleep Quality index (PSQI)<sup>10</sup>.

In this study among diabetic subjects those who are sleeping less than 6 hours per night (95.2%) had more poor quality of sleep compared to those who are sleeping 6-8 hours per night (56.3%) where as in non-diabetic subjects majority 27 subjects had a normal sleep duration of 6-8 hours per night and only 10 subjects were sleeping less than 6 hours per night. Among 27 subjects sleeping 6-8 hours per night, 63% reported good quality of sleep and only 37% had poor quality of sleep.Both poor quality of sleep and short sleep duration (#6 h) were associated with increased prevalence of diabetes, with higher rates in relatively healthy Chinese people. Compared with the group with good quality of sleep and 6e8 h sleep duration, diabetes was the most prevalent in individuals with poor sleep quality and #6 h sleep duration<sup>11</sup>. Previous studies found that self-reported short sleep duration is associated with diabetes. Some studies have reported that long sleep duration is also associated with diabetes<sup>12,13,14</sup>.

**Conclusion**

To our knowledge, not much study in this area has been conducted, so the researcher out of interest decided to conduct a descriptive pilot study to assess the difference in quality of sleep among subjects with diabetes and without diabetes. Based on the study findings sleep quality improvement plays an important

role in glycemic control among people with type 2 DM. A good sleep quality should be considered as an important component in the prevention and management of type 2 DM.

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# Competency Based Core Infusion Curriculum in Indian Setup-An Imperative Need

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## Abstract

Intravenous cannulation and intravenous therapy are the most common procedure performed by nurses in Indian Set up. The complications and risks associated with Intravenous are greater extent depend up on the depend up on the Nurses knowledge and skill. Competent nurse who has trained in specialized area of infusion nursing may have impact on patient and institutional related outcomes. This article highlights the need of competency-based core curriculum on infusion nursing in Indian set-up.

**Keywords:** *Competency, Infusion Nursing, Competency-based curriculum, Intravenous therapy.*

## Introduction

The scientific and technological advancement in the last two decades had affected all spheres of the health care industry. The transition of principles related to Intravenous (IV) therapy has been evolving to align with technological development. The establishment of various quality standards demand the nursing care of the highest quality. The majority of peripheral intravenous (PIV) cannulation and maintenance in India are performed by Nurses. However, the educational opportunities to update their knowledge and practice in infusion nursing are limited owing to the lack of core curriculum. Their practice is highly depending up on the basic level education and experience gained in the work environment.

Hence, this article discusses the importance of competency-based core infusion curriculum in India by highlighting risks associated with Intravenous therapy

and strategies adopted to minimize these risks and complications.

**Complications of Peripheral Intravenous catheter (PIVC):** It is estimated that a PIV catheter is placed in 80% of all patients admitted to hospitals.<sup>[1]</sup> The number of complications such as phlebitis, thrombophlebitis, infiltration, extravasation and infections are associated with IV therapy.

Studies have determined that the overall development of infusion-related phlebitis rates ranging from 2.5% to 70%.<sup>[2-5]</sup> In India, the incidence of phlebitis was 56.5% and 29.8% which occurred in the same setting at different time periods.<sup>[6-7]</sup> It is well above the accepted rate of 5% or less. Despite the high rates of phlebitis, the associated bacteremia remain very low at < 0.2%.<sup>[8,9]</sup> and even then also it adds 7.4 days to the average hospital stay.<sup>[10]</sup>

Incidence of infiltration were 7.5% and 13.9% among the Vascular Access Device (VAD) inserted by infusion nurses and generalist nurses respectively<sup>[12]</sup> In India, Incidence of infiltration was found to be 31.5% which was quite higher than any published reports.<sup>[6]</sup> The incidence of infiltration and extravasation is seldom reported in India. Even in the published studies<sup>[6-7]</sup>, no reliable conclusion can be drawn as the criteria and definitions regarding extravasation and infiltration were not listed.

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The wide variation in incidence rates of phlebitis may be attributed to measurement error, observational biases, limited samples, used a wide variety of tools, retrospective and lack of control. The published reports may be underestimating the true incidences of phlebitis, infiltration, and extravasation in clinical set up that pose a greater threat as the magnitude of the problem goes unnoticed.

**Risk factors of Infiltration, Extravasation and Phlebitis:** The causes of Phlebitis, infiltration and extravasation are multi factorial. There are enough evidence available in the literature regarding role of mechanical factors such as small size and poor condition of veins,<sup>[13]</sup> larger catheter size relative to vein size, site of placement, poor securement, catheter fracture,<sup>[14]</sup> and physiologic factors<sup>[13,15]</sup> such as clot formation at the tip of the catheter and edema of the cannulated limb and pharmacologic factors such as pH, osmolarity and irritant drugs.

The role of factors such as age, sex, size & type of catheter, skin preparation and dressing material in the development of phlebitis remain controversial. The published studies reported varying results.

**Knowledge and skills of Nurses - Paramount risk factor:** Knowledge and skill of the nurses can minimize PIVC related complications.<sup>[16]</sup> It is found that nurses' practice was inappropriate during insertion and handling PIVC. It is also observed that PIVC was placed over joints and the presence of soiled securement device. The PIVC and drip-set were not replaced as per recommended guidelines.<sup>[6]</sup>

A questionnaire survey revealed that knowledge of risk factors of infusion phlebitis is incomplete even among experienced nurses in Swedish.<sup>[17]</sup> It has been shown that the skills of the staff, who insert and maintain the PIVC, are of importance for the incidence of phlebitis.<sup>[18]</sup> The studies also reported that the knowledge levels of the nurses were inadequate and was not up to date. The good manual skill had resulted in low risk of phlebitis.<sup>[19]</sup>

**Review of Strategies to reduce the risks associated with PIVC placement and maintenance:**

**Documentation and surveillance:** Proper documentation, surveillance, and expert skills in early identification of these complications would assist in proper reporting of cases and subsequent treatment.

However, only 46.2 % of records contain the data regarding insertion site, hand side and lumen size of PIVC, the extent of PIVC documentation in medical records was very low and suggested that education of nurses on proper PIVC documentation should be given priority.<sup>[19]</sup>

Researchers have found that surveillance may lead to a reduction in phlebitis rates and recommended that VAD sites, particularly those that are used for drugs and/or fluids, be inspected daily and that these inspections be recorded.<sup>[20-22]</sup>

In most of the hospitals, peripheral catheters are inserted by nurses, house staff, or residents with limited experience in IV catheter care. Because the assessment of insertion sites may not be performed regularly and many complications resulting from IV therapy have subtle early clinical manifestations, these problems are often overlooked.<sup>[23]</sup>

**IV Therapy team:** Intravenous therapy team comprises experts in the field of infusion and do a dedicated function of IV cannula placement and maintenance. The beneficial effects of IV teams have been recognized. There was 30% increase in catheter related complications when IV catheters were maintained by staff nurses compared with by IV teams and had resulted in significant reduction in phlebitis rates..<sup>[4,24,25,27,28]</sup>

**Infusion Nurses:** The benefits of infusion Nurse is well documented in reducing catheter related complications lower leakage rate (6.4% Vs 15.3%), a lower infiltration rate, a lower phlebitis rate(7.5% Vs 13.9%)<sup>[11]</sup> and decreased the health care costs.<sup>[29-30]</sup> The definition of an infusion nurse remains unclear in the literature. It is assumed that the nurse who undergone specialized training or education on infusion nursing and whose competencies are validated at a regular interval.

**Education and training:** It is well recognized that education and training had a positive effect on practice and in reducing catheter related risks and complications. The educational program had significantly improve the compliance of nurses to evidence based guidelines and resulted in 57% reduction in catheter related infections which sustained for many months.<sup>[31-33]</sup>

Multiple method of dissemination and periodic surveillance were found to be an appropriate strategy for sustaining the nurses' compliance with guidelines and

improving nurses knowledge<sup>[33,34]</sup>.

Nurses' education and experience significantly predicted overall ratings of peripheral intravenous cannulation. Nurses with graduate diploma qualifications had higher performance ratings. The variation in nurses' education and experience affects their performance of peripheral intravenous cannulation.<sup>[33]</sup>

**Indian Scenario:** In India, Nurses practice related to intravenous therapy largely depend up on personal experience, knowledge gained during basic nursing program, and day to day practice. They are seldom exposed to any form of continuing education program. Intravenous cannulation skills are primarily acquired by an apprentice system and the manner by which intravenous cannulations are subsequently placed, may be governed by the habits formed early in training. Current practices are not supported by evidenced based guidelines. Saini<sup>13</sup> reported that hand washing was not practiced in any case of peripheral intravenous cannula insertion and subsequently while handling the peripheral intravenous cannula. Further, the documentation system remains inadequate which makes it difficult to estimate true incidences of phlebitis, infiltration and extravasation. To date, No specific recognized curriculum or course is available to update the knowledge and practice of the nurses regarding infusion or intravenous curriculum in India.

Although, IV teams and dedicated infusion nurses seem to be effective in reducing IV related complications, implementation of such approach in Indian set up won't be cost-effective and feasible, considering direct and indirect costs associated with training, dedicated manpower etc. The best alternative will be training the existing nurses in the field of infusion nursing.

The Indian Nursing Council(INC) (regulatory body for maintaining uniform standards in India) had yet to develop a curriculum in this thirist area. Infusion Nurses Society of India (INS) had ventured to sensitize the nursing community regarding importance of specialized education in the area of infusion nursing by organizing conferences and workshops. It started yielding promising results. The INS-India also developed online courses on Peripheral Intravenous cannulation. However, the response and acceptance of nursing community in India have yet to be evaluated.

**Need for competency-based curriculum:** The basic curriculum of nursing education in India focus on

behavioral objectives, norm-referenced evaluation, and set us 50% achievement in their overall knowledge and skill set. As a result, the hospital administration spent a considerable cost for training, induction and orientation of newly recruited nurses. Further, It also poses a greater risk to patients and society as a whole as the nurses involving in medication administration and other invasive procedures such as peripheral cannulation and care of PICC with limited knowledge and skill.

It is the general opinion of nurses in India that the gap between education and practice are widening. They often suggest for adopting competency-based models to design the curriculum. The competency-based curriculum demands 80% to 95% achievement in essential areas and it is based on criterion-based performance measures. The major focus of competency-based models is to determine practice competencies of real-life practice and identifies where need exists to correct deficiencies.<sup>[35]</sup>

The importance of competency-based model in nursing education in India is well recognized. However, the implementation has been going at very slow pace. Recently, INC also ventured out with competency-based basic nursing curriculum and placed in public domain for comments. Unfortunately, the draft curriculum also does not have any mention about dedicated infusion nursing module.

The quality control and accreditation standards demand the competency of the employee must be validated at regular interval.

Therefore, the development of a competency-based curriculum is an imperative need in India like the Infusion Nurses Society Competency Validation Program in the United States and worldwide. The program also should facilitate the nurses to undergo training at limited cost and validate their competencies at regular interval.

**Recommendations:** The regulatory bodies and associations should incorporate competency-based curriculum in general basic education as a mandatory module. There must be clear mention regarding scope of practice in the curriculum to facilitate legal protection of extended practice. Competency-based curriculum should be based on well-established frameworks. The Lenburg's Competency Outcomes and Performance Assessment (COPA) model is suggested as it is well accepted by nursing community in designing and implementing Competency-based education. Each

learner competency must be certified with high quality assessment method. The number of testing centers across India to validate and certify competency of the practitioners should be increased and conveniently located. The Indian Association Pediatrics (IAP) model of BLS certification may also be adapted to train general nurses in infusion nursing.

### Conclusion

It is concluded that competency of the practitioner is a paramount factor in enhancing patient safety. Each graduate should demonstrate competency related to infusion practice before awarding degree. Further, the competency should be validated at regular interval to ensure safety of the clients..

Hence, the regulatory bodies like Indian Nursing Council and Universities should focus on developing and implementing Core curriculum on Infusion Practices which is an imperative need.

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# Patanjali Yoga Practice and its Effect on Mental Health and Moral Judgment Amongst Juvenile Delinquents

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## Abstract

Research awareness and involvement in yoga for health-related results are growing worldwide. Patanjali Yoga relieves stress and fatigue which have turned into one of the few major challenges confronting the medical fraternity in present times. Yoga let go the body from any type of muscular or chronic strain and rejuvenates the body from exhaustion, body aches, stress, aids to ease the body and mind, enhances concentration and alertness, and frees the soul. It helps one to create integrity amongst his outward self as well as his innermost self. If the practices are followed meticulously then Patanjali Yoga develops a constructive effect both in the inward and outer selves of an organism. Patanjali's yoga practice aims to bind the individual self with the Ultimate One and one can achieve this union by regulating and discarding the ever- arising 'vrittis' or amendments of the mind. With Patanjali Yoga mind can be balanced through the exact kind of discipline and training. The purpose of this paper was to study the effect of Patanjali Yoga practice on mental health and moral judgment of experimental group of juvenile delinquents. Pre and post experimental design was used in this research work. Patanjali Yoga practices were used as independent variables whereas mental health and moral judgments of delinquents as dependent variables. A sample of 70 delinquents of age group (13-18 years) from Government Observation Home in Agra district was chosen with random selection method. There were two groups –experimental group (n=35) and control group (n=35). Patanjali Yoga practices were imparted to delinquents for 90 days with duration of one hour each day. For measuring the moral judgment of delinquents, moral judgment test by Juri Baruh (2004) and for measuring mental health, mental health battery by A.K. Singh and Alpana SenGupta (2008) were used. Mean, Standard deviation and t-test were carried out for data analysis. The findings suggest that mental health factors like emotional stability, adjustment, autonomy, security-insecurity and self-concept were found to be of average level and intelligence ranged from average to low in experimental and control group delinquents. It was also found that Patanjali Yoga plays a significant role by strengthening emotional stability, adjustment and self-concept in delinquents, however, the Patanjali yoga does not significantly affects mental health factors like autonomy, security-insecurity and intelligence in delinquents. The findings also concluded that Patanjali Yoga does not affect moral judgments of delinquents.

**Keywords:** *Patanjali Yoga, Mental Health, Moral Judgment, Juvenile Delinquents.*

## Introduction

Children are greatest national asset and resource. Children should be allowed and provided opportunity to grow up to become robust citizens, physically fit, mentally alert and morally healthy, endowed with skills and activations needed by the society. In recent years, it has become very clear that juvenile delinquency is the most important aspect of the subject matter of

criminology. The juvenile is a child who is alleged to have committed/violated some law which declares the act or omission on the part of the child as an offence. Delinquency is an act or conduct of a juvenile which is socially undesirable. Juvenile delinquency generally means the failure of children to meet certain obligations expected of them by the society. Research awareness and involvement in yoga for health-related results are

growing worldwide. Patanjali Yoga relieves stress and fatigue which have turned into one of the few major challenges confronting the medical fraternity in present times. Yoga let go the body from any type of muscular or chronic strain and rejuvenates the body from exhaustion, body aches, stress, aids to ease the body and mind, enhances concentration and alertness, and frees the soul. It helps one to create integrity amongst his outward self as well as his innermost self<sup>1</sup>. If the practices are followed meticulously then Patanjali Yoga develops a constructive effect both in the inward and outer selves of an organism. Patanjali's yoga practice aims to bind the individual self with the Ultimate One and one can achieve this union by regulating and discarding the ever-arising 'vrittis' or amendments of the mind. With Patanjali Yoga mind can be balanced through the exact kind of discipline and training. In Patanjali's Yoga Sutra, the eightfold path is called *ashtanga*, which literally means "eight limbs" (*ashta*=eight, *anga*=limb). These eight steps which are Yama (control), Niyama (rules of conduct), Asana (posture), Pranayama (control of breath), Pratyahara (withdrawal of sensory perceptions), Dharana (concentration), Dhyana (uninterrupted meditation), Samadhi (effortless meditation, absorption, equilibrium) basically act as guidelines on how to live a meaningful and purposeful life<sup>2</sup>. They serve as a prescription for moral and ethical conduct and self-discipline; they direct attention toward one's health; and they help us to acknowledge the spiritual aspects of our nature.

### Objectives Of The Study:

1. To study the effect of Patanjali Yoga Practice on mental health of experimental group of juvenile delinquents.
2. To study the effect of Patanjali Yoga Practice on moral judgment of experimental group of juvenile delinquents

### Hypothesis of the Study:

1. There is significant effect of Patanjali Yoga practice on mental health of experimental group of Juvenile delinquents.
2. There is significant effect of Patanjali Yoga practice on moral judgment of experimental group of Juvenile delinquents.

**Operational Definition:** Juvenile Delinquents- In the present study, Juvenile delinquents is in context with those who are unaccepted through society and are punished through law and justice and they are kept

at government observation homes for improvement through rehabilitation method.

**Mental Health-** In the present research, mental health is in context with to six factors incorporated in tool constructed by Sen and Gupta (2008) and these six factors are emotional stability, adjustment, autonomy, security-insecurity, self-concept and intelligence.

**Moral Judgment-** In the present research, moral judgment is in context with in which a person takes decision in perspective of moral standards and moral values in different circumstances.

**Patanjali Yoga-** In the present research, Yoga is in context with Patanjali's Ashtanga Yoga and its three stages that is Asana, Pranayama and Dhyana.

## Methodology

**Method:** In the present research, pre and post experimental design was used for studying the effect of mental health and moral judgment on juvenile delinquents. Juvenile delinquents were divided in two groups that is Experimental (N=35) and Control (N=35) group. Patanjali Yoga practices were imparted to Juvenile Delinquents for 90 days with duration of one hour each day.

**Variables of the study:** Patanjali Yoga practices and its three stages that is Asana, Pranayama and Dhyana were used as independent variables whereas mental health and moral judgment of delinquents are dependent variables

**Sample of the Study:** A sample of 70 delinquents of age group (13-18 years) from Government Observation Home in Agra district was chosen with random selection method.

**Research Tool:** For measuring the moral judgment of delinquents, moral judgment test by Juri Baruh (2004) and for measuring mental health, mental health battery by A.K. Singh and Alpana SenGupta (2008) were used.

**Statistical Techniques:** Mean- In the present research, Mean was used for knowing average achievement of mental health and moral judgment factors of juvenile delinquents.

**Standard Deviation:** In the present research, standard deviation was used for knowing how much deviation is there between obtained scores of mental

health and moral judgment factors of juvenile delinquents from average scores.

**T-test:** In the present research, t-test was used for knowing significant difference between pre and post obtained scores.

**Delimitation of the study:**

1. Present study was delimited to Government observation home in Agra district, India.
2. Present study was delimited to juvenile delinquents of 13-18 years of age group.

3. Yoga practices were delimited for 90 days with duration of one hour each day.
4. There was no usage of any other psychological treatment other than Patanjali yoga practices.

**Analysis and Interpretation of Data:** For knowing the effect of Patanjali yoga practice on juvenile delinquents the researcher calculated mean and standard deviation of obtained scores of pre and post patanjali yoga practice (after three months) as given in table 1.

**Table 1: Exhibiting mean, standard deviation and t-test value of obtained scores of mental health of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	71.51	13.72	72.28	12.16	0.90	<0.05
Post Test	71.97	11.42	87.20	6.94	6.95	>0.01

From table 1 it is revealed that before giving Patanjali yoga practice mean of obtained scores are 72.18 and 71.51 whereas standard deviation is 12.16 and 13.72. When t-test was computed value came out to be 0.90 which was found insignificant at 0.05 level of significance and hence at the time of pre-test there is uniformity between control and experimental group. From table 1 it is also revealed that t-test value has been found 6.95 between experimental group of juvenile delinquents whom Patanjali yoga practice has been given and control group of juvenile delinquents whom Patanjali yoga practice has not been given which is

found significant at 0.01 level of significance<sup>3</sup>. Hence, it can be said that Patanjali yoga practice makes mental health of juvenile delinquents remarkable.

From Table 2 it is revealed that there is significant effect of Patanjali yoga practice on mental health factor ‘emotional stability’ between experimental group of juvenile delinquents which has been given Patanjali yoga practice and control group of juvenile delinquents which has not been given Patanjali yoga practice which is confirm by t-test value which is found to be 5.45 which is significant at 0.01 level of significance.

**Table 2: Exhibiting mean, standard deviation and t-test value of obtained scores of mental health factor emotional stability of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	8.40	2.52	9.14	2.18	0.27	<0.05
Post Test	9.17	2.53	11.94	1.32	5.45	>0.01

From the table 2 it is also revealed that before giving Patanjali yoga practice to experimental and control group of juvenile delinquents the t-test value found to be 0.27 on the basis of the obtained scores of mental

health factor ‘emotional stability’ which is found to be insignificant at 0.05 level of significance<sup>4</sup>. Hence, it can be said at the time of pre test there is uniformity between control and experimental group of juvenile delinquents.

From Table 3 it is revealed that there is significant effect of Patanjali yoga practice on mental health factor ‘adjustment’ between experimental group of juvenile delinquents which has been given Patanjali yoga practice

and control group of juvenile delinquents which has not been given Patanjali yoga practice which is confirm by t-test value which is found to be 5.34 which is found to be significant at 0.01 level of significance.

**Table 3: Exhibiting mean, standard deviation and t-test value of obtained scores of mental health factor adjustment of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	23.80	4.79	25.62	4.03	0.12	<0.05
Post Test	24.45	4.76	30.22	3.50	5.34	>0.01

From table 4 it is revealed that there is insignificant effect of Patanjali yoga practice on mental health factor ‘autonomy’ between experimental group of juvenile delinquents which has been given Patanjali yoga practice

and control group of juvenile delinquents which has not been given Patanjali yoga practice which is confirm by t-test value which is found to be 0.24 which is found to be insignificant at 0.05 level of significance<sup>5</sup>.

**Table 4: Exhibiting mean, standard deviation and t-test value of obtained scores of mental health factor autonomy of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	9.77	2.71	9.54	2.16	0.72	<0.05
Post Test	9.25	2.04	9.82	2.37	0.24	<0.05

From table 5 it is revealed that there is insignificant effect of Patanjali yoga practice on mental health factor ‘intelligence’ between experimental group of juvenile delinquents which has been given Patanjali yoga practice

and control group of juvenile delinquents which has not been given Patanjali yoga practice which is confirm by t-test value which is found to be 0.001 which is found to be insignificant at 0.05 level of significance.

**Table 5: Exhibiting mean, standard deviation and t-test value of obtained scores of mental health factor Intelligence of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	11.65	5.09	11.40	6.12	0.80	<0.05
Post Test	11.00	5.05	14.25	2.68	0.001	<0.05

From table 6 it is revealed that there is insignificant effect of Patanjali yoga practice on moral judgment between experimental group of juvenile delinquents which has been given Patanjali yoga practice and

control group of juvenile delinquents which has not been given Patanjali yoga practice which is confirm by t-test value which is found to be 0.018 which is found to be insignificant at 0.05 level of significance.

**Table 6: Exhibiting mean, standard deviation and t-test value of obtained scores of moral judgment of juvenile delinquents in reference to Patanjali yoga practice**

Group Test	Control Group (N=35)		Experimental Group (N=35)		T-test	Significance Level
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre Test	17.97	3.97	18.17	4.34	0.84	<0.05
Post Test	16.34	4.35	18.68	4.14	0.018	<0.05

**Findings and Conclusions**

It can be said that Patanjali yoga practice makes mental health of juvenile delinquents remarkable. There is significant effect of Patanjali Yoga practice on mental health factors which are emotional stability, adjustment and self concept. It is also revealed that there is insignificant effect of Patanjali Yoga practice on mental health factors which are autonomy, security-insecurity and intelligence. It was also found that Patanjali yoga practice do not effect moral judgment of juvenile delinquents. Hence, after having conversation with authority it was clear that there was a positive change seen amongst juvenile delinquents due to Patanjali Yoga practice and they want these yoga practices to be contionusly scheduled from time to time.

**Ethical Clearance:** Not required as per study

**Source of Funding:** Not Applicable

**Conflict of Interest:** Nil

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# Quality of Life of Wives of Alcoholics

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## Abstract

**Background:** Alcoholism is a common problem both in developing as well as developed countries. It leads significant harm to the physical, psychological and social health of individuals, families and communities as a whole. Wives of the alcoholics are the persons who suffer the consequences of alcoholism and its effects the most.

**Objective:** To assess the quality of life of wives of alcoholics.

**Materials and Method:** Quantitative approach with descriptive survey research design was adopted in the study. Total 150 men residing at Mangalore and Bantwal taluk of Dakshina Kannada district were administered the AUDIT tool through house to house survey, of which 132 men who scored 8 to 10 were taken as alcoholics and their wives were selected as participants through purposive sampling technique. Participant information sheet and informed consent was obtained. The data was gathered by using WHOQOL-BREF tool to assess the quality of life.

**Results:** Shows that mean quality of life score of wives of alcoholics in physical domain (11.73), psychological (9.43), social (5.04) and environmental (13.10) respectively. The chi-square test shows that there is a highly significant association between QOL scores of subjects and selected variables such as income of family ( $p \leq 0.001$ ) and number of children ( $p \leq 0.018$ ).

**Conclusion:** The study findings revealed that wives of alcoholics are having poor quality of life. Hence need to adopt effective interventions to promote the wellbeing of the wives of alcoholics and to improve their quality of life.

**Keywords:** *Quality of life, Wives of alcoholic, Alcohol, AUDIT, WHOQOL-BREF.*

## Introduction

Alcoholism is a serious global health concern which affects not only the individual but also his family and

the society as a whole. It creates major problem to the family members especially the wife and they face untold misery. Wives of the alcoholics are the persons who suffer the consequences of alcoholism and its effects the most. Wives of alcoholics first they try to adjust with the problems but finally they begin to feel depressed, confused, and even guilty<sup>1</sup>. WHO reported that about 140 million people throughout the world suffer from alcohol dependence<sup>1</sup>.

The wife of an alcoholic, who enters into marital life with a heart full of expectations, becomes exhausted, when she faces tough life situations from alcoholic husband. Social influence process plays an important

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role in the etiology and maintenance of problematic alcohol use<sup>2</sup>.

Alcohol abuse is a known public health problem in the world. The harmful use of alcohol results in 3.3 million deaths each year. It was estimated that the age of 15 years and above people drinks 6.2 L of pure alcohol per year. About (38.3%) of population actually drinks alcohol; which indicates that people who do drink consume on an average about 17 L of pure alcohol annually. Nearly, 15.3 million persons had drug use disorders. It was reported that among 148 countries the injecting drug use; of which 120 people reported HIV infection<sup>3</sup>.

In Indian society, alcoholism is one of the major social problems which have negative effects on the spouse of an alcoholic<sup>4</sup>. This problem directly affects the health of family structure, feeling of hatred, self pity, avoidance of social contacts, divorce, irresponsibility of husbands, suicide, homicide, broken home, poor academic performance of children, poverty are all the outcome of this evil. The community support system, including the mental health services can be a good resource for them to bring them out of this contagious problem.

From all the above statistics it is evident that there is an increased with multi factorial problems among the wives of alcoholics, which decreases the quality of life. So it demands special attention. Hence the present study was undertaken to assess the quality of life of wives of alcoholics.

## Materials and Method

A quantitative approach with descriptive survey research design was adapted in this study to meet the objectives. The study was conducted in two villages of Mangalore and Bantwal taluks of Dakshina Kannada district. The investigator administered the Alcohol Use Disorders Identification Test (AUDIT) tool to 150 men through house to house survey, of which 132 men who scored more than 8-10 scores were considered as alcoholics and their wives were selected as subjects through purposive sampling technique for the study. Ethical Clearance: obtained from Institutional Ethics committee of Father Muller Medical College, Mangalore.

**Inclusion Criteria:** The study includes

- Wives of alcoholics who are living with their alcoholic husbands for more than two years

- Wives who are not consuming the alcohol

**Exclusion Criteria:** The study excludes

- Wives of alcoholics, who are diagnosed with any psychological problems and chronic illness
- Wives of alcoholics who are separated from her alcoholic husbands

The permission to conduct study was obtained from District Health Officer (DHO) Mangalore. Informed consent was obtained from the study subjects. The need and purpose of the study was explained to the participants in their local language and confidentiality was assured. The quality of life of wives of alcoholics was assessed by using WHOQOL-BREF scale. WHOQOL-BREF tool is a standardized, valid and reliable tool which assesses the QOL under four areas such as Physical, Psychological, Social and Environmental with a total of 26 items. The socio demographic data was collected from the subjects'. The data gathered were analyzed by using descriptive and inferential statistics.

## Results

### Section 1: Description of Sample characteristics:

This section deals with the description of the baseline characteristics of 132 subjects presented in frequency and percentage. Majority 73(55.3 %) of the subjects belongs to the age group of 36 years and above .Most of the subjects 114(86.4%) of them belongs to Hindu religion. Educational status majority 73 (55.3%) had primary education .Most 104 (78.8%) of the family belongs to BPL family, 97 (73.5%) daily wages. Family income 47(35.6%) had income of Rs.10, 001 to 15,000 per month. About 55 (41.7 %) belongs to nuclear family .Place of residence 61 (46.2 %) of subjects were residing in the rural area. About 56 (42.4%) of the subjects had moderately adequate family support. Majority 87(65.9%) had social support from social organizations .Duration of marital life of subjects had more than 10 years 87(65.9%).Number of children 57 (43.2%) had two children .Primary decision maker in the family majority had mutual consent 92(69.7%) .About 50(37.9%) of them had duration of alcoholism about 6-10 years. History of domestic violence 25(18.9%) of them were reported.

**Section II: Assessment of QOL of Wives of Alcoholics:** Data depicted in Table 1 shows that most 129 (97.7%) of subjects had poor quality of life. Whereas 3 (2.3%) had average quality of life and none of them had good quality life whose husbands are alcoholics.



The levels of quality of life of subjects are categorized as follows:

**Table 1: Frequency and percentage distribution of level of quality of life of subjects n= 132**

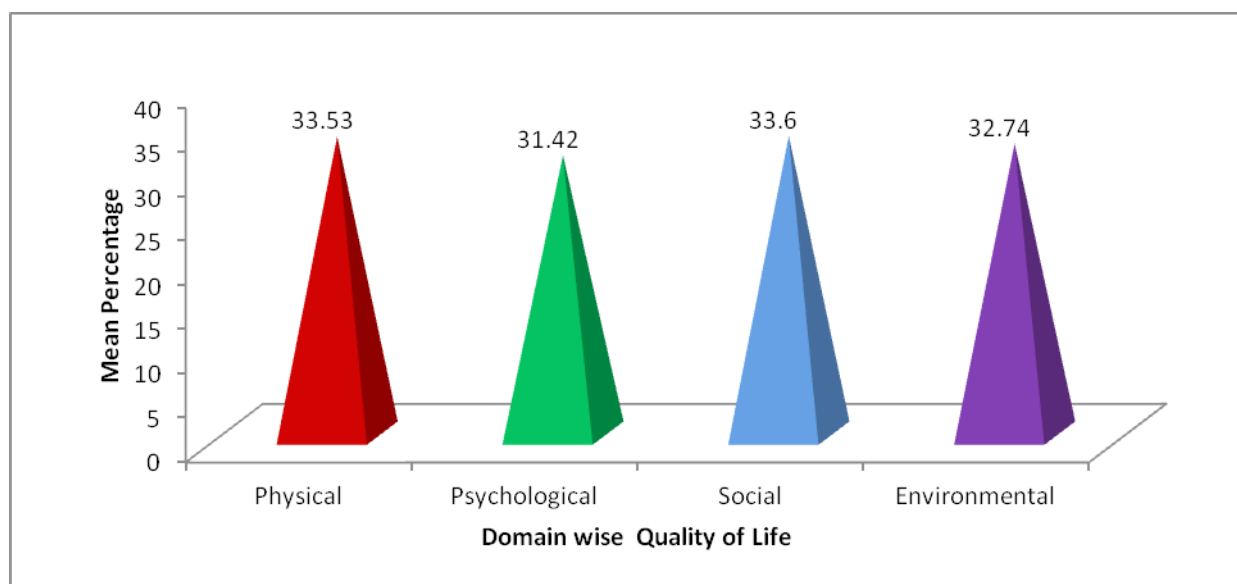
Level of QOL	(f)	(%)
Excellent (97 – 120)	0	0.0
Good (73 – 96)	0	0.0
Average (49 – 72)	3	2.3
Poor (24 – 48)	129	97.7

**Section III: Domain wise Mean, Standard deviation & Mean % of QOL of subjects:** The data presented in Table 2 & Figure 1 shows that the mean scores of QOL in physical domain (11.73), psychological

domain (9.43), social domain (5.04) and environmental domain (13.10). Standard deviation in physical domain is (2.029), psychological domain (1.786), social domain (1.206), and environmental domain (2.529) .Mean percentage of QOL scores in different domains like physical (33.53), psychological (31.42), social (33.60) and environmental (32.74) respectively.

**Table 2: Domain wise Mean, Standard deviation & Mean % of QOL of subjects n-132**

Domain wise quality of life	Mean	SD	Mean %
Physical	11.73	2.029	33.53
Psychological	9.43	1.786	31.42
Social	5.04	1.206	33.60
Environmental	13.10	2.529	32.74



**Figure 1: Pyramid diagram showing the distribution of mean percentage scores according to domains of QOL**

**Section IV: Association of quality of life scores of subjects with selected demographic variables:** Chi square test was computed to determine the association between the quality of life scores with selected demographic variables. The following null hypothesis was stated:

H<sub>01</sub>: There is no significant association of QOL scores of wives of alcoholic with selected demographic variables.

The data findings shows that there is a significant association between QOL scores of subjects and

selected variables such as income of family ( $p \leq 0.001$ ) and number of children ( $p \leq 0.018$ ). Since calculated chi square value is more than the tabled value .Hence the null hypothesis is rejected and research hypothesis is accepted.

There is no significant association between QOL scores of subjects and rest of the selected variables since the calculated chi square value is less than the tabled value .Hence the null hypothesis is accepted and research hypothesis is rejected.

## Discussion

The present study was envisaged to assess the quality of life of wives of alcoholics. The findings revealed that the mean scores of quality of life of wives of alcoholics as per domains, physical domain (11.73), psychological (9.43), social (5.04) and environmental (13.10) respectively. The scores indicated that the quality of life is low in all the four domains. The study findings also revealed that most 129 (97.7%) of subjects had poor quality of life and only 3 (2.3%) had average quality of life and none of them had good quality life whose husbands are alcoholics.

Similar study was conducted to measure disability and quality of life of individuals with AUD (Alcohol use disorders) using standardized instruments<sup>5</sup>. Another study was conducted in selected de-addiction centre; Puducherry to assess the quality of marital life among the wives of alcoholic dependents. The results revealed that majority of samples 62% had moderate quality of marital life, whereas 20% subjects had low quality of marital life, while 18 % had high quality of marital life<sup>6</sup>.

These findings are supported by a cross-sectional study was carried to evaluate quality of life and presence of stress in caregivers of drug-addicted people. Results revealed that, 55.9% were mothers with a mean age of 47.66 years; 23.8% had depressive symptoms. Mean stress among caregivers was 2.24. The study findings show that there is a significant correlation in quality of life, depression and care givers stress. Results also proved that quality of life is compromised and stress is high among caregivers, indicating the need for providing emotional and moral support<sup>7</sup>.

Another study was conducted to understand the level of Perceived Quality of life among the wives of alcoholics and wives of non-alcoholics. The result revealed that with regard to the overall perceived quality of life, majority (66.7%) of the wives of alcoholics report that they have low level of perceived quality of life whereas, majority (66%) of the wives of non-alcoholics report that they have high level of perceived quality of life<sup>8</sup>.

A descriptive study was conducted to investigate the problems faced and coping strategies used by the wives of alcoholics. Sample comprised of 30 wives of alcoholics selected for the study. The study findings show that most of the women had faced problems in multiple domains and the majority of them were having

emotional problems and only few of them reported the problems of physical violence. Coping strategies used by wives of alcoholics were reported in three major styles: engaged, tolerant and withdrawal<sup>9</sup>.

A cross sectional comparative study was carried out to explore two important areas related to the spouses of alcohol addicted individuals i.e. marital quality and their social functioning .A total of 60 subjects; of which 30 spouses of Alcohol dependent (AD) who fulfilled the criteria of ICD-10-DCR and rest of 30 subjects were from normal population. Results showed that spouses of alcohol addicted individual's perceived significantly lower marital quality and social functioning than the spouses of non-alcoholic individuals. There is positive relation between marital quality of life and social functioning of spouses of alcohol dependent individuals<sup>10</sup>.

In the present study the association between quality of life and selected demographic variables depicted that there is a significant association between QOL scores of subjects and selected variables such as income of family ( $p \leq 0.001$ ) and number children ( $p \leq 0.018$ ). Similarly a quantitative approach, Pre experimental one group pre test post test design study was conducted to assess the level of stress among spouse of alcoholics, to evaluate the effectiveness of Guided imagery on stress and to determine the association between stress and demographic variables among spouse of alcoholics. The overall pre-test mean score was 20.25 and for the post test is 14.25. There was a significant difference in the mean score of stress before and after Guided imagery i.e. the calculated 't' value was 19.613 and it was statistically significant at 0.05 level. Further there was no significant association between the stress score and selected demographic variables<sup>1</sup>.

Similarly, the present study results showed that the quality of life of wives of alcoholics in all domains is low. Hence need to adopt measures to improve their quality of life.

## Conclusion

Alcoholism is a family disease, it not only damages health of the addicted persons but it also causes comprehensive damage to the family and marital life. Keeping the study results in mind, it can be concluded that there are various problems faced by the wives of alcoholics. Being health care professionals need to identify such families and adopt a comprehensive

measure which includes effective teaching and interventional programs to improve the quality of life of wives of alcoholics.

**Conflicts of Interests:** There are no conflicts of interests

**Source of Funding:** Nil

Ethical Clearance: obtained from Institutional Ethics committee of Father Muller Medical College, Mangalore.

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# A Study on Knowledge, Attitude and Practice on Mosquito Borne Diseases in Thirumazhisai, Thiruvallur District, Tamilnadu

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## Abstract

**Background:** In recent years, mosquito-borne diseases (MBD'S) have emerged as a serious public health problem in countries of the South-East Asian Region. The most important ones are malaria, dengue fever, chikungunya fever, lymphatic filariasis and Japanese encephalitis. Asia endures about 70% (47-94 million infections) of this burden, whereas India alone is responsible for 34% (24-44 million infections) of the global total. Objective: To assess the knowledge, attitude and practice about mosquito borne diseases and its prevention.

**Methodology:** A Community based cross-sectional study was conducted in suburban area -Thirumazhisai of Thiruvallur district. The Sample size of 141 was calculated. The study population was selected by simple random sampling technique. A pre-designed; pre-tested semi-structured questionnaire was used to collect data. Data entered in MS excel and analyzed using proportions.

**Results:** Among 144 household of Thirumazhisai, Thiruvallur District, majority of the residents interviewed were males (63.1%). Majority of participants belong to age group 25-34(38%). Mean age of the participants was 29±9.1 years Most of them belong to upper middle class (39.5%). 99% (142) knew that mosquitoes transmit diseases. With regards to breeding sites, 92.3%(133) of residents knew the breeding place of mosquitoes. Majority of the residents knew that mosquitoes breed in sewage and waste water (36.8%). About 132(91.6%) knew at least one preventive measure and 12(8.3%) of them knew none. 134(93%) people felt mosquito borne diseases could be prevented. Among the 134, majority (78.4%) felt that having clean surrounding and household could prevent mosquito borne disease. 66.6% of the population (96) under study are bitten by mosquitoes every day. 69.4% of them use coil and liquid for protection. Conclusion: Thus, by knowing the existing knowledge of the study population regarding mosquito-borne diseases and its prevention, evidence-based effective prevention and control strategies as well as sustainable community participation can be achieved.

**Keywords:** Mosquito-borne diseases, knowledge, practices, mosquito bite prevention method, breeding sites.

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## Introduction

In recent years, vector-borne diseases have emerged as a serious public health problem in countries of the South-East Asia Region, including India. Mosquito-borne diseases constitute an important cause of morbidity and mortality, especially in India.<sup>1</sup>

The most important ones are malaria, dengue fever, chikungunya fever, lymphatic filariasis and Japanese encephalitis. In India, every year there are millions of cases of malaria.<sup>1</sup>

Malaria is an important disease with annual occurrence of 300-500 million cases and 1.1-2.7 million deaths globally.<sup>2</sup> An estimated 96 million apparent dengue infections were reported globally in 2010. Asia endures 70% (47-94 million infections) of this burden whereas India alone is responsible for 34% (24-44 million infections) of the global total.<sup>3</sup>

The mosquito-borne diseases result in avoidable ill-health and death which also has been emphasized in National Health Policy<sup>1</sup>. National Vector Borne Disease Control Programme (NVBDCP) under the aegis of National Rural Health Mission (NRHM) is one of the most comprehensive public health programs in India including prevention and control of mosquito-borne diseases.<sup>4</sup>

Owing to upcoming urbanization and the poor quality of living at rural areas, this study is aimed to assess the existing knowledge and practices of the people regarding MBD's, along with various personal protective measures and community measures undertaken in this area.

Assessment of knowledge and practices of community about prevention of mosquito borne diseases is important for designing community-based interventions.

Mosquito-borne diseases constitute an important cause of morbidity and mortality. For example, around 2 million people die due to malaria every year. These numbers can be easily swindled with proper awareness.

Mosquito borne diseases are largely preventable yet they can cause various life -threatening illness. Knowledge and practices of community about prevention of mosquito borne diseases are an important aspect to assess the need of community-based interventions.

## Methodology

A cross-sectional descriptive study was conducted in a suburban population at Thirumazhisai, Thiruvallur District, Tamilnadu from July 2016 to September 2016.

This area falls under the suburban field practice area of Department of Community Medicine, Saveetha Medical College and Hospital, Thandalam. Study population: Households of Thirumazhisai. Study unit: Head of the family. Sampling Method: Simple random sampling. Sample Size: On the basis of the prevalence of mosquito borne diseases of (90.3%)<sup>5</sup> and taking relative precision as 5.3% of prevalence, at 95% Confidence level, the minimum sample size calculated was 144. There were 1175 households in this area, of which 144 households were identified for the study using simple random sampling technique. From each of these selected households, one person whoever was available at the time of visit was interviewed. Inclusion criteria: 1. Inhabitant of study area 2. Of sound mind 3. Can communicate by at least one of the means viz. speaking or writing. Exclusion Criteria: 1. Inhabitant outside the study area. 2. of insane mind. 3. Unable to communicate 4. Not willing to participate. Data Collection: The data was collected from the household covered under our suburban area, literate and illiterate population belonging to that community. This ensured the homogeneity of sample. The sample population consists of income groups of different level and having different life styles. A pre-designed; pre-tested semi- structured questionnaire was used to collect data on demographic background and mosquito borne diseases. It was administered to the member of the household available at the time of the visit after obtaining an informed consent. Institutional ethical committee approval was obtained prior to the conduct of the study. Statistical analysis: Data entry and analysis was done using statistical package for social sciences (SPSS) version 16 software. Descriptive statistics were calculated for background variables and the prevalence of mosquito borne diseases.

## Results

**Socio-Demographic Details:** This cross sectional study was conducted among 144 household of Thirumazhisai, Thiruvallur District, Tamil Nadu. In the present study, majority of the residents interviewed were males (63.1%). Majority of participants belong to age group 25-34(38%). Mean age of the participants was 29 ±9.1 years. Most of them belong to upper middle class (39.5%) according to Modified Kuppaswamy socio-economic scale. (Table 1).

**Table 1: Background characteristics of the participants**

No.	Background Characteristics	Total no of participant (N=144)	Percentage %
1.	<b>Age of the participants</b>		
	15 -24	23	15.9%
	25 -34	56	38%
	35 –44	48	33.3%
	45 - 54	17	11.8%
2.	<b>Sex of participants</b>		
	Male	91	63.1%
	Female	53	36.1%
3.	<b>Socioeconomic status (Modified Kuppuswamy Scale)</b>		
	Upper class (I)	21	14.5%
	Upper middle class (II)	57	39.5%
	Lower middle class (III)	36	25%
	Upper lower class (IV)	16	11.1%
	Lower class (V)	14	9.7%
4.	<b>Education</b>		
	Illiterates	27	18.7%
	Primary	34	23.6%
	Middle school	15	10.4%
	High school	35	24.3%
	Graduation	26	18%
	Post Graduation	7	4.8%
5.	<b>Occupation</b>		
	Unemployed	31	21.5%
	Unskilled	47	32.6%
	semiskilled	19	13.1%
	Skilled	23	15.9%
	Professional	24	16.6%

**Knowledge:**

**Knowledge regarding mosquito borne diseases:** Among the 144 residents, 99% (142) knew that mosquitoes transmit diseases while 1% (2) did not know.

Among the people who were aware of transmission of disease (142) by mosquito, dengue (69%) was the most common disease known to the population. This was because there had been an outbreak of dengue in nearby areas in the recent past. 43(30.2%) people knew about malaria while 6 of them couldn't name any of the disease. (Table 2).

**Table 2: Knowledge regarding mosquito borne diseases**

Mosquito borne diseases	Number N = 142	Percentage
Malaria	43	30.2%
Dengue	98	69%
Filariasis	3	2.1%
Chikunkunya	16	11.2%
All of the above	9	6.3%
Don't know	6	4.2%

\*Multiple response questions

**Knowledge regarding mosquito breeding sites:** With regards to breeding sites, 92.3 % (133) of residents knew the breeding place of mosquitoes.

Majority of the residents knew that mosquitoes breed in sewage and waste water (36.8%). (Table 3).

**Table 3: Knowledge regarding mosquito breeding sites**

Mosquito breeding sites	Number N = 133	Percentage
Rivers and ponds	20	15%
Sewage and waste water	49	36.8%
Pots	3	2.2%
Artificial collection of water	33	24.8%
All of the above	38	28.5%
Don't know	1	0.75%

\*Multiple response questions

**Knowledge regarding prevention of mosquito breeding:** About 132(91.6%) knew at least one preventive measure and 12(8.3%) of them knew none. (Figure 1).

**Attitude:** When questioned about prevention of mosquito borne diseases, 134(93%) people felt that mosquito borne diseases could be prevented while 4 of them had no opinion. 6 members (4%) felt that these diseases cannot be prevented. Among the 134, majority (78.4%) felt that having a clean surrounding and household could prevent mosquito borne diseases. (Figure 2).

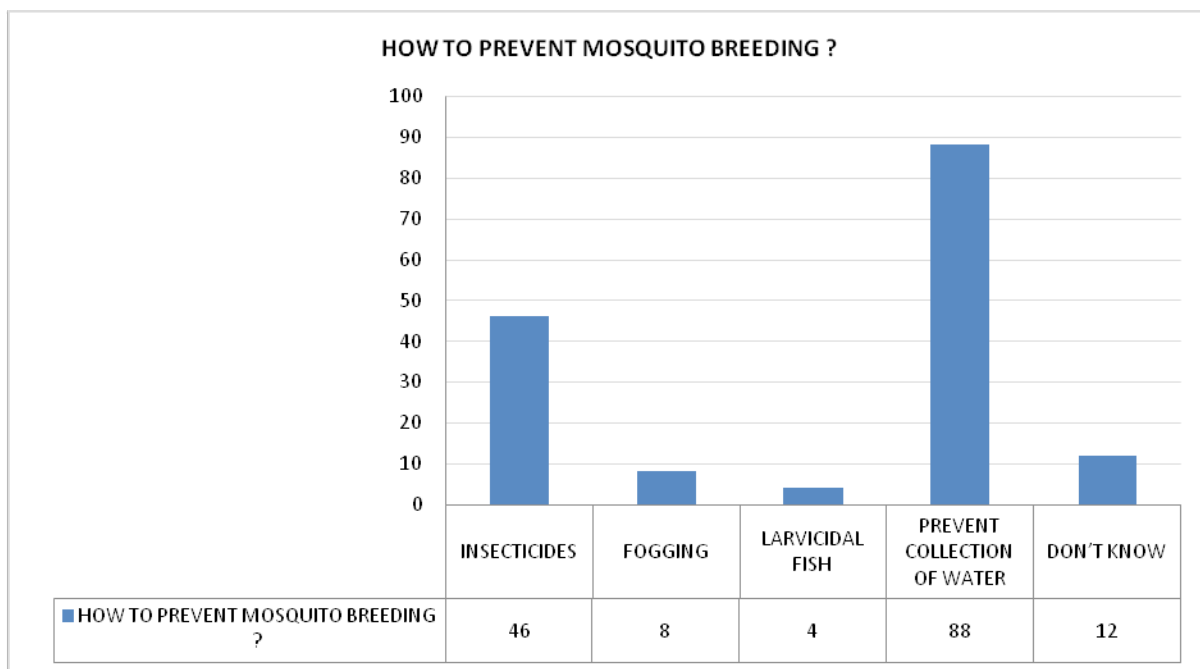


Figure 1: Knowledge regarding prevention of mosquito breeding

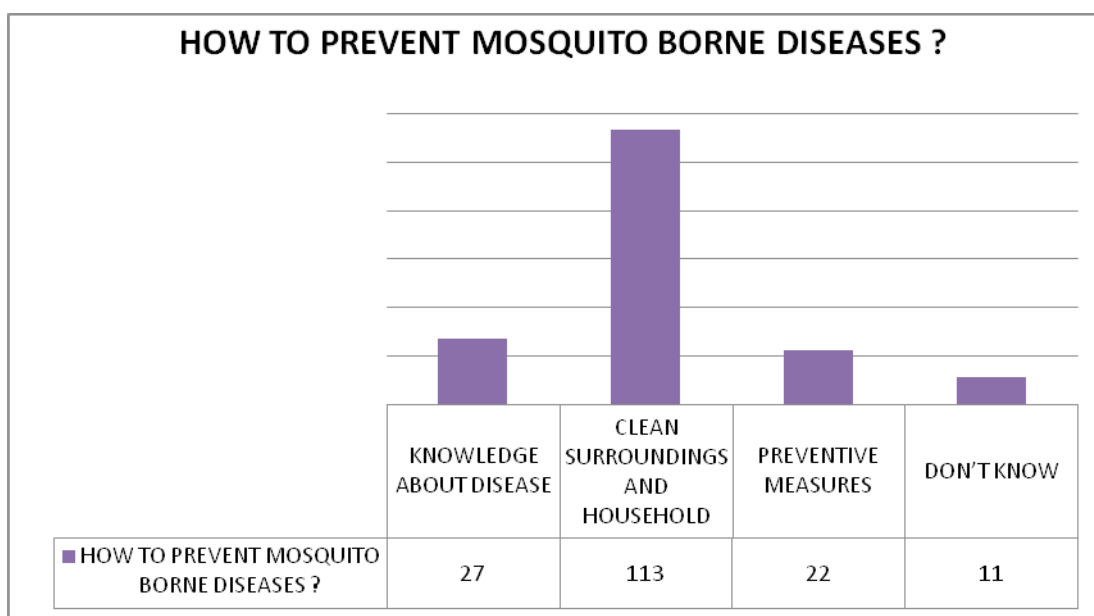


Figure 2: Attitude towards prevention of mosquito borne diseases

Majority (48.6%) understood that everyone’s active participation is required to control these diseases. 30% felt that residents role is important in controlling these diseases. 16% felt that government role is important in controlling these diseases. Only 6% felt that it’s the role of health department in controlling these mosquito borne diseases.

66.6% of the population (96) under study are bitten by mosquitoes every day followed by 15% of them bitten

by mosquitoes few days a week. It is also found half of them are bothered by mosquitoes and have altered their behaviour. These people stay indoors for the same reason.

**Practice:** Among the interviewed, 4 of them were affected in the past one year and 2 relatives/friends were also affected. Among them, 5 had dengue and one of them had malaria.

When asked about the treatment taken among the people affected, 2 have received tablets and 2 have received IV injections, one have received both tablets and IV injection. Only one did not receive any treatment.

With respect to place of treatment, 5 of them had received care from government hospitals while 1 of them in a private hospital.

When residents were questioned about protecting themselves from mosquito bites, majority (69.4%) of them use coil and liquid followed by the use of mosquito net (29.8%). (Table 4)

**Table 4: Protective measures used by the residents**

Protective Measures	Number OD People Used (%)
Mosquito net	43(29.8%)
Coil and liquid	100(69.4%)
Proper clothing	12(8.3%)
Repellent creams	12(8.3%)

\*Multiple response questions; Figures in parentheses indicate percentages.

Only 8% of residents practice any method for protecting themselves from mosquito bite. Among them, 47% practice it during rainy season and 44% practice the method always, whereas 9% of them practice only during an outbreak

Each house where the residents had been interviewed was checked for breeding sites inside and also outside the house. 84% of the population live in pucca houses, 5% katcha and 11% in semi pucca.

There were no potential breeding sites inside 70 of the households and outside 57 households. Inside the house, dustbin was the common breeding site. Rain water collection was found to be a major potential site outside the houses.

### Discussion

In the present study, majority of the residents interviewed were males (63.1%). Similar findings were obtained from a study conducted in Belagavi city<sup>6</sup> which reported 56.3% males. Other studies conducted in Puducherry<sup>7</sup>, Mangalore<sup>5</sup> and Delhi<sup>8</sup> reported majority of participants being female.

In the present study, majority of participants belong to age group 25-34(38%). Mean age of the participants was 29 ±9.1 years. A study conducted in Belagavi city<sup>6</sup> reported that 45.8 % of participants were in the age

group of 20-29. Study conducted in Mangalore<sup>5</sup> reported higher mean age of 41.2±14.1 years.

In the present study, 39.5% of participants belong to upper middle class (II). A study conducted in Belagavi city<sup>6</sup> reported that majority (41.4 %) belongs to class IV socio-economic status.

The present study revealed that 18.7% of participants were illiterates. This was similar to study conducted in Belagavi city<sup>6</sup> (19.3%). Whereas a study conducted in Mangalore<sup>5</sup> revealed only 5% illiteracy level.

The present study was focused on the awareness and practices of mosquito borne diseases and its prevention. In the present study, 99% were aware that mosquitoes transmit a disease which was found to be higher than study conducted in Puducherry<sup>7</sup> and Mangalore<sup>5</sup> which reported 76.8% and 90.7% awareness.

Majority of people in the present study were aware of Dengue (69%) which was similar to study conducted in Delhi(62.3%) by Kohli Cet al.<sup>8</sup> but was higher than study reported from Mangalore<sup>5</sup> which reported only 18.4%.

The present study reported that 36.8% of the residents knew that mosquitoes breed in sewage and waste water. Study conducted by Pallavi V Tenglikar et al in Karnataka<sup>9</sup> and study in Mangalore<sup>5</sup> reported higher awareness of 85% and 74% regarding mosquito breeding in sewage water.

In the present study, 93% people felt that mosquito borne diseases could be prevented while 4 of them had no opinion. 66.6% of the population (96) under study are bitten by mosquitoes every day. It is also found half of them are bothered by mosquitoes and have altered their behaviour. These people stay indoors for the same reason.

In the present study, majority of residents 69.4% were protecting themselves from mosquito bites, by using coil and liquid, which was found to be higher than the study conducted in Karnataka<sup>8</sup> and Belagavi city<sup>6</sup> which reported 57.4% and 57.8% of repellents usage to protect themselves from mosquito bites.

Each house where the residents have been interviewed was checked for breeding sites inside and also outside the house. In the present study, 84% of the population live in pakka houses. A study in Belagavi city<sup>6</sup> reported that 71.4% in pakka house.



Inside the house, dustbin was the common breeding site. Rain water collection was found to be a major potential site outside houses. It's also observed that rain water collection on roads is present outside 45 households. Necessary steps must be taken by the local authorities at the earliest.

### Conclusion

From this study it is important to note that 8% of the population don't know where mosquitoes breed and 6% felt it cannot be prevented. Thus knowledge and awareness must be improved. Thus, by knowing the existing knowledge of the study population regarding mosquito-borne diseases and its prevention, evidence-based effective prevention and control strategies as well as sustainable community participation can be achieved.

**Limitations of the Study:** This study was conducted in our field practice area covered by one Urban PHC, therefore the findings cannot be generalised to other urban areas.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** Ethical approval was obtained from the Institutional Review Board (IRB) and Institutional Ethics committee. Written informed consent was obtained from the study participants and information sheet regarding the study was given to all the participants.

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# Awareness, Attitude and Obstacles in Research among Dental Professionals in Chennai: An Institutional Based Survey

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## Abstract

**Background:** Advancement in treatment modalities has improved as a result of research. Individual's critical thinking and analysis has enhanced. In the advent of incorporating their clinical trials into practice, it had greatly improved in treating patients and enhancing patients care.

**Aim:** To compare the awareness, attitude and obstacles in the field of research among interns, postgraduate students and faculty members among Dental professionals.

**Materials and Method:** An institutional based cross sectional questionnaire survey was conducted among interns, postgraduates and faculty members of the dental profession. A sample size of 261 was determined. Ethical clearance was obtained from Institutional Ethics Committee.

**Statistical Analysis:** Descriptive statistics, chi-square test and student's t-test were used to analyze the data.

**Results:** On analyzing the questionnaire, 61.2% of study subjects were currently guiding and undertaking research projects. Majority of the subjects stated that doing research enhanced their critical thinking and knowledge. The most common obstacle stated for research was lack of time and lack of financial incentives. When assessing barriers to publishing an article, it was reported that lack of publication related knowledge was the most major obstacle in all groups. Majority of the post graduates and faculty members prefer to conduct recent advance based research; whereas interns prefer to do research based on innovative idea which was statistically significant.

**Conclusion:** This research study revealed positive attitude toward research among dental professionals.

**Keywords:** Research, Awareness, Obstacles, Dental professionals.

## Introduction

Research occupies a central role in recent years

and has increased greatly among developed countries<sup>1</sup>. The word 'research' was derived from the French word 'Recherché' which means 'to go about seeking'<sup>2,3</sup>

Advancement in treatment modalities has improved as a result of research. Individual's critical thinking and analysis has enhanced<sup>4</sup>. In the advent of incorporating their clinical trials into practice, it had greatly improved in treating patients and enhancing patients care<sup>5</sup>

In the past decade, developing countries relied on western world for their research findings to be applied

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in for patients' care. This did not give a solution to the problems in the developing countries. In the recent years, awareness in research has been instilled in the minds of the younger generation<sup>6</sup>.

Many studies have been reported regarding the awareness of research among medical population. Very few studies have been done among dental professionals<sup>7</sup>.

In recent times, intern's involvement in research work has been increased to a great extent. Postgraduates are involved in research as a part of their curriculum. All of them need the guidance of faculty members. There are no previously published literature done in Tamil Nadu which assesses the awareness, attitude and obstacles in the field of research among dental professionals. With this in mind, a survey was conducted to assess the awareness, attitude and obstacles in the field of research among institutional based dental professionals.

**Materials and Method:** This is a questionnaire based cross sectional study carried out among dental professionals who are affiliated to institutions. Ethical clearance was obtained from Institutional Ethics Committee of the institution (Ref. No.: CSP/16/JUN/49/209). Random sampling methodology was used to select three institutions. The questionnaire was administered to the participants who were present on the day of study and who gave verbal consent.

15 close ended questions were formulated and validated by three experts of different specialties. The questionnaire consists of basic demographic details of the participants and questions related to awareness, attitude and obstacles in research.

The sample size was calculated based on a study done by Vijay Kumar et al<sup>3</sup> and was estimated to be 218 assuming 95% confidence interval and 5% marginal error. Furthermore, the sample size was increased by 20% to maintain an adequate sample size and to compensate for non response or faulty response. This was estimated to be 261.

**Statistical Analysis:** The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data, descriptive statistics like frequency analysis, percentage analysis were used. To find the significance in categorical data, Chi-Square test was used. In the above statistical tool, the probability value of 0.05 was considered as significant level.

**Results:** The overall distribution of sample shows 36% males and 64% females. The percentages of interns were 32% while post graduates were 40% and faculty were 27 %.

On analyzing the questionnaire, it was found only 52% of the subjects understood the right concept of research.

Approximately 63% of them reported that reading journals and participating in research helps in enhancing evidence based clinical practice, and this was found to be statistically significant. 56% of the subjects admit that they read journal only when need arises. But it is even more surprising that 52% post graduate also do the same. It was reported that around 25% of the interns did not have the habit of reading journal at all.

It was found that around 69% interns did not involve themselves in research activities. Out of those involved in research, 65% of them failed to publish their completed research projects. (Fig.1) Both of these results were found to be statistically significant.

Majority of the subjects prefer to do experimental based study compared to descriptive and analytical studies.

Although 92% of the dental professionals felt that they should have knowledge on statistics, yet they preferred a statistician for the analysis.

46% of the post graduates and 42% of faculty members said that the motive behind conducting research at post graduate level was to appraise knowledge and this showed statistical significance. However 23% post graduates and 35% of faculty members said that they do it mandatory as a part of curriculum. (Fig. 2)

Majority of the subjects stated that doing research enhances their critical thinking and knowledge on analyzing. Personal barriers like financial incentives and lack of time as a personal barrier on the research had an almost equal impact. (Fig.3)

When assessing professional barriers, it was found that 59% reported lack of time and 20% reported lack of mentorship. (Fig. 4). This was found to be statistically significant ( $p = 0.02$ ).

Difficulty in following up patients was the barrier among 43% of the participants. Out of this, 46% were interns and 36% were postgraduates (Fig.5).

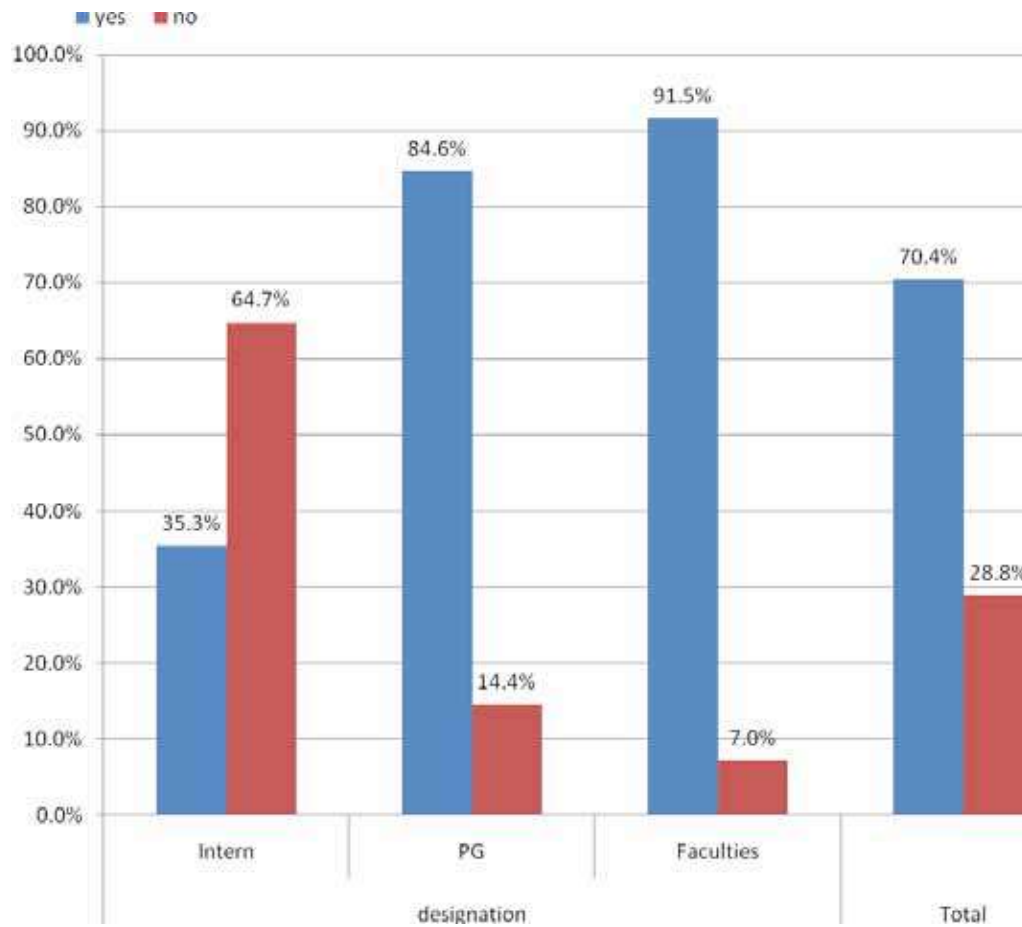


Fig. 1: Efforts to publish completed research projects

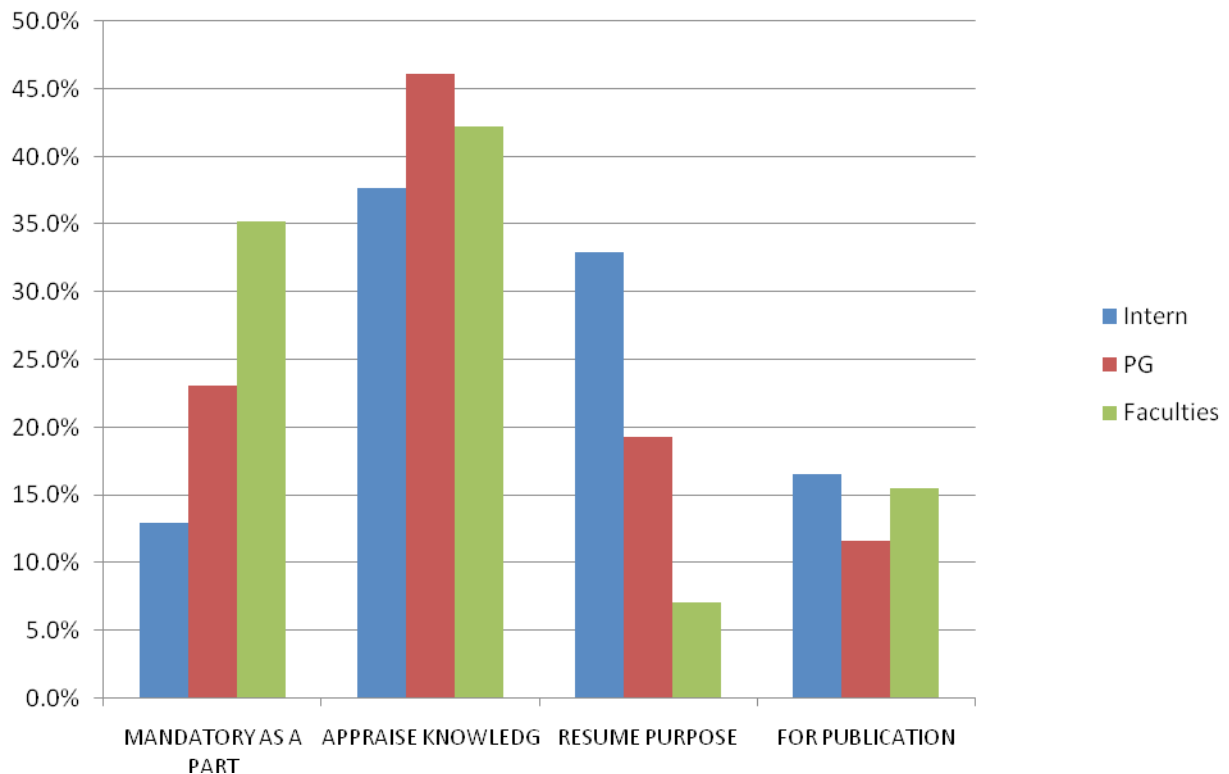
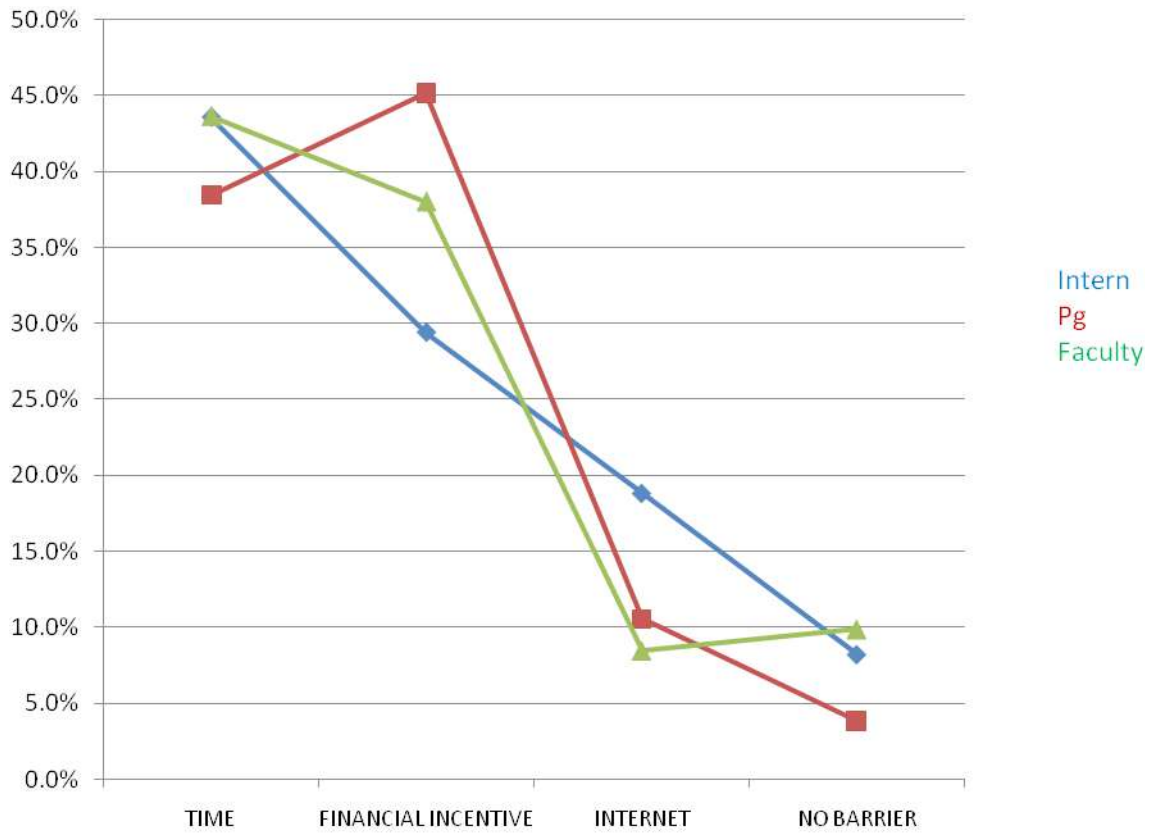
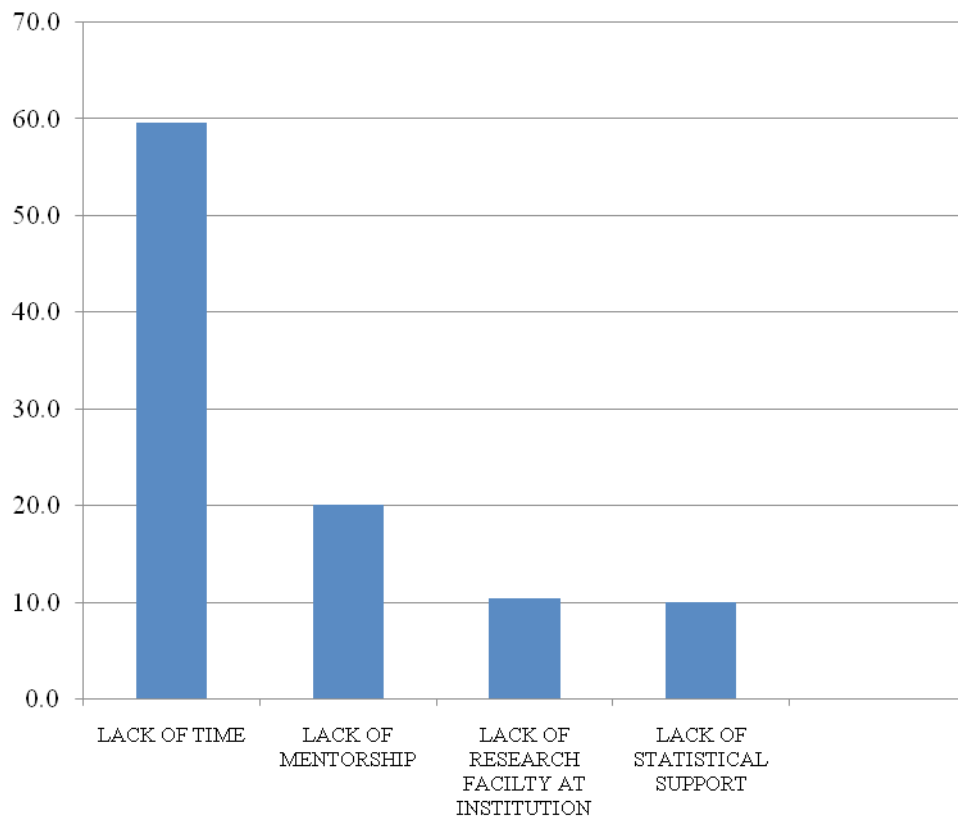


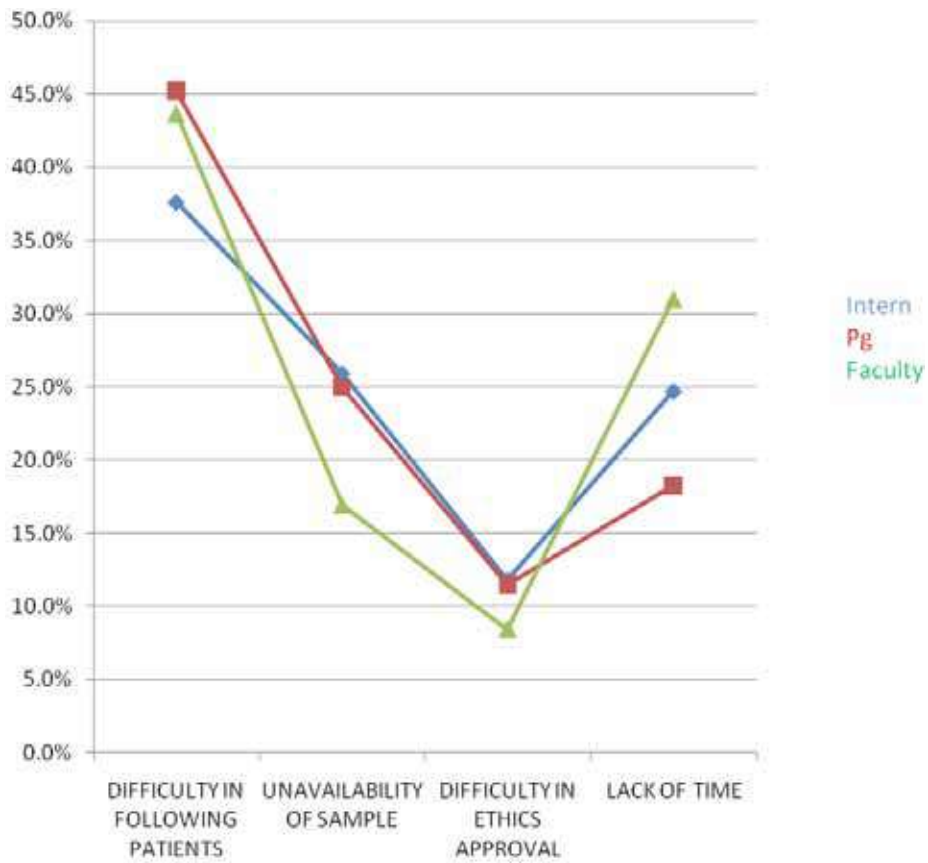
Fig. 2: Motive behind conducting research at postgraduate level



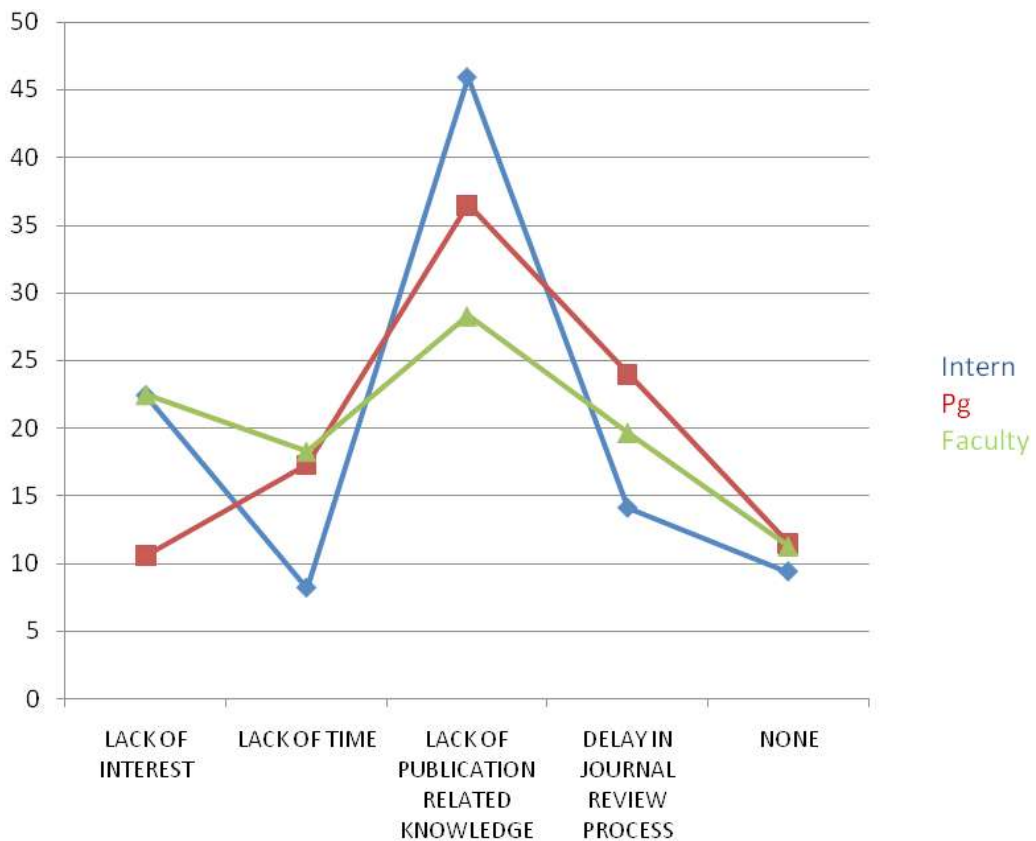
**Fig.3 : Personal barrier in your research**



**Fig 4 : Professional barrier in your research**



**Fig 5: Barrier among students participating in research**



**Fig .6: Barriers in publishing**

When assessing barriers to publishing an article, it was reported that lack of publication related knowledge was the most major obstacle in all groups. 33% of the students reported that there was lack of interest from the guide. Similarly 22% of the faculty members said that there was lack of interest from the students (Fig. 6).

Majority of the post graduates and faculty members prefer to conduct recent advance based research; whereas interns prefer to do research based on innovative idea. This was found to be statistically significant ( $p = 0.05$ ).

## Discussion

In many developed countries research programs has been included as a part of undergraduate curriculum for medical students. It is necessary for them to attain publication for taking up their final examination<sup>9</sup>. In Germany research occupies an important role in the undergraduate curriculum for medical students. 28% of medical students attained for publication<sup>10,11</sup>. Academics and research should go hand in hand<sup>9</sup>. Dentistry can be brought to the next level in India by incorporating research into the curriculum at the undergraduate level<sup>8</sup>.

In a study conducted by Jamuna Rani,<sup>2</sup> it has been stated that there is interest among the undergraduate medical students to participate in research. However, not many of them were actively involved in research. According to the present study, though undergraduates are involved in research, very few had participated and had taken efforts to publish it.

Postgraduates and faculty members frequently read journal as they are regularly involved in journal club discussions. Habit of reading journal and taking part in research at the undergraduate level help the students so that they will have an idea about how to carry out further research during higher education.

Kumar et al<sup>3</sup> reported that dentist should have knowledge on statistics. This study also supports the same. Jamuna Rani et al,<sup>2</sup> cited various reasons for lack of participation of undergraduate medical students in research. A few of them included lack of knowledge, time and guidance. Alghamdi, et al<sup>11</sup> in a similar study among senior students reported a lack of training courses and lack of professional supervisors as the major barriers.

In this study lack of time for research due to clinical work was cited as an obstacle faced by most of the students. There should be separate time allotted for the

students to carry out research projects. Lack of financial incentives was a personal barrier in the present study. Students should be provided with fund to undertake research. Giri et al<sup>13</sup> reported that lack of financial incentives and inadequate support from the guide and supervisor was a major obstacle

Lack of interest by the guide in publishing the journal was reported in this study. Before starting the study, protocol of the research study should be discussed with the faculty members. The guide in addition to periodic assessment of research work they should provide necessary information and guidance to the students.

Saniya et al<sup>1</sup> reported that lack of training in research was the major barrier among medical students.

Oliveira et al<sup>12</sup> reported that the most important barrier for not taking up research as lack of time, followed by lack of guidance by faculty.

In this study, lack of publication related knowledge can be overcome by training the students in research methodology. Awareness and knowledge regarding publication of journal should be educated to the students in the colleges.

Since there was very few studies have been reported among dental professionals, the comparison was made with medical population.

**Recommendations:** It is necessary to impart research related knowledge amongst undergraduate dental students in order to explore the lacunae in research. Encouragement and motivation should be given to the budding dentists for overall betterment of dental profession.

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# “Chewing Technique” Using Gums toward Mucositis Prevalence on Chemotherapeutic Cancer Patients

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## Abstract

Mucositis treatment is currently developed more focusing on treatment rather than prevention. Therefore, more therapy related studies with the concept of prevention is essential to be conducted. Chewing techniques using chewing gum become an optional treatment to prevent the occurrence of chemotherapy-related mucositis. This study aimed to determine the effect of chewing techniques using chewing gum to prevent the occurrence of mucositis in patients who received chemotherapy at Hasan Sadikin Hospital Bandung. This quasi experimental study employs the pre-posttest without control design. There were 30 cancer patients from a population of 75 patients who received chemotherapy recruited through consecutive sampling. The incidence of mucositis was measured using the Oral Assessment Guide (OAG) before treatment (day 1) and after treatment (day 6). The results of the study revealed that median pre-test mucositis score was constant (8-8) but the maximum post-test score of mucositis score increased (10). There was no significant difference in pre-posttest mucositis score indicating that the mucositis incident after treatment did not differ significantly compared to before treatment. Chewing activity by using chewing gum stimulates the parasympathetic nerves resulting in dilation of blood vessels in the salivary glands that drain saliva. The mucosal protective process will increase and can prevent the decline of oral mucosal conditions. Simultaneously chewing gum technique has a tendency to prevent increased oral mucositis score among patients who received chemotherapy at Hasan Sadikin Hospital Bandung. The hospital may consider chewing gum techniques in the nursing care for patients who received chemotherapy to prevent increased mucositis score and to improve quality of life.

**Keywords:** *Chemotherapy, mucositis, chewing gum technique.*

## Introduction

International Agency Research on Cancer (IARC) Globocan in 2012 states that there are 14.1 million new cancer cases and 32.6 million cancer patients (within 5 years of diagnosis) worldwide, 48% of which (15.6 millions) occurs in developing countries. The result of the Basic Health Survey from the Ministry of Health (2015) show the prevalence number of tumor/cancer illness in Indonesia, which is 4.3 per 1000 people. Lung,

liver, stomach, colorectal, and breast cancer are the biggest causes of death each year.<sup>1-2</sup> Moreover, cancer has brought about a number of negative impacts on physique, psychology, social relationship, spirituality, and finance. A study to cancer patients show some physical handicaps suffered by patients, including pain, exhaustion, nausea, asthma, insomnia, decreasing appetite, and increasing heart rate.<sup>3</sup>

Four primary method for cancer therapy are surgery, chemotherapy, radiation, and biotherapy.<sup>4</sup> In Indonesia, most cancer patients are tardy for diagnosis and treatment; therefore, patients who consulted the healthcare service are already on the last stadium stage. It leads them to dealing with fewer choices in treatment with chemotherapy as the last resort. It is designed to destroy cancer cells, but its practice can also destroy the

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healthy ones. Of many side effects of chemotherapy, one in particular is mucositis. Approximately 61% of all cancer patients undergoing chemotherapy have suffered mucositis. Oral mucositis can be extremely painful, destroying an abundant network of cells. It can also give impact to the patient’s life quality, increase infection risk, cause delay/interruption or even failure of the entire treatment, and be in dire need hospitalization as well as budget gridlock. Some actions toward mucositis treatment include oral cryotherapy, low laser level therapy (LLL), utilization of honey topical agent, Chlorhexidine, Nistatine, and Triamcinolone acetonid. From these interventions, it is believed that it can cure mucositis, despite the inaccuracy of the chemical compounds, the augmentation of budget, and the difficulty applying it onto healthcare service providers. Currently, there is no concensus regarding proper treatment in oral care to prevent mucositis due to chemotherapy.<sup>5</sup>

Until recently, no consent has been done regarding the proper treatment in oral care to prevent mucositis due to chemotherapy. Although several implementations with therapy intervention are being developed, no effective action has come to fruition regarding oral care treatment to prevent mucositis due to chemotherapy. In the research, the main idea of mucositis prevention is the process of chewing rather than the content of the gum. There for utilization of gums in this research is anticipated to optimize the process.

**Method**

This research applies the *quasi-experiment pretest and posttest without control* design. The researcher implements intervention only on a group which is the intervention group without counterparts. The impact of behavior is assessed by comparing the posttest and pre-test values.

The oral care protocol was done to 30 respondents to chew gum. Data sampling was done twice including the first day before the experiment and the following sixth day. Analysis on the respondent’s oral condition applied Oral Assessment Guide (OAG) tools.

During pre-chemo, the respondents were asked to chew 2 gums for 5 minutes before disposing them, followed by another chewing during chemo for 10 minutes. Later, they were asked to keep chewing gums 3 times a day for 10 minutes and a total of 5 days after each chemotherapy. The oral care protocol was done 10 minutes after breakfast, lunch, and dinner. Six days after chemotherapy, an analysis was done using Oral Assessment Guide tools adopted from Eilerset.al., (1998).<sup>6</sup>

**Result**

The research was conducted for 2 weeks from 19 to 27 June 2017 at Asnawati Ward in Hasan Sadikin Hospital Bandung, followed by respondent’s individual homes because they were non-admitted patients. On the 6<sup>th</sup> day, the researcher met the respondents to assess the scores for posttest mucositis.

**Table 1. Respondent’s Characteristics**

Characteristics	Respondents	F (n=30)	Percentage
Age (Mean±SD 45.40 ± 6.63)	< 40 years	7	23.3
	≥ 41 years	23	76.7
Gender	Male	3	10
	Female	27	90
Education	Elementary	14	46.7
	Junior High	9	30.0
	Senior High	7	23.3
Chemotherapy Cycle	< 3rd chemo	16	53.3
	≥ 3 <sup>rd</sup> chemo	4	46.7
Cancer Types	IDCM	27	90.0
	Ca Colon	2	6.6
	Ca. Lung	1	3.3
Types of Chemotherapy Agents	Fluorouracil, Cyclophosphamid	22	73.3
	Paclitaxel, Carboplatin	6	20.0
	Xeloda, Oxaloplastin	1	3.3
	Docetaxel Carboplatin Doxorubicin	1	3.3

Table 1 shows the age of most respondents  $\geq 41$  (76.7%) with a mean of 45.40 whose majority is female (90%) and elementary schooler (46.7%), with the most chemotherapy cycle is on  $< 3$  (53.3%), the type of cancer is IDCAM (*Intra Ductal Carcinoma Mammae*) (90%) and the most chemotherapy agent applied are Fluorouracil, Doxorubicin, and Cyclophosphamid (73.3%).

The analysis result of mucositis frequency before and after the intervention of chewing gums can be seen on table 2.

**Table 2. Frequency of Mucositis Pre-post test**

Respondent's Category	Pretest		Posttest	
	f	%	f	%
Mucositis	0	0	3	10
Not Mucositis	30	100	27	90

Table 2 shows that during pretest all respondents do not experience mucositis where each parameter with the score of 1 is normal. The normal state indicates normal voice, normal chewing ability, soft pink and damp lips, complete and pink gingiva, as well as strong and clean teeth. On the other hand, the post-test shows that 3 respondents undergo increase the mucositis scores during research.

**Table 3. Analysis Result of Wilcoxon Test for Pre-Posttest Mucositis Scores**

OAG Score	Median (Min-Max)	p-value
Pretest	8 (8-8)	0.102
Posttest	8 (8-10)	

Table 3 shows the median result (min-max) of mucositis pretest score of 8 (8-8), meaning that the value of the respondent's pre-test mucositis score is on the normal range. It indicates that all respondents have normal oral mucosa condition. Meanwhile, the median (min-max) of mucositis posttest score of 8 (8-10) increases on 3 respondents. The analysis result of Wilcoxon test of mucositis pre-posttest score with p-value 0.102 ( $>0.05$ ). There is indicates that no significant average difference of mucositis score before and after the intervention of chewing gums. In a nutshell, it does not improve mucositis score for patients undergoing chemotherapy.

Table 4 shows that the variable which influences mucositis result and is strongly interrelated is that of age with p value 0.00 and correlation value 0.735. It shows that age has positive correlation direction with strong correlation with mucositis score.

**Table 4. Respondent's Characteristics that Influence Mucositis Result**

Category	Median (minimum-maximum)	P value
Age	r = 0,735c	0,00c
Gender	2 (1-2)	0.550a
Education	2 (1-3)	0.502b
Chemotherapy Cycle	2 (1-6)	0.392b
Cancer Type	1 (1-4)	0.949b
Type of Chemotherapy Agent	1 (1-4)	0.760b

<sup>a</sup>Mann-Whitney Test, <sup>b</sup>Kruskal-Wallis Test<sup>b</sup>, <sup>c</sup>Spearman Correlation Test<sup>c</sup>

Meanwhile the variables of gender (p value 0.550), education (p value 0.502), chemotherapy cycle (p value 0.392), cancer type (p value 0.949) and the type of chemotherapy agent (p value 0.760) do not have significant interrelation.

### Discussion

The act of chewing gum has an impact on mucositis prevalence. This can be proven by no significant changes in pretest-posttest mucositis score with p-value 0.102 ( $>0.05$ ). It means that there is no decline in the respondent's oral mucosa condition.

Before chemotherapy, the oral condition of all respondents is normal. Until the 5<sup>th</sup> day of chemotherapy, all respondents chewed gums. Twenty-seven respondents show no increase on mucositis score up to the 6<sup>th</sup> day of post-chemotherapy. This is due to the fact that the chewing activity using gums is a set of mechanical movements that stimulate parasympathetic nerves. Then, it is followed by dilatation in blood vessels to saliva glands, serving as a canalizer.

Saliva is an important factor in preserving the health of teeth and mouth taking the role a protector. It helps as a lubricant covering mucosa and protects oral cavity against mechanical, thermal and chemical irritations. It claims similarly regarding one group pretest-posttest design. She advocates that gums are advantageous to stimulate saliva secretion and increase plaque pH and saliva, hence the best to clean oral cavity. Chewing gums for at least 10 minutes regularly can stimulate the increase of saliva secretion. It also shows similar view, stating that the stimulated saliva secretion may induce its promptness, resulting in a bigger saliva volume. All of this may influence the concentration of saliva

component. Added volume and more watery saliva will reduce the chance of microorganism to colonize the cavity.<sup>6</sup>

Moreover, it will cause the increase of organic and inorganic saliva substances. The components included are immunoglobulin A (IgA), mucin, lysozyme, lactoferrin, and lactoperoxidase, all repressing bacteria growth. On the other hand, the inorganic saliva included are bicarbonate and thiocyanate; while the former protects through repressing the fluctuation of pH saliva's degree of similarity, the latter operates in the lactoperoxidase system by oxidizing bacterial enzymes to cell membranes that may hamper acid production and *streptococcus* growth. This is also similar to what researcher statement that chewing gum may reduce the bacteria population in saliva significantly.<sup>7-8</sup>

Saliva is a complex and colorless oral liquid, secreted from major and minor saliva glands to maintain homeostasis inside the oral cavity<sup>8</sup>. For healthy adults, saliva is produced about 1.5 liters in 24 hours. Its secretion is controlled by innervation system, mainly by cholinergic receptors. The main trigger to increase the saliva secretion is through mechanical trigger.<sup>6</sup>

Saliva has several important functions in the oral cavity, including lubricant, cleaning action, dissolution, chewing and digestion, speaking process, buffer system and, most importantly dental caries repression. Saliva and its glands are crucial parts of the mucosa immune system. The plasma cells inside produce antibody, particularly from Immunoglobulin A (Ig A) to saliva. Besides, there are several types of antimicrobial enzymes which contain lysozyme, lactoferrin, and peroxidase.<sup>9</sup>

Saliva also is a result of a myriad glands located under the oral mucosa. Every day, the human's saliva gland produces almost 600 ml serous saliva and mucin that contains minerals, electrolytes, buffers, enzymes and their inhibitors, growth factor, cytokine, secretory immunoglobulin A (sIgA), and glycoprotein. Proteins in saliva include lactoferrin, lysozyme, peroxidase, defensins and histatin, which may hamper or block microorganism growth in the mouth; e.g., histatine has the characteristics of fungicides.<sup>4-9</sup>

With the increase of saliva production, the process of mucosa protection will accumulate; therefore, it may prevent the decrease of oral mucosa condition. That being said, there is an intervention influence of chewing gum shown by Wilcoxon analysis test displaying that

the intervention may prevent the increase of mucositis score through a mechanical process. This process will trigger the saliva glands. Saliva itself is crucial due to its strong bond with a biological process occurring inside the mouth. Generally, saliva plays a role as a protector of the oral surface, water adjustment, virus issuance, and the product of organic metabolism itself and microorganism, food digestion and tasting as well as differentiation and skin cells growth, epithelium, and nerves.

The respondents with increasing mucositis score are 40, 38, and 35 years old respectively. No significant increase on mucositis score occurs because the age category between children and the elderly is not included in this research. According to researchers, both children and the elderly retain a higher risk of suffering from mucositis compared to other ranges of age. It is due to epithelial cells and mucosa membranes more sensitive to suffer from toxicity. Moreover, the elderly is more known to experience a decline of new cells growth and is related to the function of the liver and kidney<sup>9-10</sup> also supports this view, claiming that young respondents have larger impact in lowering mucositis degree. This is because their bodies have better capability of repairing cells or damaged network than those of the elderly. According Hondst, et.al, the patients above 50 years old have higher risks due to the DNA's low-level capability of repairing itself. Although several researches claim that young age and the elderly are prone to suffer mucositis, they do not share similar views because the respondent's age in this research does not involve children and the elderly.<sup>7-11-12</sup>

According to the chemotherapy cycles, the respondents with increasing mucositis score are undergoing the 1<sup>st</sup> and 3<sup>rd</sup> chemotherapy cycles. This is not entirely supported by the research result by Hendrawati, et.al showing the number of the most oral mucositis cases which occur in patients undergoing chemotherapy the 4<sup>th</sup> cycle (86%) and 1<sup>st</sup> cycle (52%) compared to other cycles. This is due to the number of respondents which is higher in the < 3<sup>rd</sup> cycle.<sup>13</sup>

In this research, the most common type of cancer is IDCM (*Intra Ductal Carcinoma Mamae*) which is 90%. It shows that it is quite common for patients undergoing chemotherapy. The respondents with increasing mucositis score have the IDCM cancer type. As a literature, recollects mucositis mostly occurs in patients with blood cancer undergoing chemotherapy due to

leukemia, knowing that it causes myelosuppression. Patients neutropenia are prone to bacterial infections like mucositis<sup>13</sup>. The increase of mucositis score occurs on respondents with IDCM cancer similarly with most patients in this research. In fact, there are no respondents with the hematologic malignancy or lessercancer types.

The act of chewing gum not only helps increase mucositis score to patients undergoing chemotherapy, but also makes them face difficulty in fulfilling nutrition as well as prevents from much severer mucositis impacts due to chemotherapy. The implication of this research for nursery is that the act of chewing gum may be considered as one of the analysis material in the field of nursing to give intervention to patients undergoing chemotherapy.

### Conclusion

This research concludes that the analysis of *Wilcoxon* test of pre-posttest mucositis score with p-value 0.102 (>0.05) indicates no significant average difference of mucositis score before and after the intervention of chewing gum. It means the intervention of chewing technique using gum does not increase the mucositis score for patients undergoing chemotherapy. The value of pre-test mucositis score of all respondents are within the normal range. However, there are some respondents with increasing posttest mucositis score. The parameter increases in posttest mucositis score occurs in the 4 parameters which are tongue, gingiva, chewing process, and lips.

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# Predicting Pollutant Removal with Abundance of Plants in the Interest of Health: An Evidence Based Study

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## Abstract

Pollutants are important determinants of respiratory morbidity. This study endeavours to explore the role of vegetation in air quality improvement. The 24 hour average of prevailed ambient levels of air pollutants, (PM<sub>2.5</sub>), (NO<sub>2</sub>) and (NO) at four sites of Delhi were recorded. The abundance, frequency and density of vegetation was assessed using belt transect method. Software i- Tree Canopy was used to assess the amount of pollution removal and carbon sequestration potential by vegetation. Results indicate that Pusa had highest abundance (6.7), frequency (86%) and density (6.2) of vegetation as compared to Dwarka, Rohini and ITO sites. ITO had minimum abundance (2.0), frequency (50%) and density (1.9) of vegetation. The correlation between the abundance, frequency and density of vegetation and ambient levels of air pollutants was negative. The i-tree software indicates that the potential of vegetation in removing the load of air pollutants was significant. The quantity NO<sub>2</sub> and PM<sub>2.5</sub> removed by vegetation of Pusa, Dwarka, Rohini and ITO sites were 331.2g and 128.5g; 117.7g and 46.4g; 67.6g and 26.6g and 37.6g and 15g respectively. The carbon sequestration potential was maximum (520Kg in year) and minimum (60.2Kg in year) at Pusa and ITO respectively. Regression equations were accordingly computed, which could predict the potential pollution removal with vegetation. Objective evidence based estimation of potential reduction of pollutants with planting trees, has important implications on public health.

**Keywords:** Air quality, Vegetation, Pollution removal, Carbon sequestration, Belt transect, Respiratory morbidity.

## Introduction

New Delhi faces disrepute owing to high pollution levels. Air pollution has emerged as a major challenge, particularly in urban areas. The problem becomes more complex due to multiplicity and complexity of

air polluting source mix (e.g., industries, automobiles, generator sets, domestic fuel burning/ waste incineration, road side dust, construction activities, lack of energy efficiency systems etc.). Being a major centre of commerce, industry and education, Delhi has experienced a phenomenal growth in recent years. The burgeoning population coupled with rapid growth in terms of vehicles, construction, and upsurge in coal consumption by power plants has resulted insidious environmental concerns in Delhi.

Air pollution continues to remain a major public health concern despite various actions taken over two decades: relocation of polluting industries, introduction of improved emission norms for vehicles, phasing out lead from gasoline, reduction of sulphur in diesel and benzene in gasoline, city public transport fleet on CNG,LPG, banning of 15-year old commercial vehicles,

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restriction on transit freight traffic, prohibiting open incineration/combustion, introduction of metro rail, etc. Increasing pollution levels cause diseases such as asthma, bronchitis, cough, lung cancer etc.

There is a need to take stock of the levels of air pollutants at various locations in the city, as different pollutants might have different determinants and thus varying remedial measures. Plants are well known to remove various pollutants in the environment. Delhi has a relatively rich plant and forest cover which facilitates pollution control. But the vegetation cover varies from location to location. It is therefore important to assess the vegetation cover and to correlate it with pollutant levels. Pollution removal is a function of the quantity (abundance, frequency and density) and quality (shrubs/trees) of vegetation at a particular place.

The pollution level and vegetation cover at different sites in Delhi was measured and further, the removal of pollutants by vegetation was estimated. Regression equations worked out, predict the potential pollution removal with vegetation.

**Materials and Method**

This analytical study was undertaken at New Delhi, (area 1484 sq km). Pollution levels and vegetation was estimated during January to March 2018, at four selected sites catering to North, East, Central and South-West directions, located far away from each other:

1. Dwarka (DAV School) - South West Delhi (28.59° N, 77.06°E)
2. ITO crossing - East Delhi (28.63° N, 77.25° E)
3. DTEA Senior Secondary School, Pusa Road - Central Delhi(28.64°N, 77.17°E)
4. Rohini (Delhi Technical University) - North West Delhi(28.75° N, 77.11° E)

Data of PM<sub>2.5</sub>, NO<sub>2</sub> and NO levels, on daily basis was downloaded from Central Pollution Control Board (CPCB) nearby monitoring sites displayed on website for the entire study period. <sup>1</sup>

**Estimating Vegetation:** Belt transect methodology was used to monitor and quantify vegetation as proposed by Bhaskar, *et.al.* (2015).Belt transects were marked between two points of 500 m area. The length of the belt transect was taken as 500 m at each selected site, where 30 quadrats were laid down, each of size 0.5m x 0.5m.<sup>2</sup>

The vegetation in each quadrat was identified, counted and tabulated. The abundance, frequency, density of vegetation was quantified using standard definitions<sup>3</sup>:

**Abundance** = Total no of individuals/No of quadrats of occurrence

**Frequency (%)** = No of quadrats in which species occurred x 100/Total no of quadrats studied

**Density** = Total no of individuals/Total no of quadrats studied

**Estimating Pollution Removal:** The ‘i-tree canopy’ software was used to study pollution removal levels. It reviews Google Maps aerial photography at random points and conducts a vegetation cover assessment within a defined project area. The selected study site was entered in i-tree canopy- location linked to google map. The area of the selected sites (assessed for vegetation) was marked using polygon feature of the programme. Relevant ‘type’ of vegetation i.e., trees and grasses were entered. The software estimated the amount of various pollutants removed by vegetation in that area on annual basis. It also determined the amount of CO<sub>2</sub> sequestered in trees/plants.<sup>4</sup>

**Equipment Used for Monitoring Vegetation:** Quadrat of 0.5 x 0.5 m, Measuring tape of 30 m, Nails, Thread, Camera, Laptop

**Analysis:** Microsoft Excel was used for correlation and regression between abundance, density and frequency of plants with pollutant levels and their removal.

**Findings:**

**Pollutant Concentration:**

Average Pollutant concentration for PM<sub>2.5</sub>, NO<sub>2</sub> and NO was ascertained, Table 1.

**Table 1: Average pollutant concentration (January-March 2018)**

Site	Level of pollutant		
	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	NO (µg/m <sup>3</sup> )
Pusa	91.5	24.6	29.1
Dwarka	157.4	40.0	27.1
Rohini	205.5	26.9	41.2
ITO	146.2	73.5	129.6
Standard	60.0	80.0	80.0



**Abundance, Density and Frequency of Vegetation:** Quadrat analysis was carried out to determine the abundance, density and frequency of vegetation at the four selected sites (Table 2). Vegetation was highest in Pusa and lowest in ITO. A total of 11

species were recorded at the four sites. Three plant species were common at each sites namely *Euphorbia hirta*, *Cynodon sp.* and *Amaranthus sp.* (Figure 1). Tree species, typically *Polyalthia longifolia* was also occasionally prevalent.



**Figure 1: Common plants at three sites: Euphorbia hirta (top left), Cynodon sp (top right), Amaranthus sp (bottom) (Source : Google Images)**

**Table 2: Abundance, density and frequency of three common plants**

S.No.	Site	Species	Abundance	Frequency	Density
1.	Pusa	Euphorbia	2.46	86	2.13
		Cynodon	14.9	96	14.4
		Amatanthus	2.95	77	2.26
		Mean	6.77	86	6.15
		Tree sp	1	70	0.7
2.	Rohini	Euphorbia	1.85	90	1.66
		Cynodon	6.1	93	5.7
		Amaranthus	2.13	76	1.63
		Mean	3.36	86	1.65
		Tree sp	1	50	0.5
3.	Dwarka	Euphorbia	2.15	86	1.86
		Cyndon	12	90	10.76
		Amaranthus	2.56	83	2.13
		Mean	5.57	86	4.9
		Tree sp	1	56.6	5.66
4.	ITO	Euphorbia	1.92	46	0.9
		Cynodon.	2.41	40	0.97
		Amaranthus	1.78	63	1.13
		Mean	2.03	50	1.97
		Tree sp	1	16.6	1.66

**Correlation of Pollutants Versus Abundance, Density and Frequency of Plants:** An inverse correlation was seen between frequency of various plant species (*Euphorbia*, *Cynodon*, *Amaranthus*) and levels of NO and NO<sub>2</sub>. (statistically significant for *Euphorbia* and *Cynodon* with NO<sub>2</sub> and NO) and *Amaranthus* with NO (Table 3).

**Table 3: Correlation of frequency, abundance and density of three plant species with pollutants**

Pollutant	Correlation coefficient (r) with		
	Frequency Euphorbia	Frequency Cynodon	Frequency Amaranthus
PM <sub>2.5</sub>	0.13	0.003	0.037
NO <sub>2</sub>	-0.96*	-0.96*	-0.78
NO	-0.98*	-0.99*	-0.95*
Pollutant	Correlation coefficient (r) with		
	Abundance Euphorbia	Abundance Cynodon	Abundance Amaranthus
PM <sub>2.5</sub>	-0.87	-0.57	-0.61
NO <sub>2</sub>	-0.44	-0.71	-0.74
NO	-0.51	-0.83	-0.81
Pollutant	Correlation coefficient (r) with		
	Density Euphorbia	Density Cynodon	Density Amaranthus
PM <sub>2.5</sub>	-0.31	-0.55	-0.43
NO <sub>2</sub>	-0.91	-0.76	-0.78
NO	-0.96*	-0.85	-0.91

\*P<0.05

An inverse statistically significant correlation was also seen between abundance of two plant species (*Amaranthus and Cynodon*) and levels of NO. Abundance of *Amaranthus* also exhibited a statistically significant inverse correlation with NO level.

As abundance, frequency and density of plants increase, the pollutant levels decrease. ITO is one of the most polluted areas in Delhi. Pollution is caused by

high vehicular density; Pusa on the other hand has green areas, and less vehicular pollution resulting in lower levels of PM<sub>2.5</sub>, NO<sub>2</sub> and NO.

**Pollutant Removal Versus Abundance, Density and Frequency of Plants:** Annual pollution removal at these four sites was estimated using software i- Tree Canopy. Similar analysis was repeated for other sites and results are summarized in Table 4.

**Table 4: Annual removal of pollutants by plants**

Pollutants	Removal of pollutants annually			
	Pusa	Dwarka	Rohini	ITO
CO (g)	58.8	21.2	12.1	6.8
NO <sub>2</sub> (g)	331.2	117.7	67.6	37.6
O <sub>3</sub> (g)	2514	910.5	521	4661.3
PM <sub>2.5</sub> (g)	128.5	46.4	26.6	15
SO <sub>2</sub> (g)	160	58	33.1	18.4
PM 10 (g)	44.7	258	148.2	82.6
CO <sub>2</sub> Sequestered (kg)	520.0	188.2	108.0	60.2

**Table 5: Correlation of frequency, abundance and density of three plant species with removal of pollutants**

Removal of Pollutant	Correlation coefficient (r) with		
	Frequency Euphorbia	Frequency Cynodon	Frequency Amaranthus
PM <sub>2.5</sub>	0.45	0.55	0.44
NO <sub>2</sub>	0.40	0.53	0.31
CO	0.44	0.54	0.44
SO <sub>2</sub>	0.45	0.55	0.44
O <sub>3</sub>	0.91	0.85	0.86
CO <sub>2</sub> (seq)	0.44	0.54	0.44
	Abundance Euphorbia	Abundance Cynodon	Abundance Amaranthus
PM <sub>2.5</sub>	0.95*	0.75	0.91
NO <sub>2</sub>	0.96*	0.76	0.91
CO	0.94*	0.74	0.92
SO <sub>2</sub>	0.95*	0.75	0.90
O <sub>3</sub>	0	0.1	0.38
CO <sub>2</sub> (seq)	0.91*	0.73	0.91
	Density Euphorbia	Density Cynodon	Density Amaranthus
PM <sub>2.5</sub>	0.77	0.78	0.87
NO <sub>2</sub>	0.77	0.87	0.87
CO	0.78	0.86	0.78
SO <sub>2</sub>	0.76	0.86	0.86
O <sub>3</sub>	0.66	0.45	0.56
CO <sub>2</sub> (seq)	0.78	0.87	0.87

(\*P&lt;0.05)

It was observed that, in most cases plant parameters were well correlated with removal of pollutants, esp. abundance ( $r=0.73$  to  $0.96$ ) and density ( $r=0.76$  to  $0.87$ ). However, statistically significant correlations were observed for abundance of plants with pollutant removal. It was particularly true for abundance of Euphorbia ( $r=0.91$  to  $0.96$  for most pollutants i.e., PM<sub>2.5</sub>, NO<sub>2</sub>, CO and CO<sub>2</sub> sequestered, with  $p<0.05$  for all of these). (Table 5)

Since the correlations for abundance of Euphorbia with pollutant removal were observed to be very high and statistically significant, regression equations were estimated.

Abundance *Euphorbia* vs NO<sub>2</sub> removal:  $y = 459.32x - 823.75$ ,  $R^2 = 0.9071$

Abundance *Euphorbia* vs PM<sub>2.5</sub> removal:  $y = 177.67x - 318.09$ ,  $R^2 = 0.9089$

Abundance *Euphorbia* vs CO removal:  $y = 81.417x - 145.84$ ,  $R^2 = 0.9092$

Abundance *Euphorbia* vs SO<sub>2</sub> removal:  $y = 221.5x - 396.66$ ,  $R^2 = 0.9095$

Abundance *Euphorbia* vs CO<sub>2</sub> sequestered:  $y = 719.05x - 1287.3$ ,  $R^2 = 0.9088$

## Discussion

PM<sub>2.5</sub>, NO<sub>2</sub> and NO are dangerous pollutants which adversely affect human health and environment. They inflame lung epithelium; reduce immunity causing/aggravating short and long-term conditions like wheezing, coughs, asthma, colds, influenza and bronchitis. Pollutants also increase the mortality from bronchial asthma, chronic bronchitis, lung cancer and heart disease.

Reducing pollution will thus have a huge positive effect on health. Pollution removal is directly proportional to higher vegetation in an area. As PM<sub>2.5</sub> and NO<sub>2</sub> levels increase the PM<sub>2.5</sub> and NO<sub>2</sub> removal decreases and vice versa. Increased frequency abundance and density of plants reduces pollutants. Areas with higher vegetation

and lower pollution levels will have higher pollution removal, in-turn lowering mortality rate and morbidity.

Results of carbon sequestration were found to be in tune with the effect of pollution removal seen in proportion to plants. Carbon sequestration describes long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change. Trees play major role in carbon sequestration.

Regression equations were computed for abundance of *Euphorbia* (independent variable) and pollution removal (dependent variable). Equations indicated the resultant change in pollutant removal with each unit change in abundance of plants, eg. taking  $x = 2$  in all equations i.e. doubling abundance of *Euphorbia*, we find that removal of  $\text{NO}_2$ ,  $\text{PM}_{2.5}$ ,  $\text{CO}$ ,  $\text{SO}_2$  and  $\text{CO}_2$  (sequestered) will increase by 94.9g, 37.25g, 17g, 46.34g and 150.8 kg respectively.

### Conclusion

India takes a step with National Clean Air Programme to focus on real time monitoring stations, research and pollution control.<sup>5</sup> Countries like Norway have made the transition from coal to renewable energy. Milan, Italy plans to plant three million trees by 2030 which will absorb 5 million tonnes of carbon dioxide a year and remove  $\text{PM}_{2.5}$  by 3000 tonnes over decade, helping reduce temperatures by  $2^\circ\text{C}$ .<sup>6</sup>

The Indian policy makers need to realise that the more they wait, the more they will lose on environment,

public health and economy. We need to plant more and more trees, for a cleaner change and a better community health.<sup>7</sup>

**Funding:** Amity University

**Ethical Clearance:** No ethical issues envisaged

**Conflict of Interest:** Nil

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# A Trailer of Health Care Spending in Indian Scenario

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## Abstract

**Background:** Health care spending is an important public health issue, liable for public health expenditure of the country which influences life expectancy of the citizen. The roots of health care spending are complex and sensitive but inevitable. The average life span of an Indian is ranging to 59.3 years which is comparatively less with other developing countries of Asia.

**Objectives:** The objective of the current study is to estimate the value of per capita health of India and to access the factors associated with the Health care spending of an average Indian.

**Method:** A cross sectional study conducted from January 2019 to June 2019 among the components of health care services in and around Chennai city. House-to-house interview was conducted using pre-designed and pre-tested questionnaire with likert scale on health care spending. The sample size is 160 families. Data are analyzed with proportions, linear regression model, dispersion and other diagrammatic representation – histograms and pie diagrams are used.

**Result:** The overall spending on health care issue is less than 2 percent of the total family income. People are not interested in spending money to maintain the health and are ignorant with health issues and also knowledge regarding medical insurance and other public health programs. The prevalence of such ignorance in non-communicative diseases is higher and medication with local pharmacist is a common phenomenon.

**Keywords:** HDI, per capita, health, WHO, health care, per capital expenditure.

## Introduction

Development is a process of migration from the given position to the better position. The Indian economic development is also moving towards the better position, in terms of Human Resource Index (HDI). India's HDI value for 2017 is 0.640 increased from 0.624 in 2016. The post liberalization era has witnessed an increase of nearly 50 percent in value of HDI, irrespective of millions of people in poverty which is a notable achievement in Indian history as the HDI value in 1990 is only 0.427.

According to United Nations Development Programme, India is ranked 130<sup>th</sup> position among 189

countries and positioned above the average of 0.638 for the region. Neighboring countries with similar demographic conditions like Bangladesh and Pakistan, have reached only 136<sup>th</sup> and 150<sup>th</sup> position respectively. However, India can achieve new heights, subject to the change in the health care spending which restrain the growth of Human Development Index. As on this date, the per capita expenditure on health is at a dismal \$63 which is lesser than Bhutan and Sri Lanka.

According to World Health Statistics Report 2018, India's per capita health expenditure is the lowest compared to other developing countries of Asia. China's per capital spending on health is \$ 426, Thailand \$217, Malaysia \$386, Philippines \$127, Sri Lanka \$118, Indonesia \$112 and Bhutan \$91, but Pakistan is spending only \$38. This indicates that investment on health care spending will improve the Human Development Index. In easy words, the country which has higher per capita expenditure on health, achieved higher Human Development Index.

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## Methodology

The current study focuses on impact of Health Care Spending on Economic Development in terms of per capita health. For this purpose, a pilot study was conducted with 20 samples. Based on the pilot study, Pre-designed and Structured Questionnaire was prepared and sample survey was conducted during the period January 2018 to June 2018.

### Hypothesis:

$H_0$  : Health Care Spending influences the Human Development Index of the nation.

$H_1$  : Health Care Spending not influences the Human Development Index of the nation.

### Data Collection:

Sample Size	: 160 Families
Type of Data	: Primary data
Area of Sampling	: In and around Chennai City, Tamilnadu, India
Method of sampling	: Random Sampling
Initiation of study	: Pilot study on HCS
Statistical tools used	: Proportions, Chi-square test and pictorial representation
Source of data	: Both primary data and Secondary data

**Review of Literature:** There are many recent studies are conducted relating to Human Development Index and health care spending. Some of the studies supports the present discussion.

Simon Grimaetal<sup>1</sup>The average public spending in Mediterranean countries spends less on total healthcare expenditure than the European Union Average both in terms of GDP proportion and per capita spending on health. The overall health infrastructure is comparatively good but delivery of health service by physician is not significant.

George J Schieber, Jean-Pierre Poullier<sup>2</sup>. The united states spends more on healthcare spending in terms of GDP proportion compared to any other countries and Physician-Population Ratio is average for the OECD countries. In terms of inpatient medical care beds, physician visits, hospital days and average length of stay are lowest in OECD countries which are much higher in united states.

William D Savedoff<sup>3</sup> this study throws light on importance of per capita health spending and provides 5 different approaches to improve the public health care spending. When a country reaches five percent of its national income on health care spending, result in developmental activities of the nation improves in reaps and bounds which in turn significant values on economic indicators.

Irene Papanicolas, Liana R Woskie and Ashish K. Jha<sup>4</sup> some explanations for high spending, social spending and health care utilization in the United states did not differ substantially from other high-income nations, Prices of labour and goods, including pharmaceuticals and devices, and administrative costs appeared to be the main drivers of the differences in spending.

Jennifer Prah Ruger, Hak Ju Kim<sup>5</sup> the current article made an attempt to measure out-of-pocket health care spending their burden ratio, that is out-of-pocket spending burden ratio employing household equivalent income in Korea Republic. The lowest income people spent 12.5 percent of their total income out of pocket on medical expenditures, which was 6 times that of highest income group (2 percent). The factors influencing the healthcare spending are socioeconomic status, insurance type, healthcare facilities and socio demographic variables. Korean has highest out-of-pocket spending burden ratio.

**Pragmatic Approach:** The practical difficulty in choosing the econometric tool is to measure the per capita spending of health resulted in analyzing the health spending, started from income factor, not the individual but the family income. The Education level and proximity of health care components, like hospitals and medical clinics etc are also included while measuring the per capita spending on health. Different medical systems are available to the public which influences the medical spending of the medical customer i.e., the patients. The affordability of medical expenses is also the deciding factor of health care spending. The current study considered several approaches to express the per capita spending and finalized with the linear regression model to calculate the per capita spending on health.

**Simple Linear Regression Model:** Before running the multiple regression for health care spending with five variables, it is decided to express the influence each variable to the health care spending, for the purpose of

better understanding, simple linear regression model is applied with each variable to the health care spending

$$Y_1 = \beta_0 + \beta_1 X_1 \text{ - Family Income}$$

$$Y_2 = \beta_0 + \beta_1 X_2 \text{ - literacy level}$$

$$Y_3 = \beta_0 + \beta_1 X_3 \text{ - proximity of health care components}$$

$$Y_4 = \beta_0 + \beta_1 X_4 \text{ - alternative medical treatment}$$

$$Y_5 = \beta_0 + \beta_1 X_5 \text{ - affordability of medical expenses}$$

Out of five independent variables, family income and proximity of health care components influence more than the other three variables such as literacy level, alternative medicine and affordability of medical expenses.

**Multiple Regression Model:** In order to calculate the per capita spending on health, linear regression model is framed with the specific variables.

A multiple linear regression model with 5 predictor variables  $X_1, X_2, X_3, X_4$  and  $X_5$  and a response  $Y$ , can be written as

$$Y = \beta_0 + \beta_1 X_1 + \beta_1 X_2 + \beta_1 X_3 + \beta_0 + \beta_1 X_4 + \beta_1 X_5 + \mu$$

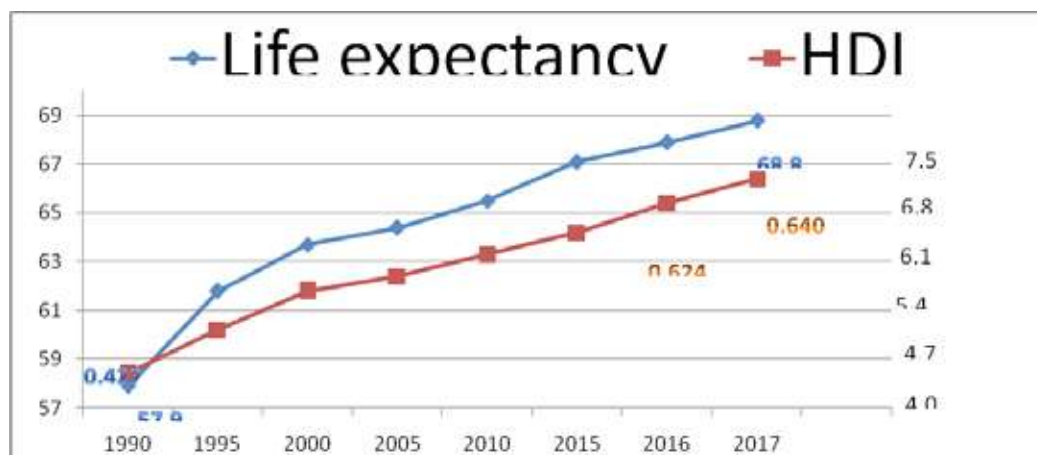
Where  $Y$  is cost of health spending,  $\beta_0$  autonomous spending on health,  $\beta_1$  the regression coefficient of Family income  $x_1$ ,  $\beta_2$  is the regression coefficient value of literacy level of the respondents  $x_2$ ,  $\beta_3$  is the regression coefficient value of proximity of health care components  $x_3$ ,  $\beta_4$  is the regression coefficient value of alternative medical treatment  $x_4$  and  $\beta_5$  is the regression

coefficient value of affordability of medical expenses  $x_5$ . The term  $\mu$  is the residual term.

Instead of simple linear, while conducting multiple regression model, negligence amount of spending attitude towards the health care spending. The family income coefficient  $\beta_1$  and proximity of health care components  $\beta_3$  have positive effect with health care spending and the other three variables such as literacy level, alternative medicine and affordability of medical expenses are having relative influence over the health care spending. On order to find the impact of Health Development Index (HDI), the life expectancy is compared with HDI under the discussion of current status of India in Global health ranking.

**India’s Position in Global Health ranking:**

During the post liberalization era of Indian economy i.e., from 1990, she has witnessed tremendous growth in both quantitative and qualitative economic indicators. During the period from 1990 to 2017, the Gross National income has increased nearly 266 percent and the Human Development index has increased nearly 50 percent, from 0.427 to 0.640 in the same period. These two economic indicators are the right elements understand that India march passing towards the successful path in lifting millions of Indians out of poverty. It is to be noted that within the year it has increased 0.16 points in HDI as it is 0.624 in 2016 and 0.640. The movement in the HDI has made positive changes in education, income and health. This steady growth of HDI improves the economic process in the economy mainly in the per capita spending on health. The following diagram (fig. 1) shows the comparative chart of life expectancy and HDI in India during 1990 -2017.



Source : timesofindia.com<sup>6</sup>

**Fig. 1: Comparison of HDI and Life expectancy**

**Health Care Spending–per capita health:** The result of this minor project pave way for the awareness of health related issues particularly in the developing countries like India. As for as the relation between health spending and the family income is concerned, there is an insignificant portion of family income spent for the health purpose. It is not even two percent of the total income. The current study surprisingly understood that literacy level on health care spending has negative correlation with the health care spending. This is mainly due to lethargically spending attitude of the middle income group of the nation. Easy going and sense of expediency influence the poor spending of health care issues. The vital factor for the poor healthcare spending is the non-availability of health care components in the local areas. In easy words, proximity of health care components shows a positive symptom for the health care spending which indicates that nearby health clinics and health care centers induces the public to spend on health related issues. In other words, transportation cost and boarding cost restricts the health consultations and treatments.

**Findings:** Based on the observation and the primary data collected, Health Care Spending influences the Human Development Index of the nation

### Discussion

Now-a-days the consultation fees of medical practitioners and cost of medicine are not affordable by majority of the public. This happens mainly due to business motive of health care centers and fees structure of private medical institutes. Medical profession becomes artificial hereditary nature as father or mother is doctor, then son or daughter of the respective couple are becoming doctor. Most of the doctors try to marry another doctor only for professional convenience. If this extends, there will be new caste called medical caste (MC) in near future.

### Conclusion

The government of India is devoted to improve the health in terms quality of the life for its entire people.

The success of India’s national development schemes like Beti Bachao Beti Padhao, Swachh Bharat, Make in India and initiatives aimed at universalizing the school education and health care, will be crucial in ensuring that the upward trend on human development accelerates and also achieve the Prime Minister’s vision of development for all the key principle of the Sustainable Development Goals – to leave no one behind.

**Ethical Clearance:** Completed. (Dept. level committee at VELS).

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Effect of Balance Training on Health Related Quality of Life in Patients with Chronic Obstructive Pulmonary Disease (COPD)

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## Abstract

**Objective:** There is a need to find the effect of balance training with pulmonary rehabilitation in subjects with COPD. The Purpose of this study is to find the effectiveness of balance training with pulmonary rehabilitation on improvement of balance, exercise tolerance, health related quality of life and risk of falls.

**Method:** A 20 moderate COPD subjects randomised into experimental group and control group. The experimental group with 10 subjects were treated with balance training along with pulmonary rehabilitation and control group with 10 subjects were treated with pulmonary rehabilitation for eight weeks. The outcome measurements such as Berg Balance Scale, Timed Up and Go Test, Activities Balance Confidence (ABC) scale, 6 minutes walk test and St George Respiratory Questionnaire was measured before and after 8 weeks of intervention in both the groups' subjects.

**Results:** There is a statistically significant difference ( $p < 0.05$ ) in means of balance measures, Six minutes walk test, and St. George respiratory questionnaire between the groups. There is no statistically significant difference in St. George respiratory questionnaire components- Symptoms, and Activity score between the groups.

**Conclusion:** The subjects with moderate COPD shown greater improvement in balance, exercise tolerance, health related quality of life and reduced risk of falls in pulmonary rehabilitation with balance training

**Keywords:** Moderate COPD, balance, Berg Balance Scale, Timed Up and Go Test, , Activity specific balance Scale, health related quality of life.

## Introduction

The GOLD defines that "Chronic Obstructive Pulmonary Disease (COPD) is a preventable and treatable disease with some significant extra pulmonary

effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible.<sup>1-4</sup> In India according to chest clinics nearly 25-30 % of cases data are COPD.<sup>3</sup> COPD is ranking 3rd in 2020 in global burden of disease and it is one of the most important cause of death worldwide.<sup>5</sup>

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COPD is recognized as a systemic disease associated with a broad array of physical and functional limitations<sup>6</sup>. The skeletal muscle performance deteriorate in COPD

by reduced muscle mass, fibre type profile, strength and endurance.<sup>7</sup> Studies have proven that patients with mild COPD shown a significant reduction in skeletal muscle endurance and strength compared with healthy and sedentary subjects.<sup>5</sup> Balance and mobility are the important elements of most of the activities of daily living. Studies have shown that due to hypoxia to peripheral muscles in COPD there is reduced muscle strength that impairs balance.<sup>7</sup>

Recent Studies have also shown that there is reduced static as well as dynamic balance in patients with COPD.<sup>8,9</sup> Studies have also shown that there is reduction in the functional balance and mobility in individuals with COPD relative to healthy controls in western population. This reduction may be due to systemic effects of COPD.<sup>7</sup>

The exercise component of pulmonary rehabilitation includes upper limb, lower limb, and respiratory muscle training but balance training is not considered in the standard guidelines of pulmonary rehabilitation.<sup>10</sup> From the literature it is evident that individuals with COPD has defects in balance control that is associated with an increased risk of falls.<sup>5</sup>

The aim of the study is to find the effectiveness of balance training with pulmonary rehabilitation on improvement of balance, exercise tolerance, health related quality of life and risk of falls in subjects with moderate COPD.

## Methodology

The approval for the study was obtained from the scientific and Research Ethical committee of RGUHS. Subjects included in the study were referred by Pulmonologist and the physician diagnosed with moderate COPD based on spirometry test FEV1/FVC < 0.70 and FEV1  $\geq$  80%, age group between 40-60 years<sup>5,6</sup>.

Subjects were excluded with pathological condition affecting muscle, joint and bone such as rheumatoid arthritis, cardiovascular conditions like ischemic heart disease. Subjects who met inclusion criteria was allotted into Experimental Group and control Group. The purpose of the study was explained to the subjects and the informed consent was obtained from the subjects.

**Intervention procedure for Experimental group:** In this group, subjects received balance training and pulmonary rehabilitation program.

**A. Conventional Pulmonary Rehabilitation:** Consists of 60 minutes rehabilitation program with adequate rest period for 3 days a week for 8 weeks and has 4 main components consistent<sup>10</sup> during both endurance and resistance training

**1. Supervised Endurance Exercise Training:** Subject received an individualized exercise training in the form of walking was given 3 times in a week and advised the subjects to do walking at home based on the Rate of perceived Exertion. A Borg score of 5–6 for dyspnoea or fatigue was set as a target. The progression in the walking endurance was made by increasing the distance based on RPE.

**2. Upper and Lower extremity Strength Training:**<sup>11,12</sup> Upper extremity strength training includes biceps, triceps and deltoids and lower extremity training includes quadriceps, hamstrings, hip flexors, hip extensors and hip abductors using free weights. The amount of resistance based on subject's ability to complete 10-15 repetitions. Progression includes increased resistance and number of sets. During both endurance and resistance training, subjects were asked to rate their dyspnea and leg fatigue using a visual analog scale (Borg 0-10) to monitor their exercise intensity and document to progress their intensity of exercises.

**B. Balance Training:** Training consists of 15-20 minute session 3 times per week for 8 weeks by using Circuit training include standing exercises, transition exercises, ambulatory exercises and functional exercises for balance.<sup>12-14</sup>

**Intervention procedure for Control group:** Subjects in this group received 60 minutes of conventional pulmonary rehabilitation program for 3 days a week for 8 weeks.

**Outcome Measurements:** The assessment of balance by using, Berg Balance Scale, Timed Up and Go Test, Single limb stance time, Activities Balance Confidence (ABC) scale, Assessment of risk of falls using Elderly falls screening test, Exercise tolerance capacity by using 6 minutes walk test and for health related quality of life using St George Respiratory Questionnaire was measured before and after 8 weeks of intervention.

## Statistical Method

Descriptive statistical analysis was carried out and presented as mean  $\pm$  SD. Significance was assessed at 5 % level of significance with p value was set at 0.05. To analyses the variables pre to post test within the groups, 'paired t test' and 'Wilcoxon signed rank test' were used. To compare the variables between the groups, Independent 't' test and Mann Whitney U test were used.

## Results

The study was conducted on total 20 subjects (Table-1) in experimental group there were 10 subjects with mean age 55.20 years and in each Group. Analysis with in Experimental and control group (Table-2) shows

that there is a statistically significant difference ( $p < 0.05$ ) in pre to post-intervention means of variables measured for balance, exercises tolerance, risk of falls and health related quality of life.

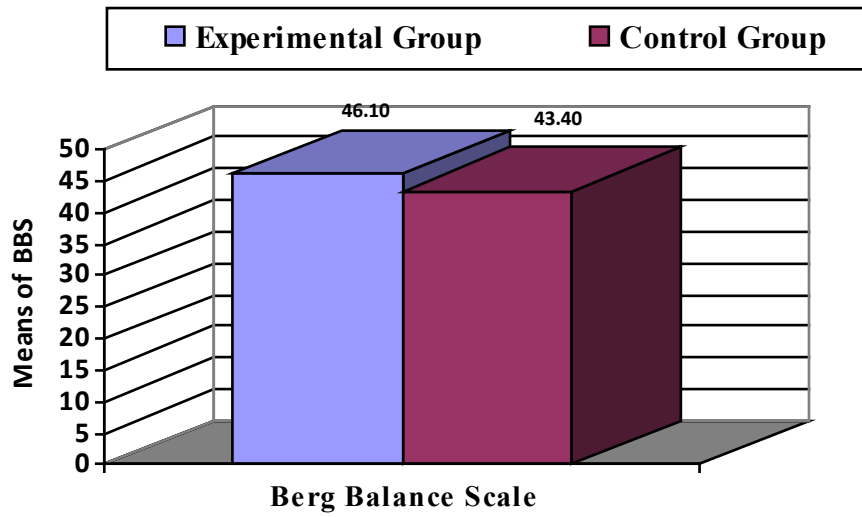
Comparative analysis of means of variables measured between the Experimental and control group shown that there is a statistically significant difference ( $p < 0.05$ ) in means of balance measurements, exercises tolerance, risk of falls and St. George respiratory questionnaire. There is no statistically significant difference in St. George respiratory questionnaire components- Symptoms, and Activity score between the groups. (Graph 1-4).

**Table 1: Characteristics of the subjects**

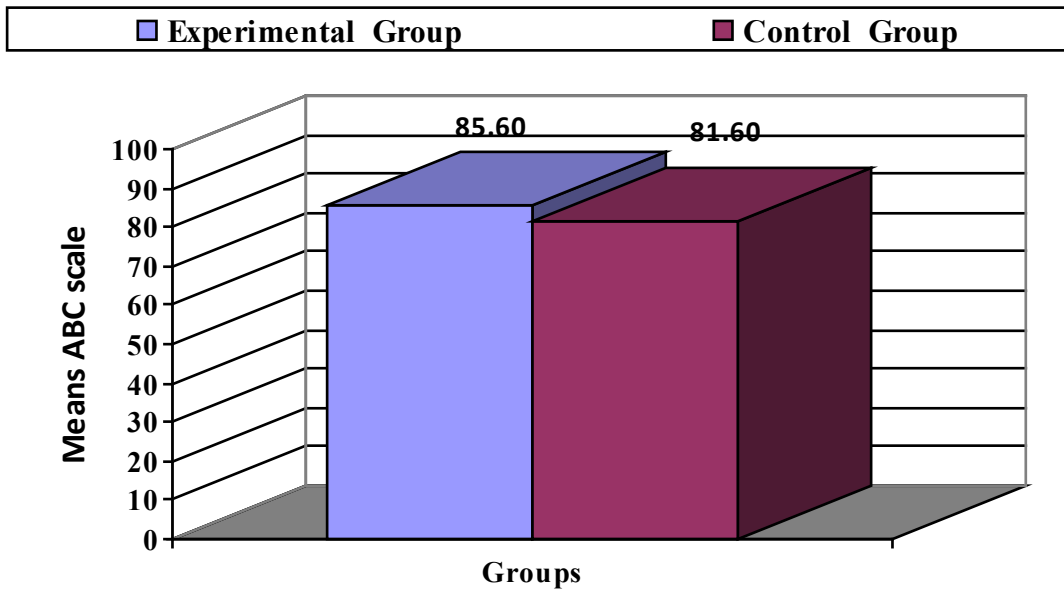
		Experimental Group		Control Group		Significance
Number of subjects studied (n)		10		10		--
Age in years (Mean $\pm$ SD)		55.2 $\pm$ 3.35		55.2 $\pm$ 4.59		p= 0.858 (NS)
Gender	Males	8	80%	7	70%	--
	Females	2	20%	3	30%	

**Table 2: SHOW THE BBS, TUG, SLST, ABCS, Six minutes test, EFST, and St. George questionnaire- Pre and post measurements within the experimental group and control group**

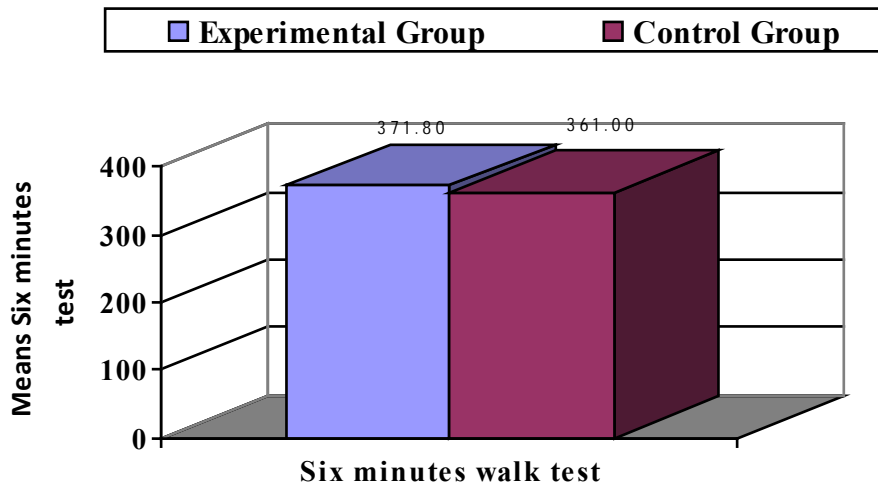
Experimental Group	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	Control Group – Pre Mean $\pm$ SD	Control Group – Post Mean $\pm$ SD
Berg Balance Scale (BBS)	39.00 $\pm$ 0.66	46.10 $\pm$ 0.56	36.30 $\pm$ 0.67	43.40 $\pm$ 1.07
TUG-Timed Up and Go Test in sec (TUG)	16.90 $\pm$ 0.99	12.60 $\pm$ 0.51	16.80 $\pm$ 0.78	14.15 $\pm$ 0.58
Single limb Stance time (SLST) in sec	16.20 $\pm$ 1.98	23.50 $\pm$ 1.35	15.30 $\pm$ 1.25	20.40 $\pm$ 0.84
Activities Balance Confidence (ABC) scale	78.90 $\pm$ 1.10	85.60 $\pm$ 0.96	79.30 $\pm$ 0.67	81.60 $\pm$ 1.17
Elderly Falls Screening Test (EFST)	3.80 $\pm$ 0.42	0.80 $\pm$ 0.42	4.00 $\pm$ 0.47	1.90 $\pm$ 0.56
Six minutes test	311.50 $\pm$ 6.68 (300-320)	371.80 $\pm$ 9.25	310.50 $\pm$ 16.40	361.00 $\pm$ 7.74
St. George: Symptoms	68.49 $\pm$ 5.14	47.75 $\pm$ 5.55	67.22 $\pm$ 8.40	48.50 $\pm$ 4.58
St. George: Activity Score	63.26 $\pm$ 7.18	45.82 $\pm$ 8.02	64.24 $\pm$ 9.71	50.26 $\pm$ 5.98
St. George: Impact score	44.03 $\pm$ 7.74	26.82 $\pm$ 5.67	44.13 $\pm$ 4.92	36.31 $\pm$ 5.07
St. George: Total score	53.90 $\pm$ 3.02	36.06 $\pm$ 3.88	54.06 $\pm$ 2.58	44.87 $\pm$ 3.02



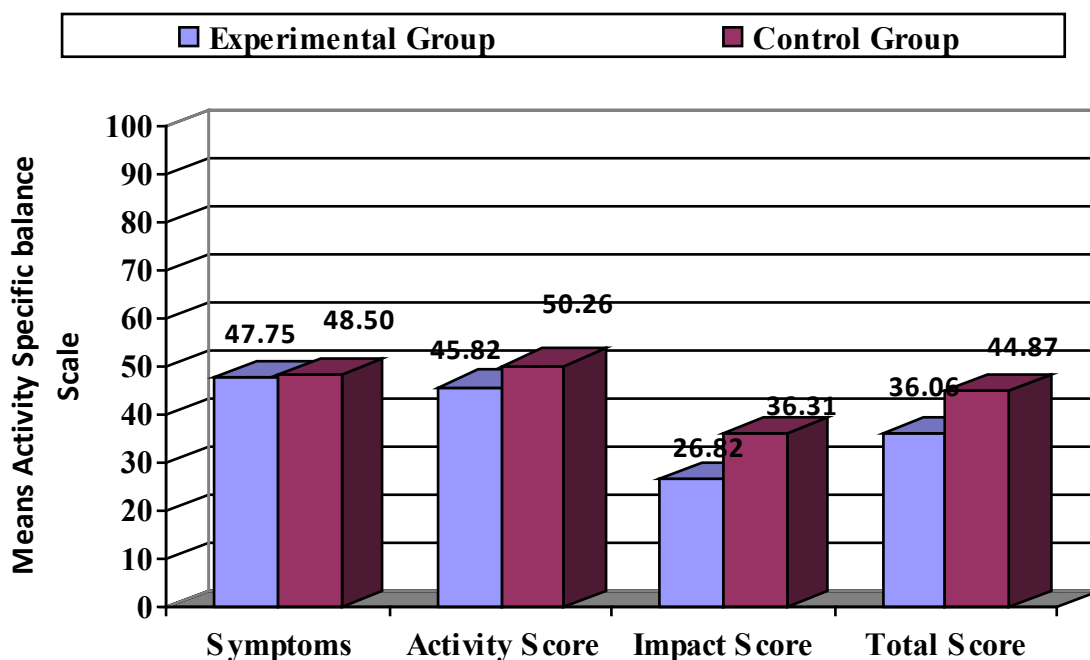
Graph 1: Comparison of POST means of Berg Balance Scale between Experimental and Control Group



Graph 2: Comparison of post means of Activities Balance Confidence (ABC) scale between Experimental and Control Group



Graph 3: Comparison of post means of Six minutes test between Experimental and Control Group



**Graph 4: Comparison of post means of St. George respiratory questionnaire Experimental and Control Group**

### Discussion

The present study has found that eight weeks of balance training with pulmonary rehabilitation given in experimental group and pulmonary rehabilitation without balance training given in control group shown there is a significant improvement of health related quality of life, balance, exercise tolerance and reduction in risk of falls in subjects with moderate COPD. When the improvements in Experimental group was compared with control group shown that there is a statistically significant difference in means of balance, health related quality of life, exercises tolerance and risk of falls.

The improvement in health related quality of life, balance and exercise tolerance in both the groups could be because of effect of pulmonary rehabilitation program. In our study both the group subjects received the same program of pulmonary rehabilitation. Exercises given in pulmonary rehabilitation induces changes in the biochemistry of muscle cells that increases the tolerance of higher levels of activity which is associated with improvement in exercise tolerance.<sup>15,16</sup> Stav et al (2009) in their study, Pulmonary rehabilitation found that there was increase in exercise endurance time which was assessed at six-month intervals up to three years.<sup>17</sup>

A study has been found that after individualized pulmonary rehabilitation program there was a significant

effect on improvement in dyspnea peak and the maximal heart rate in 6MWT, it was stated that this could be due to improved physical conditions response to exercise which decreased sensation of dyspnea<sup>29</sup> and by some physiological changes like better cardiac adaptation, decrease in lactic acid production and reduction in metabolic cost of exercise. The relationship between muscle weakness and postural instability is well established in older adults; it is likely that the small improvements in balance observed in this study were due to the strength training component of PR, albeit of low-intensity.

Comparative analysis of means of variables measured between the Experimental and control group shown that there is a statistically significant difference ( $p < 0.05$ ) in means of balance measurements and exercises tolerance measurements and St. George respiratory questionnaire components- impact and total score between the groups with large effect size. There is no statistically significant difference in St. George respiratory questionnaire components- Symptoms, and Activity score between the groups with small effect size. The greater percentage of improvement found in experimental than control group. This could be due to the effect of balance training along with pulmonary rehabilitation. In both the groups following pulmonary rehabilitation shown significant effect in reduction

of symptoms where as there is significant difference between the group, therefore the addition of balance with pulmonary rehabilitation may not have significant effect on improvement of symptoms.<sup>18</sup>

Studies have shown the effect of balance training with pulmonary rehabilitation on improvement of various balance related outcome measures. Decrease in the skeletal muscle performance is seen in COPD which is exhibited by reduced muscle mass, fibre type profile, strength and endurance,<sup>7</sup> a significant reduction in skeletal muscle endurance and strength is found in subjects with mild COPD compared with healthy and sedentary subjects<sup>5</sup> and the quadriceps fatigability is more in individuals suffering from COPD compared to healthy control subjects.<sup>19,20</sup>

This could be because of increased load and oxygen need of respiratory muscles in COPD and reduced venous return that competes with an impaired delivery of oxygen to the limb muscles.<sup>15,20</sup>

The study was conducted on small sample size. The eight weeks of balance training with pulmonary rehabilitation given in experimental group found there is a significant effect on improvement of health related quality of life, balance, falls and exercise tolerance in subjects with moderate COPD,

Further study can be studied to find the effect of balance training along with pulmonary rehabilitation on muscle strength and endurance that related to effect on muscle mass, aerobic capacity, pulmonary function test.

### Conclusion

The study concludes that pulmonary rehabilitation with or without balance training for subjects with moderate COPD found statistically and clinically significant effect on improving variables measured for balance, exercise tolerance, Health related quality of life and risk of falls. However adding balance training with pulmonary rehabilitation found greater percentage of improvement in balance, exercise tolerance, health related quality of life and reduced risk of falls in subjects with moderate COPD.

**Conflicts of Interest:** None

**Source of Funding:** Self

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# Factors Associated with Achieving Hematological Response in CML (Chronic Myeloid Leukemia) Patient

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## Abstract

**Background:** The goal of CML therapy is to achieve complete hematological response first, then cytogenetic response and complete molecular response at the very end. Achieving a complete hematological response is the easiest and relatively inexpensive to detect. Several factors are thought to have an association with achieving hematological response. This study sought to determine the factors associated with achieving hematological response in CML patients

**Method:** We conducted an observational retrospective cohort study of CML patients at Wahidin Sudirohusodo Hospital and its network on 2018-2019 period. Diagnosis was done by positive BMP (Bone Marrow Punctie) results for CML, then a monthly blood check until a hematological response was achieved.

**Results:** There wer 39 research subjects, 19 male (48.7%) and 20 female (51.3%). No association found between age, gender and achievement of hematological response. Type of therapy was significantly correlated with the achievement of hematological response, with the highest number found in Nilotinib therapy compared to other group. (54,1%;  $p = 0.046$ ) Subjects who achieve hematological response had a lower percentage of blast cells. (6.1% vs. 7.9% ;  $p = 0.016$ )

**Conclusion:** The use of Nilotinib therapy was significantly associated with a succesful achievement of hematological response. A lower percentage of blast cells was found in CML patients who achieved hematological response.

**Keywords:** CML, factors, complete hematological response.

## Introduction

Chronic myelocytic leukemia (CML) is a chronic myeloproliferative disease caused by genetic defects obtained in pluripotent stem cells that are characterized by the presence of the philadelphia (Ph) chromosome with a main consequence as the fusion of ABL and BCR genes on chromosome 22.<sup>1,2</sup>

CML is 14% of all leukemias and 20% of leukemia in adults. The incidence per year is 1.6 cases per 100,000 adults with a slightly dominant male. Data on CML in Indonesia in 2018 obtained 2,374 patients, mostly in the area of Surabaya as many as 516 patients, at least in Banda Aceh as many as 40 patients, in Makassar obtained a total of 110 pasien.<sup>3</sup>

The goal of CML therapy is to achieve complete hematological response at first, then cytogenetic response and complete molecular response at the very end.<sup>4,5</sup> Achieving a complete hematological response is the easiest and relatively inexpensive to detect. Several factors are associated with the achievement of hematological response. Singh and colleagues

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stated older age and female sex were related with a poor achievement of haematological, cytogenetic and prognostic responses.<sup>6</sup> Type of therapy also has an association with achieving hematological response. Breakthroughs in molecular targets of tyrosine kinase inhibitor (TKI) have brought changes in the history of disease and in therapeutic approaches to the treatment of CML patients. The high percentage of blast cells number is a poor prognostic factor and hematological response in CML disease. We sought to study various factors associated with achievement of hematological response in CML patients

## Method

This study was a retrospective cohort study by observational analysis of CML patients at Wahidin Sudirohusodo Hospital Makassar, on the period of 2018-2019. Inclusion criteria were CML patient, age  $\geq 18$  year. Exclusion criteria were (1) Other myeloproliferative diseases (2) Patients with acute infections. CML diagnosis was done by BMP (Bone Marrow Puncture) analysis showing CML pattern.

The types of therapy given to the subjects of this study were the hydroxy urea, imatinib and nilotinib. The percentage of blast cells obtained from BMP results at the beginning of the study. Monthly Complete Blood Count and differential count examination was done until a complete hematological response is achieved (Platelets

$\leq 450 \times 10^9 / L$ , Leukocytes  $\leq 10 \times 10^9 / L$ , and normal differential count) Statistical analysis was done using *Statistical Package for Social Science (SPSS) v.22 (IBM®)* with 95% confidence interval. Non parametric analyses was done using *fisher test* and *Mann Whittney U test* for comparison between groups.

## Results

Baseline characteristics of the 39 study subjects are displayed on Table 1. Female gender predominates over male gender (51,3% vs. 48.7% respectively). The mean age was  $40.2 \pm 13.3$  years.

**Table 1. Baseline Characteristics of The Study Subjects**

Variable		n	%
Gender	Male	19	48,7
	Female	20	51,3
Type of Therapy	Hydroxy Urea	14	35,9
	Imatinib	8	20,5
	Nilotinib	17	43,6
CML Phase	Chronic Phase	36	92,3
	Acceleration Phase	1	2,6
	Remission Phase	2	5,1
Hematological Response	Achieved	24	40,9
	Not Achieved	15	39,1

**Table 2. Baseline Hematological Characteristics of The Study Subjects**

Variable	Minimum	Maximum	Mean	Std. Deviation
Blast Cell (%)	2	15	6,8	2,3
Leucocyte	1.400	163.700	2.5587,2	36.141,2
Trombocyte	35.000	1.083.000	277.284,6	242.183,4

The types of therapy given consisted of Hydroxy Urea to 14 study subjects (35.9%), Imatinib to 8 research subjects (20.5%), and Nilotinib to 17 research subjects (43.6%). In this study, 36 research subjects (92.3%) experienced chronic phase CML, 1 research subject (2.6%) experienced acceleration phase CML, and as many as 2 research subjects experienced remission phase CML (5.1%). Achievement of hematological responses

in research subjects by 24 research subjects (40.9%), and that was not achieved by 15 research subjects (39.1%).

Table 2 shows the percentage of Blast cells ranging from 2-15% with an average of  $6.8 \pm 2.3\%$ . The number of leukocytes ranged from 1.400 - 163.700 with an average of  $25.587.2 \pm 36.141,2$ . Platelet counts ranged from 35.000-1.083.000 with an average of  $277.284,6 \pm 242.183,4$ .

**Table 3. Association between age group and hematological response achievement**

Age		Hematological Response		Total	p (C.I. 95%)
		Achieved	Not Achieved		
< 40 years old	n	12	9	21	0,542
	%	57,1%	42,9%	100,0%	
≥ 40 years old	n	12	6	18	
	%	66,7%	33,3%	100,0%	
Total	n	24	15	39	
	%	61,5%	38,5%	100,0%	

Table 3 shows the achievement of hematological response at age ≥ 40 years was higher than at age <40 years (66.7% vs. 57.1% respectively). However, no significant association was found between age and hematologic responses achievement (p = 0.542).

**Table 4. Association Between Gender and Hematological Response Achievement**

Gender		Hematological Response		Total	p (C.I. 95%)
		Achieved	Not Achieved		
Male	n	11	8	19	0,648
	%	57,9%	42,1%	100,0%	
Female	n	13	7	20	
	%	65,0%	35,0%	100,0%	
Total	n	24	15	39	
	%	61,5%	38,5%	100,0%	

Successful hematological response was seen more in female subjects than male subjects (65% vs. 57.9% respectively), as shown in Table 4. There was no statistically significant association between gender and hematological responses achievement (p = 0.648).

**Table 5. Type of Therapy And Its Conjunction with Hematological Response Achievement**

Type of Therapy		Hematological Response		Total	p (C.I. 95%)
		Achieved	Not Achieved		
Hydroxy Urea	n	5	9	14	0,046
	%	35,7%	64,3%	100,0%	
Imatinib	n	6	2	8	
	%	75,0%	25,0%	100,0%	
Nilotinib	n	13	4	17	
	%	76,5%	23,5%	100,0%	
Total	N	24	15	39	
	%	61,5%	38,5%	100,0%	

Table 5 shows hydroxy urea therapy resulted in the hematological responses achievement of 5 subjects (35.7%), less than those who did not achieve hematological responses (n = 9 ; 64.3%). Imatinib therapy resulted in the hematological response achievement of 6 subjects (75%); a higher number than those who did not achieve hematological responses. (n = 2 ; 25%) Nilotinib therapy, resulted in the hematological response achievement of

13 subjects (76.5%), a higher number than those who did not achieve a hematological response (n = 4 ; 23.5%) . A significant association between types of therapy with the achievement of hematological response (p = 0.046). Nilotinib therapy resulted in the highest number of hematological response achievement, compared to Imatinib and Hydroxy Urea therapy (54,1% vs. 25.0% vs. 20.9% respectively).

**Table 6. Comparison of Blast Cell Percentage In Different Hematological Response Achievement**

Hematological Response	n	Mean (%)	SD	p (C.I. 95%)
Achieved	24	6,1	1,8	0,016
Not Achieved	15	7,9	2,6	

The mean of blast cell was found to be significantly lower in subjects who achieved a hematological response compared to subjects who did not (6.1% vs. 7.9% respectively,  $p = 0.016$ ).

### Discussion

**Age:** Subjects who achieved hematological response at age  $\geq 40$  years (66.7%) was higher than at age  $< 40$  years (57.1%). However, there is no statistically significant association between age and the achievement of hematological response.

Increasing age was commonly associated with CML development into an advanced stage. Research conducted by Cortes and colleagues, showed that patients treated with Imatinib achieve a better hematological response and cytogenetic response in patients under 65 years compared with those above 65 years of age, but there is no significant correlation between age and induction remission of hematology.<sup>7</sup> Research conducted by Safaa and colleagues in Egypt found there was no significant difference between age, gender, and social status in achieving therapeutic targets.<sup>8</sup>

Age is related to tolerability and poor adherence so it influences the response of therapy. Old age experiences many drugs side effects of both hematological and non-hematological compared to young age. Research by Rosti and colleagues found that old age was associated with poor prognostic factors for outcome in CML Philadelphia chromosome (+) patients.<sup>9</sup> Arora's study explained that age also affect drug pharmacokinetics, besides adherence, number of transporters, drug interactions and drug - plasma protein binding.<sup>10</sup>

**Gender:** In this study, there was no significant difference in the percentage distribution of hematological responses achievement between male and female, although it was seen to be higher in female (65%) than in male (57.9%) ( $p = 0.648$ ). No significant association was found between gender and the achievement of hematological responses.

Research by Singh and colleagues explains that the achievement of a hematological response and poor

cytogenetic and prognostic responses are found in patients with older age and female gender, but do not elaborate further on the cause of this.<sup>6</sup>

Differences in achievement between male and female are explained as a result of poor adherence and tolerance found in male gender.<sup>11,12</sup> Pharmacokinetic variability also has an important role. Differences in body weight might also explain the differences in drug concentrations in male and female. Lighter weight in female mean female get an average dose of milligrams per kilogram of body weight higher than male, which means higher plasma drug concentrations.<sup>13</sup>

**Type of Therapy:** The percentage of subjects who achieved hematological response was found to be significantly higher in the administration of Nilotinib than those with Imatinib and hydroxy urea (54,1% vs. 25.0% vs. 20.9% respectively). A significant association was found between types of therapy and the hematological response achievement ( $p = 0.046$ ).

The study of Safaa and colleagues in Egypt found that 71.6% and 67.2% of patients who received Gleevec (Imatinib) achieved complete hematological response and cytogenetic responses. Patients who received hydroxy urea therapy, only 34.1% and 31.9% achieved a complete therapeutic response.<sup>8</sup>

Research conducted by Zhao et al. In 116 early chronic phase of CML patients treated with imatinib in China, obtained a complete hematological response of 94.1%.<sup>14</sup>

Research by Parveen Jain et al., Which compared treatment with tyrosine kinase inhibitors in this case imatinib with hydroxy urea, obtained 95% results achieving complete hematological response compared to 30% receiving hydroxyurea.<sup>15</sup> In a study conducted by Druker<sup>16</sup>, O'Brien<sup>17</sup>, and Kantarjian<sup>18</sup>, around 95% of patients achieved a complete hematological response. Research conducted by the Benelux CML study group, by Hehlmann and colleagues, shows that about 35% of patients achieve a complete hematological response with the use of hydroxy urea.<sup>19</sup>

Treatment of CML has experienced a rapid rate of progress over the past few years. Breakthroughs in the molecular targets of tyrosine kinase inhibitor (TKI) in recent years have brought changes in the history of the disease and in the therapeutic approach to patient treatment. The action mechanism of this TKI class of drugs are to selectively inhibit tyrosine kinase activity by occupying the ATP binding domain in ABL thereby preventing substrate phosphorylation.<sup>20</sup>

**Blast Cells Percentage:** The mean of blast cells was found to be significantly lower in subjects who achieved hematological response (6.1% vs. 7.9%,  $p = 0.016$ ). The percentage of the number of blast cells has a prognostic factor in CML disease. The large number of blast cells circulating in the peripheral blood is also associated with the clinical phases of CML (chronic phase, acceleration, blast crisis), where the further phase, the more the number of blast cells circulating in the peripheral.

The increased blast in CML is a direct consequence of continued BCR-ABL activity, possibly through oxidative stress and reactive oxygen species, resulting in DNA damage and impaired DNA repair, and subsequently causing genetic instability and clonal evolution with additional cytogenetic aberration and multiple mutations in the kinase domain BCR-ABL.<sup>21</sup>

Based on this study, age and gender did not have an association with achieving hematological response. There is a significant association between type of therapy and the percentage of blast cells with achieving complete hematological response. However, further research needs to be done on other factors that might affect the achievement of hematological response in CML patients, such as medication adherence and the possibility of resistance to drug administration.

### Conclusion

The type of therapy (nilotinib) and the low percentage of blast cells have an association with achieving complete hematological response.

**Conflict of Interest:** No Potential conflict of interest relevant to be declared

**Source of Funding:** This study was conducted with self funding, no external funding sources for this study

**Ethical Clearance:** The study protocol was approved by the Ethics Committee in Research of our

institution (Hasanuddin University), following the ethical recommendations from the Helsinki Declaration of 1975.

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# 'My Live is Meaningful and Adherence to Antiretroviral Therapy' Men Who Have Sex with Men (MSM) Who Live with HIV/AIDS; Mixed Method

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## Abstract

**Purpose:** To identify the distribution of meaning in life frequency and adherence to antiretroviral therapy (ART) as well as to perceive and explore the association between meaning in life and adherence to antiretroviral therapy (ART) of HIV-seropositive within MSM in Padang City, West Sumatra, Indonesia.

**Method:** This research used a mixed method with an approach of exploratory sequence design, which was in quantitative stage through a cross-sectional design approach that intended to know the relationship between variables. 102 sample size. In the qualitative stage, the researchers used the conceptual content cognitive map (3CM) method as a data retrieval technique and then continued with the interview.

**Results:** Characteristics of MSM in West Sumatra more than half were gay with early adulthood who were mostly on ART treatment less than one year. Almost all MSM were middle and upper educated, and they worked in sixteen sectors of employment in which the private sector was the largest. Most MSM had a meaningful life. More than half of MSM were discipline to go through ART treatment. There was a significant correlation between the meaning in life and the adherence of ART  $p(0,000)$  with the identification of several aspects that related to the meaning in life and ART adherence. They were spiritualism, lifestyle, psychological, life purpose, life achievement, knowledge, and motivation.

**Conclusion:** The importance of meaning in life within HIV-seropositive MSM that might influence the ART adherence. Therefore, the researchers recommend to conduct a compliance monitoring activity and provide logotherapy for MSM whose life is not meaningful.

**Keywords:** MSM, Meaning in life, ART adherence, HIV/AIDS, 3CM.

## Introduction

The use of ARV requires a high adherence rate of 90-95% in order to achieve therapy success and can prevent the emergence of drug resistance<sup>(1,2)</sup>. WHO has a target that 90% of People Living with HIV/AIDS

(PLWHA) already underwent ART by 2016, but the target realization is only 53%. PLWHA who undergo antiretroviral therapy is increasing. In 2016, there are 19.5 million or about 53% of the total number of PLWHA, and in mid-June 2017 the number has progressed to 20.9 million or about 56.9% of the total number of PLWHA<sup>(3)</sup>. Meanwhile, PLWHA in Indonesia who have undergone ART based on Ministry of Health report (2016), in 2015 there were 63,066 people where 2,056 of them experienced ART on the second line, and by 2017, PLWHA who had accessed antiretroviral therapy were 77,780 people where 2,374 people were on ART on the second line. From the data above, we can conclude that

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there are still many PLWHA who have not accessed ART, while the number of PLWHA in the second line shows improvement from year to year<sup>(4)</sup>.

According to research by Audet, Wagner, & Wallston (2015), meaningfulness of life by PLWHA associated with the psychological welfare of patients<sup>(5)</sup>. There has been no research on the relation of meaning in life toward ART, but based on research conducted by Corless et al.,(2006), about the relation of meaning in life to TB treatment adherence, it can conclude that there is a relationship between the meaning in life and the level of TB treatment adherence<sup>(6)</sup>. The meaning of life is a daily experience in life that is real<sup>(7)</sup> in both pleasant and unpleasant situations<sup>(8)</sup> and if someone can live every event to meets then his life will be happy<sup>(9)</sup>. The feeling of happiness can be achieved if someone who can achieve his life goals<sup>(10)</sup>.

Researchers in preliminary study at NGOs Taratak Jiwa Hati with interview six participant find that all PLWHA are still difficult to remember to consume medicine and sometimes late to consume it and there are still MSM who feel their lives are meaningless. This study is important to undertake because it can give a description of ART adherence and the meaning in life of HIV-seropositive MSM. This study aims to identify the characteristics of HIV-seropositive Men who have sex with men (MSM), the distribution of meaning in life frequency and adherence to antiretroviral therapy (ART) as well as to perceive and explore the association between meaning in life and adherence to antiretroviral therapy (ART) of HIV-seropositive within MSM in Padang City, West Sumatra, Indonesia.

## Material and Method

This research was mixed method through explanatory sequel design approach, where the qualitative data that was obtained in the research will help the explanation of the quantitative data result<sup>(13)</sup>. In quantitative phase, researchers used a cross-sectional design<sup>(13)</sup>. Total sampling use in this research with 102 Sample size MSM with HIV at NGOs Taratak Jiwa Hati West Sumatra Indonesia. Before conducting the research, the researchers tested the validity and reliability of the Meaning in Life Questionnaire (MLQ) in Indonesian version<sup>(14)</sup> and Morisky-8 Scale<sup>(15)</sup> also in Indonesian version, and all question items of both questionnaires were valid and reliable<sup>(16,17)</sup>. In the qualitative phase, the researchers used The Conceptual Content Cognitive

Map (3CM) method as a data retrieval technique. This method was a method developed by Kearny & Kaplan,<sup>(18)</sup> by using open-ended questions that were used to deeply understand the important concepts of informants' perceptions concerning the relationships between the meaning in life and ART adherence.

## Results and Discussion

**Research Sample:** The characteristics of respondents including sexual orientation, age, education level, duration of ART, and occupation. More than half of the MSM were gay with early adulthood, a majority of them were on ART for less than one-year treatment, almost all MSM were middle and upper educated, and they worked in sixteen sectors of employment in which the private sector was the largest<sup>(19)</sup>. Based on research that the respondents who have sexual orientation as gay was 56 people and as bisexual men were 46 people. The age range of respondents was in the adulthood age between 25-45 years old, where this age range was for both early and late adulthood<sup>(4)</sup>. The education level of respondents, most of them, was in the middle and upper education with a percentage of 81.4%. Various researches indicated that the level of education was one of the factors that will interact in health status. Where, if a person had a higher educational status, it could reduce mortality and increase the income, even reduce twice as much mortality either directly or indirectly<sup>(20,21)</sup>. In terms of time span on undergoing antiretroviral treatment, more than half or 54% of respondents were categorized as a newbie because it was still under one year time.

**Meaning in life of HIV-seropositive MSM:** The majority of respondents (64.71%) had a meaningful life and about 35.29% felt a meaningless life. Of the 102 respondents, 72.5% felt that there was no distinct purpose in life, and almost all respondents (91.2%) were looking for something that made their life meaningful. Meaning in life had a different function for each individual, but according to Mackenzie & Baumeister (2014), the function of meaning in life could be divided into three function themes<sup>(22)</sup>. The meaning in life according to Starck (2014), was said to be the phase where a person reached his life goal<sup>(10)</sup>. According to Audet et al., (2015), the low meaning in life indicated non-adherence ART and provided a stimulus of management for handling the suffered disease<sup>(5)</sup>. We were able to analyze that most respondents had been able to find the meaning of their lives although the meaning in life that was found was from an unpleasant experience. The need for counseling

to improve the meaningfulness of life of seropositive MSM (35.9%). By doing so, MSM population especially seropositive one will get more external support or motivation and can improve their meaningfulness in life.

**ART treatment adherence of HIV-seropositive MSM:** From the research results obtained that 57.8% respondents were adherence to antiretroviral therapy and the rest did not comply as much as 43 respondents or 42.2%. This level of adherence was seen from the accuracy of the dosage and the frequency of time-consuming ARV. According to Bangsberg, Kroetz, & Deeks, (2007), ART adherence should be observed to discern the compliance level of the treatment, as some studies indicate that with treatment adherence of (95%) or more indicates the effectiveness of antiretroviral

therapy<sup>(23)</sup>, but on adherence (75%) shows a rise of viruses with retention against drugs<sup>(24)</sup>. Some patients fail to maintain ART adherence<sup>(25)</sup>. Treatment and handling management of HIV are part of the management of chronic diseases, which have principles of medication adherence, prevention of drug retention, and morbidity prevention management<sup>(25)</sup>. This condition becomes a challenge for health workers. Nurses can maximize counseling services particularly for HIV counselor and psychiatric nurses that can provide special therapies to turn negative behaviors into the positive. Apart from health workers, peer advocates also need to improve their role to remind the companions to take the drugs in a timely and appropriate dose given.

**The relationship of meaning in life with ART adherence treatment within HIV-seropositive MSM:**

**Table 1: The relationship of meaning in life with ART adherence treatment within HIV-seropositive MSM n=102**

Meaning in life	ART adherence				Total		p	OR (CI95%)
	Non-adherence		Adherence					
	f	%	f	%	f	%		
Meaningless	31	86.1	5	13.9	36	100	0,000	27,90 (8.98-86.82)
Meaningful	12	18.8	54	81.8	66	100		

Table 1 showed that there was a relationship between meaning in life and ART adherence. When a person whose life was meaningless will have 27.90 times risk to be non-adherence in undergoing antiretroviral therapy than a person whose life was meaningful. The exploration results obtained 23 statements which consisted of 7 categories. The category are the purpose of life, the achievement of life, knowledge, motivation, spiritualism, lifestyle, and psychological.

Farber et al (2003), the meaning of the success of good treatment is directly proportional to the high expectation and inversely proportional to the level of depression<sup>(26)</sup>. There has been no research on the relation of the meaning in life to the level of ART adherence, but based on a research that conducted by Corless et al (2006), about the relation of meaning in life to TB treatment adherence, it can conclude that there is a relationship between the meaning in life and the level of TB treatment adherence<sup>(6)</sup>.

The exploration of the relationship between the meaning in life and ART adherence can occur due to the fulfillment of the basic components of the formation of meaning. According to Mackenzie & Baumeister (2014), there are four basic components that form the meaning in life. First is the necessity for a purpose of life which can be categorized into results attainment and fulfillment of more abstract desire<sup>(22)</sup>. The exploration result from this life purpose component was that the participant had a life purpose to get married “... *Although I am an LGBT, I have a plan to have a wife (P2)*”.

The life accomplishing of each participant was unique and different in interpreting the achievement of their life. “...*Can overcome all by thinking positively... experiencing the life...just like before HIV...(P1)*”.

The other achievement of the meaning in life was always being motivated to experience the life “...*Always keep the spirit, always optimistic and not pessimistic...*”.



(P3)” In addition, the participants also live his life by becoming a better person “...*experiencing the life...by becoming a better person... (P4)*”.

The next necessity is trust and faith. Participant’s spirituality indicated the existence of belief or faith by placing his trust in God “...*Pray regularly...ask God by tahajud prayer (Moslem’s prayer near midnight), what is the crux of this problem so that it can be solved well (P3)*”. Participants believed that by counseling their life purpose can be achieved, following the participant’s statement;

“...According to the hospital, as a person with HIV, I can have a wife and have offspring without spreading the disease by doing the program (P2)”

The last necessity is that one must have positive self-esteem. The meaning in life according to Starck (2014), by having a sensitive feeling with the experience of how to love his life<sup>(10)</sup>.

“...meet other people living with HIV..feeling no burden of thinking and ... should be motivated in undergoing this antiretroviral therapy.. there is a desire to behave better again ... optimist to maintain health ... be firm in facing this life and keep struggling do not get desperate (P3)”.

The freedom to choose what the participants did was to live a healthier life “...*enough exercise, a good diet and have a deeper understanding of what HIV is (P2)*”. Human suffering is the third concept of the meaningful theory.

“..with despairing by not taking ARV (P3) and why doing a healthy life while I’ve HIV and no one willing to befriend me, to approach me...(P2)”.

The uniqueness of a person’s meaningful life that is stimulated by various things ultimately can make someone adherence to undergoing antiretroviral therapy. However, to gain meaningfulness of life, one must be able to accept who they are and where their position now. The meaningfulness of life can be obtained not only in a pleasurable event but also be found from unpleasant events. HIV-seropositive is an unpleasant experience for everyone especially the respondents. Thus, health workers need to assist respondents in order to rediscover the purpose of their life so that they have the meaning in life as before HIV-seropositive.

## Conclusion

PLWHA adherence to consume ART was influenced by the meaning in life, where, when PLWHA had a clear purpose that he wanted to accomplish in life, then that PLWHA will adherence to consuming ART. Meanwhile, PLWHA adherence was also influenced by peers, information attainment, and self-motivation. This research provides important suggestions for health workers to be actively involved in enhancing the motivation of PLWHA, especially MSM to behave openly so that the quality of life monitoring can be done.

**Ethical Clearance:** This study has passed and granted ethical clearance from the Faculty of Medicine University of Andalas No.346 /KEP/FK/ 2018.

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# The Development Model of Post Malaysia Sports School's Athlete Alternative Career Pathway

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## Abstract

The purpose of this study is to identify the challenges, issues, threats and potential among athletes post Malaysia National and State Sports Schools, of what hinder them from making their debut at the professional sports scene post sports schools. Based on the objectives of the study, eventually a model of alternative career pathways will be developed and propose to sports division ministry of education to help make sure sports schools athlete wellbeing and welfare post sports schools can be well secure in the future. This research was guided by the principles of thematic analysis (TA) (Patton, 1990) in data collection and analysis and also related closely with the research on the needs of career pathways development. 10 participants post sports schools athlete, parents, teachers, as well as an administrator of the schools were involved and interview sessions with all participants conducted which each interview lasted ranging from 45 minutes to 90 minutes length. The findings of the study highlight three important themes in ensuring athlete post sports school's future are well taken care of by the governing body of the schools, which are pre sports schools, during sports schools, and post sports schools. In conclusion, this model may assist the most important "stakeholders" who is the athletes to be sure of them of welfare and wellbeing post sports schools and to improve knowledge on the pathways development for the governing body of sports schools training provider in order to implement them into practice.

**Keywords:** *Sports school's athletes, Training, Knowledge, Challenges, issues, threat, potential, and career pathways.*

## Introduction

In the reality, not all former elite athletes in sports schools have finally become professional athletes. High competition, injuries, limited opportunities and impairment may be the cause of this drop out. For those who have enough academic qualifications, the opportunity to continue their studies or choose employment in most areas including sports is always open to them. For former sports schools athletes who have dropped out in both academic and sports fields,

their chances are very limited and not as extensive. If this happens, then the time, sacrifices, and sweat for many years in training at sports schools come to a waste and almost does not mean anything as job they are currently doing after sports schools years, not require schools sports participation as a prerequisite.

**Problem Statement:** Not all sports school athletes become professional athletes. For former sports school athletes who have dropped out in both academic and sports fields, some of them work as general workers and other jobs that can be applied without qualification in sports. If this happens, then the time spend, sweat and sacrifices for many years in sports school does not mean anything. Hence a study is critically needs to be carried out to obtain a data base of the total number of student dropouts from sports schools in order to understand this phenomenon thus formulate the strategy of assisting the post sports schools athletes to continue their career in sports-related fields.

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**Research Objectives:** This research was based on education, aims to present a solution to the education issue that is a high dropout rate among athletic sports athletes. For that, the following objectives need to be met:

1. Understand current career-related needs and demand for dropout sports school athletes.
2. Develop concepts and strategies to give second “route” to sports schools’s athletes a chance to become a professional athletes or work or study opportunities.
3. Propose post-school sports alternative career development model for post sports schools athletes.

**Literature Review:** Experience dropped out of the team also has an impact on the potential to be dropped out of the current sport.<sup>1</sup> However, other likelihood of dropouts among athletes at sports schools will only be known when this proposed study is implemented; because every problem is unique to its context. In one study by Jin<sup>2</sup>, the results of the study have shown that the career module can improve career maturity among students effectively.

According to Surujlal and Nguyen<sup>3</sup>, most of the football coaches will face some challenges, heartbreaks, conflicts, tensions and these issues should not be underestimated. Launder<sup>4</sup> (2009) states that even though a coach’s job is quite complex, the knowledge they have is the main factor that influenced athlete or team’s preparations.

This is because it influences the contentment of athletes or players to practice. According to Zulakbal Abd Karim<sup>5</sup>, coaches who are more knowledgeable and intelligent in facing the challenges in the process of building their careers as a coach tend to do better in their responses toward every challenge they encounter<sup>6</sup>,state that a coach needs to have knowledge on coaching in order to help improve their coaching skills.

Almost all remain in jobs related to the training they receive<sup>7</sup>. Therefore, the level of retention of athlete students in athletics since training in sports schools should also be identified through this study. “Burn out” is among the factors of retirement from athletics<sup>8</sup>. The formation of a model in determining athlete’s career direction is not a foreign matter for foreign researchers. Developmental Model of Sport Participation<sup>9,10</sup> for example provide a framework that demonstrates various

sports engagement paths<sup>11</sup>. Hence, the formation of an alternative career path model in this proposed study is an important thing that is necessary for specific use to sports athletes in Malaysia.

## Methodology

The study was based on the principles of thematic analysis (TA)<sup>12</sup> and is closely related to research on individual career needs and it allows wider analytical and analytical techniques to understand the complexity of the former sports schools athlete career path. The method used allows technique analysis. This enabled richer and detailed frame of work in order to understand the complexity of more dynamic post sports schools athlete career development pathways needs and demands<sup>13</sup>. In this research, the researchers have utilized purposive sampling technique by conducting “semi structured open ended in-depth interview”, observation and study notes to 10 participants (post sports schools athletes). The number of samples was determined by “saturation of information”. Due to this, three main strategies were used to collect data which was “semi structured open ended in-depth interview”, observation and study notes. The usage of these three data sources is necessary in order to increase the credibility of the findings and to reduce the possibility of misinterpretation.

**Findings:** The findings are based on the diversity of perceptions and Sports Schools former athletes as a source of information that results in changes in their cognitive structure<sup>15</sup>. The data were collected based on thematic analysis (TA)<sup>12,13</sup>, method, covering interviews, observations and study notes. The number of samples is in the range of 1 - 10 people; where 10 is the maximum if the amount has not yet been found “saturation of information”.

**Pre-Sports Schools:** In the opinion of most of the participants of this study and they mentioned with special interest, that the sports schools need to have a very strong, qualified and knowledgeable group of person to conduct the Talent Identification Process, Talent Scouting process and better or improved competition at the national level (MSSM). For example participant P1 mentioned as followed,

I feel the sports schools need to re look at their recruitment process to make sure that only the most qualified and high quality athlete will be included there. This TID process must be carried out by also most qualified coach.

According to O'Connor, Larkin and Mark Williams<sup>16</sup>, talent identification and selection for youth development programmes is based on the ability of coaches and talent identifiers to predict future sporting success based on current youth performance. The issue with talent identification and development programmes is the assumption that the factors which contribute to successful senior performance can be generalized and measured within an adolescent group to predict future senior ability<sup>17</sup>.

### **Talent Identification and Development:**

Participants hope that the talent identification process must be carried out collectively with the sports governing body, expert from the university and as well as other important stakeholder in respective sports. As an example participants:

### **Talent Scouting**

One of the example participants I labelled as P10 mention as follows:

*Now the TID carried out by the group of teachers of sports schools, but I think they need to carry out TID collectively also with the sports governing body representative. To make sure what are the demand of the sports industry and what is the expectation of the industry from the athletes of the sports schools, this will therefore make sure the athletes will be hired by the professional club upon completing their study in sports schools, not only teachers.*

The challenging task of policymakers and administrators of youth sport programmes is to develop a structure that meets the multiple needs of young participants and serves the different outcomes of youth sport<sup>18</sup>. Siedentop<sup>19</sup> has suggested that the contrasting natures of the different outcomes of youth sport are not achievable within single programme and should be promoted by different programmes.

### **During Sports Schools:**

**Input:** Participants convey their thought that professional sports body needs to be involved in the technical part of the curriculum for sports schools. Input from the sport's governing body need to be taken into consideration.

*Highly qualified coach must help coaches in sports schools, they must collaborate and work together. The state football F.A. must send their A licence coach to*

*work with the schools coach, change of ideas and give their professional input. Our student, therefore can do better.*

Peel, Cropley, Hanton & Fleming<sup>20</sup> state that experiential learning by facilitating transferability of experience is built by reality based learning.

**Intervention:** Participants believed that teachers/coaches in the sports schools needs to be working together with an expert from the professional sports organisation.

The highest sport governing body must intervene to help schools layout their coaching programme. Help educate the coaches and the administrator at sports schools. Like in Japan schools work closely with Japan FA, that what I've heard.

According to Ministry of Youth and Sports<sup>21-24</sup>, The Football Association of Malaysia (FAM) welcomes the steps taken by the government through the Ministry of Youth and Sports (KBS) to draft and implement the National Football Development Plan (NFDP).

**Post Sports Schools:** The governing body of sports schools cannot just leave it to the athlete and their family to determine or secure their own future career. An official networking between sports schools and an industrial "player" needs to be done.

**Memorandum of Understanding (MOU):** Participants of this study mention that this effort can be done through an agreement or memorandum of understanding with three main bodies as follows:

### **Study and still playing agreement with higher education institution:**

One of the example, participants (P4) mentioned as follows:

*There must be university or college, IKBN for example that create new sports related programme starting with certificate, and sports schools student can go straight in there using their playing experience. If they have a special agreement between sports schools and the education provider, it will make our future more secure. Now we need to look after ourself.*

One way to start understanding the processes behind dropout is to utilise a framework such as that proposed by Uehara, Button, Falcous, and Davids<sup>25</sup>.

## Discussion

In pre sport school phase, a player selection quality assurance body need to be set up especially for student intake to sports school. Player selection method should be tightened by involving individuals that professional or from own industry. During sport school phase programme, dual curriculum should be carried out where learning programs passed through by students should fulfill industry will and the programme should have joint venture with industry so that training passed through by those able in parallel adaptation with industry will. When it come to post sport schools phase, before student finish their schooling in this sports school, the ministry should have MOU along with IPT, IKBN and other educations institute.

## Conclusion

These three core themes are divided into other sub themes to address other requirements which serve as the basic guidance for governing body of the National and state sports schools to enhance the quality of the service provided to their athletes and their future's sake. In conclusion, this model may assist the most important "stakeholders" who is the athlete to be sure of them of welfare and wellbeing post sports schools and to improve knowledge on the pathways development for the governing body of sports schools training provider in order to implement them into practice.

**Ethical Clearance:** The study has been done in accordance with human research ethics as per required by the declaration of Helsinki".

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# A Narrative Review of Literature of Health Information Seeking Behaviour

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## Abstract

The empirical study of Health Information Seeking Behaviour (HISB) has used multiple models and measures that are tuned to the context of the traditional media environment in which there was a clear separation of interpersonal, mass media computer-mediated communication channels. In this context, there is a need to update the understanding of HISB that takes into account the complex multimedia environment in which information is generated, sought and consumed today. This study presents a narrative review of literature on HISB that addresses tries to provide an explication of the current understanding of HISB with specific focus on the need for re-conceptualisation of HISB and convergence of core internal divisions in the field.

**Keywords:** Health Information Seeking Behaviour (HISB), Human Information (HIB), Narrative Review, Information Seeking Behaviour (ISB), Convergence.

## Introduction

Health Information Seeking Behaviours (HISB) is a marriage of human instinct for sense making, felt need and social context. It has been nurtured within a large joint family of theories of human Information behaviour (HIB), Everyday Life Information Seeking (ELIS), Information Practices. More recently, Information Seeking behaviour (ISB), of which HISB is a sublet, is emerging as a distinctive field of research. This trend not only provides a historically rooting, but enables drawing on the rich and varied traditions, theoretical models and empirical findings from studies on human information behaviour. From an evolutionary perspective, human information seeking behaviour has shifted from being seen as a secondary need to primary need which has played a significant role in the evolutionary adaptive behaviour of humans. (Spink, 2010)<sup>24</sup>.

**Review of Literature:** HIB studies emerged from the discipline of Library and Information Science (LIS), but its close connections with communication have been self-evident and well recognized. (Wilson, 1994)<sup>30</sup> observed “information science, particularly in relation to the study of user behavior, can derive much benefit from a closer liaison with communication studies”. Early studies on HIB focused on information and information needs and uses/users and behaviour, information retrieval, user studies. Study of HIB and IS B dramatically increased with the widespread adoption of the Internet between 1998 and 2001 (Bawden, 2006)<sup>3</sup>; (Blessinger & Hrycaj, 2010)<sup>4</sup>; (Milojevic, Sugimoto, Yan, & Ding, 2011)<sup>22</sup>; (Lariviere, Sugimoto, & Cronin, 2012)<sup>18</sup>; (Tuomaala, Jarvelin, & Vakkari, 2014)<sup>28</sup>. In most studies, HIB is interchangeably used as information needs, seeking and uses.

Information seeking has been examined from four major perspectives – the everyday life information seeking, sense-making approaches, the information foraging approach and the problem–solution perspective on the information seeking approach and theory of information use (Spink & Cole, 2006)<sup>25</sup> Most studies focus on cognitive, affective and behavioral aspects of information (Afzal, 2017)<sup>1</sup>; (Lee, 2016)<sup>19</sup> identified

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five theories (Theory of Planned Behaviour by Martin Fishbein and Icke Ajzen (1980), Uses & Gratification by Jay Blumer and Denis McQuail (1969), Information Seeking Model (Wilson's Model, 1981), Diffusion of Innovation theory by Everett Roger (1962) and Information Seeking Model by Kuhlthau (1982) were highly cited. (Lee, H. S., 2016)<sup>19</sup>. A review from 1988 - 2007 based on bibliometrics/scientometrics analysis of LIS discipline, found that IS B is emerging as a separate sub-discipline within the broader HIB literature. (Milojevic, Sugimoto, Yan, & Ding, 2011)<sup>22</sup>

With the advent of the Internet and changes in the cognitive landscape, there was a tremendous growth in IS B studies since 1998. While the application context of HIB studies is widening as many disciplines embrace ideas from HIB, it has special salience in the field of health and medicine. (Milojevic, Sugimoto, Yan, & Ding, 2011)<sup>22</sup>. Scholars from health/medical sciences, psychology and health communication have acknowledged the importance of IS B studies from its early stages (Lariviere, Sugimoto, & Cronin, 2012)<sup>18</sup>. Surprisingly, there are very few attempts to integrate IS B and communication models (Wilson, 1994)<sup>30</sup>; (Wilson, 2018)<sup>31</sup>. Many scholars have noted that different vocabularies being in use in different disciplines to refer to same or similar phenomenon (Wilson, 2018)<sup>31</sup>; (Kim, 2017)<sup>16</sup>; (Taylor, 2016)<sup>27</sup>; (Julien, H. (1995)<sup>14</sup>; (Julien & Duggan, 2000)<sup>15</sup>; (Chang, 2011)<sup>8</sup>. This has led attempts to clarify terminologies and construct an integrated model that can support cross-disciplinary research and applications of insights from HIB studies (Lambert & Loiselle, 2007)<sup>17</sup>; (Martzoukou, 2005)<sup>21</sup>. Study of information seeking activities of health consumers and patients have incorporated models of IS B without sufficient focus on conceptual refinements that are taking place in wider HIB field. As a consequence, several internal contradictions and paradoxical conclusions have marked the studies on HISB.

Johnson, J. D. (2015)<sup>13</sup>, summarizing the significant empirical findings of HISB, identifies seven "deadly tensions" in the literature. These include 1) continued importance of interpersonal communication as a primary source of health information despite widespread use of the Internet. 2) accessibility gets more traction than quality when people are looking for information. 3) Individuals level of skill and prior experience in using new media determines the extent of HISB. 4) the law of diminishing return works with information-the more

information one gets, the less likely they are to derive value from it. 5) Individuals are "cognitive misers," and hence, they depend on tried and tested sources for health information despite the availability of better alternatives. 6) Individual differences in personality, seeking style, professional training and aesthetic preferences take precedence over the credibility of information sources. 7) People tend to undervalue the gains of knowing about their health compared to its cost. Johnson concludes that these tensions are "masked by their seemingly irrational behaviour" and hence "ignored by policymakers and system designers. (Johnson, J. D., 2015)<sup>13</sup>

However, Johnson (2015)<sup>13</sup> does not explicitly consider how these tensions are played out in the information-rich media ecosystem. The mediatized environment not only create a demand side pull factor of information seekers but also the supply side push by the healthcare industry which seeks to commodify and market healthcare devices, products and services. This internal tension is best captured by two conceptions of users -- user as consumer and user as the patient. As a consequence of this pull-push dynamics, the seven tensions appear to be accentuated and reconfigured in ways that are yet to be understood and carefully studied. By examining the way by which health and medical fields are approaching the study of information seeking behaviour, we can develop a better understanding of how new information and communication technologies (ICTs) is shaping health information seeking behaviour and its consequences.

This paper attempts to reframe the tensions identified by Johnson (2015)<sup>13</sup> in terms of convergence of set of themes that has divided the wider field of HIB and IS B. The research question that we seek to address are: 1) How and why HIB/IS B models are used within health and medical sciences? 2) What are the gaps and disjunction between wider HIB/IS B and narrower HISB literature as a consequence of encountering technology?

## Method

This preliminary analysis involves a scoping review of previous literature reviews conducted on Health Information Seeking Behaviour (HISB), in comparison with similar HIB reviews from the wider field (Wilson, T. D., 1994; Larivière, V., et al., 2012)<sup>30,18</sup>. The scoping exercise undertaken here is closer to the concept of information scanning in HIB literature. The study adopted the guidelines suggested by Arksey, H., & O'Malley, L., (2005)<sup>2</sup> for the conduct of scoping studies.

The study identified a total number of 161 review articles as of 01, June 2019 from PubMed and Google Scholar. All articles provided a review of HIB, IS B and HISB literature. The oldest article was in 1996(Godin & Kok, 1996)<sup>11</sup> on the theory of planned behaviour in health context, while the most recent article was on Consumer needs for Cancer Patients (Sung Jo, Park, & Jung, 2019)<sup>26</sup>. Five reviews were located before 1998, 39 reviews between 1999 - 2009 and 117 reviews from 2010 - 2019. The review by (Welch, Petkovic, Pardo, Rader, & Tugwell, 2016)<sup>29</sup> had longest coverage between 1946 – 2014, which included research on HISB but did not give any special focus to health information.

Several reviews of HIB and HISB have been conducted, along with a more comprehensive overview of the field of HIB. (Chang, 2011)<sup>8</sup> This study is presented in the form of a narrative review. Authors define narrative review as a tool to identify the current knowledge, trends and pattern of a particular topic. (Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005)<sup>10</sup>.

The study identified a convergence of multiple approaches that have historically marked the HIB field. HISB being a subset of HIB reflects these convergences only in a limited way. Calls for an integration of multiple approaches has been a recurrent theme in HIB literature, but HISB studies are yet to adopt integrated models.’ (Larivière, V., et al. 2012)<sup>18</sup>. An attempt is being made here to provide a focused synthesis of previous reviews of HIB and HISB literature.

## Results

In the following sections, the study considers the implications of emergent media ecosystem to the literature on HIB and HISB. The study employs the reviews from the broader discipline of HIB to assess what health information seeking studies have left out. The aim is to locate disjunctions and gaps between HIB and HISB. (Lambert, S. D., & Loiselle, C. G., 2007; Larivière, V., Sugimoto, C. R., & Cronin, B., 2012)<sup>17,18</sup>

The field of HIB has been remarkably responsive to the development of new information and communication technologies (ICTs). After a period of low interest in the late 80s to mid-90s, HIB, research output increased significantly since 1998 following the widespread adoption of the Internet amongst the general public. (Larivière, V., et al., 2012; Milojević, S., et al., 2011)<sup>18,22</sup>. Several theoretical, methodological, systematic reviews

and citation analyses were conducted to provide a summary and overview of the trends and to identify dominant models that guide the research program. HISB research has made attempts to adopt many of these perspectives in the context of health (Case, Andrews, Johnson, & Allard, 2005)<sup>7</sup>; (Julien, H., & Duggan, L. J., 2000)<sup>15</sup>.

With these efforts, HISB research has also inherited several internal tensions in conceptualization and practical applications of the HIB approaches. These tensions have been accentuated growth in social and mobile media of communication, creating opportunities for convergence of several strands of HISB empirical and theoretical debates. Overall, it was found that far from being “deadly tensions,” the study sees these issues as a sign of convergence. The study presents a narrative overview of these multiple convergences and disjunctions between HIB and HISB, for which the study has the most evidence.

The study identified seven convergences: 1) Convergence of Information Seeking and Sense Making Paradigm, 2) Convergence of Active and Passive Seeking: Unified User Seeker/Adaptive Seeker, 3) Convergence of Objective and Subjective Measurement of HISB: Representing Digital Patient, 4) Convergence of Mediated and Interpersonal Communication: Being Perpetually Connected, 5) Convergence of Opinion Leaders and Regulated Professional: Emergence of Lay Experts, 6) Convergence of Availability and Accessibility: Information Visibility and 7) Convergence of Information Competencies. Taken together, these reviews indicate scholarly attempts to make sense of the implications of the widespread adoption of new media to health.

**Implications of Convergence: Outsourcing HISB?:** New forms of convergence of human cognition and machine cognition are emerging, such as chatbots and AI Information Assistants. Just as much as users seek information, information is too is seeking a context and user for its continuity. Smartphones powered by AI and facilitated by health sensors and health information architecture that serves as its resources can be conceived as attention seeking bots.

(Halko & Kientz, 2010)<sup>12</sup>; (Marcus, 2015)<sup>20</sup> point out that persuasive technologies and products nudge individuals to certain health sources and services. In this sense, information is seeking an individual as much

as individuals seeking information. Persuasive design could lead to anticipatory information and service needs assessment and delivery, based on an individuals' persuasive profile and preferred persuasion style. (Pariser, 2011)<sup>23</sup>

Along with technological developments, several socio-economic, commercial and enlightened self-interest drives the development of the information habitat that we increasingly migrate. Intelligent technologies like AI, Chabot's, IoT, Wearables and Apps are rapidly meshing our body and mind with technology (Brodie, et al., 2018)<sup>5</sup>; (Carr, 2011)<sup>6</sup>; (Clarke, Shim, Mamo, Fosket, & Fishman, 2003)<sup>9</sup>.

**Ethical Clearance:** This is a systematic review analysis of previous literature on HISB. Hence, no ethical clearance required.

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**Conflict of Interest:** There is no conflict of interest in the paper.

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# Empirical Investigation between Occupational Stress and its impact on Job Satisfaction among Medical Practitioners' of Jawaharlal Nehru Medical College

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## Abstract

**Background/Aims:** The motivation behind this paper is to recognize the relationship between determinants of occupational stress and their effect on medicinal practitioners' fulfillment and that improves their engagement towards Jawaharlal Nehru Medical College (JNMC).

**Method:** Based on convenience sampling approach, data was gathered from 210 medical practitioners' working in JNMC through self administered questionnaire based on five point Likert scale. A descriptive cum inferential statistical technique was embraced while structural equation model likewise used to investigate the significance of proposed model.

**Findings:** The outcomes indicated that structure of organization is the most foremost determinant for medical professionals' fulfillment, trailed by environmental factor, job-demand factor and family-work factor. They nearly share similar connections as far as medical practitioners' satisfaction is concerned. Be that as it may, medical practitioners' fulfillment set out the best effect on the engagement for JNMC. While, family-work factor underscored incredibly on engagement in JNMC and the least on medical specialists' satisfaction among all the four determinants of occupational related stress.

**Practical Implications:** It will enormously help both JNMC authorities and medical specialists in creating suitable systems to build the inclination of medical experts' fulfillment for an effective and desired administration commitment for a superior wellbeing arrangement.

**Originality/Value:** This research is spearheading as in the contemporary era medical practitioners' satisfaction had moderately been less investigated in the Indian setting of JNMC and it is acting like a source that gives standard stuff to increase engagement of medical practitioners' for the medical care industry.

**Keywords:** *Occupational Stress, Medical Practitioners' Satisfaction, Engagement and Jawaharlal Nehru Medical College.*

## Introduction

Occupational stress is a perceived issue in medical

services and practitioners' have higher level of mental dreariness, self-destructive propensities and poor controls in the tantamount of social class<sup>2,16</sup>. Stress is conceptualized from the interactionist model that thinks about the natural connection of the individual as liable for the whittling down<sup>1,18</sup>. Among the elements setting off the procedure of psychological instability among JNMC experts, the most significant are those related with work, such as, over-burden, working conditions, pressure for meeting objectives and absence of self-

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governance<sup>13,20</sup>. Engagement makes them connected to their work with high sentiments of motivation, prosperity and bona fide joy for what they are expected to perform expertly<sup>1,2,5</sup>. On account of JNMC advancement and sustenance of engagement among the medical practitioners' group, it is prescribed to execute this study to recognize the connection between factors of occupational stress and medical specialists' satisfaction with particular to engagement in Jawaharlal Nehru Medical College<sup>11</sup>. In this investigation, four determinants of occupational stress (environmental factor, job-demand factor, structure of organization and family-work factor) are utilized to assess the connection between perception of medical experts' towards these measurements in Jawaharlal Nehru Medical College<sup>11</sup>. After a brief plotting of occupational stress factors, medical professionals' satisfaction and engagement of JNMC, the research speculation is proposed with a conceptual model of the examination and demonstrated with certain inferential research and a path diagram<sup>1,7</sup>.

The accompanying hypotheses, in light of various examinations, give the degree and profundity of this empirical investigation:

H1: Environmental Factor has a significant influence on satisfaction of medical practitioners' in JNMC.

H2: Job-Demand Factor has a significant influence on satisfaction of medical practitioners' in JNMC.

H3: Structure of Organization has a significant influence on satisfaction of medical practitioners' in JNMC.

H4: Family-Work Factor has a significant influence on satisfaction of medical practitioners' in JNMC.

H5: Medical Practitioners' Satisfaction has a significant impact on their engagement in JNMC.

H6: Environmental Factor has a significant influence on engagement in JNMC.

H7: Job-Demand Factor has a significant influence on engagement in JNMC.

H8: Structure of Organization has a significant influence on engagement in JNMC.

H9: Family-Work Factor has a significant influence on engagement in JNMC.

## Materials and Method

**Research Design:** This study is based on a conclusive research, where, the dependent variable is engagement (ENG) and independent variables are determinants of occupational stress (OS). Medical Practitioners' Satisfaction (MPS) plays a mediating role between engagement and determinants of occupational stress. The items of 'environmental factor' were derived from the studies of Vagg & Spielberger<sup>19</sup> (1998); Szilagyi & Holland<sup>18</sup> (1980), whereas, 'job-demand factor' were derived from the studies of Beehr, Jex, Stacy & Murray<sup>2</sup> (2000); Smither<sup>17</sup> (1998). The studies exercised by Ivancevich, Matteson, Freedman and Phillips<sup>13</sup> (1990) have identified in terms of 'structure of organization' and for the evaluative purpose of 'family-work factor', studies of Netemeyer, Maxham, & Pullig<sup>16</sup>(2005) were acknowledged in the factors of occupational stress. While, the studies of Wong JG<sup>20</sup> (2008) and Caballero, Bermejo, Nieto and Caballero<sup>5</sup> (2001) have identified for 'medical practitioners' satisfaction'. Moreover, for the purpose of 'engagement', few studies conducted by Coetzee & De Villiers<sup>7</sup> (2010) and Baumruk, R.<sup>1</sup> (2004) have adopted to select the relative items.

**Sample Design and Procedure:** Convenience sampling approach was used in terms of adapted questionnaire depended on a five-point Likert scale. The initial segment involved demographic profiles (gender, professional diversification, service engagement duration, age and education level) of the medicinal practitioners', while, the subsequent segment managed the autonomous factors, intervene variable and the dependent variable. The information was gathered in two phases from July 2019 to December 2019. In the main stage, information was produced from 50 respondents with the end goal of pilot study. In the subsequent stage, information was created from larger sample of 210 respondents. The populace in this investigation is all representatives who work as a medical practitioner in JNMC. According to the annual reports published by its central record section, the different divisions have sufficient medical practitioners according to the statutory administering bodies<sup>11</sup>. Thinking about this, we had disseminated 250 questionnaires as past examinations have watched a level of similar response<sup>6,15</sup>. Out of 240, just 210 respondents returned the questionnaires and according to rule of thumb method, the sample size of 210 medicinal practitioners' is aggregate<sup>14,15</sup>. This demonstrates 87 percent of responses rate which is

higher than the normal of reaction rates revealed in such kind of studies<sup>6</sup>. The general reliability of the scale was .874 which is viewed as adequate<sup>6,8</sup>.

**Table I: Reliability Value of the Scale**

Variables	No. of Items	Cronbach's Alpha ( $\alpha$ )
Environmental Factor	7	.781
Job-Demand Factor	5	.873
Structure of Organization	4	.722
Family-Work Factor	5	.871
Medical Practitioners' Satisfaction	8	.762
Engagement	6	.860

**Source:** Survey data and prepared by the researcher In the light of assistance taken from SPSS 20.0 and AMOS 20.0, descriptive statistics, factor analysis, regression analysis, analysis of diverse and ultimately structural path were made to advance the proximity of the stated model<sup>4,10,12</sup>. The subsequent table clarifies the estimates of the variable and its criticalness for the structural path analysis through confirmatory factor analysis and basic elements of 35 items.<sup>3,5,6,14</sup>

**Table II: Estimates of constructs of study**

Constructs	Items	Estimates
Environmental Factor	EF1	.735
	EF2	.747
	EF3	.731
	EF4	.620
	EF5	.659
	EF6	.644
	EF7	.793
Job-Demand Factor	JDF1	.756
	JDF2	.722
	JDF3	.708
	JDF4	.795
	JDF5	.745
Structure of Organization	SOW1	.684
	SOW2	.596
	SOW3	.651
	SOW4	.708
Family-Work Factor	FWF1	.543
	FWF2	.806
	FWF3	.809
	FWF4	.534
	FWF5	.708

Constructs	Items	Estimates
Medical Practitioners' Satisfaction	MPS1	.732
	MPS2	.745
	MPS3	.697
	MPS4	.720
	MPS5	.718
	MPS6	.732
	MPS7	.842
	MPS8	.875
Engagement	ENG1	.814
	ENG2	.764
	ENG3	.742
	ENG4	.801
	ENG5	.776
	ENG6	.752

**Source:** Survey data and prepared by the researcher

### Data Analysis and Results

**Descriptive Analysis of Demographic Factors:** As per the practitioners' summary based on gender, 160 were males and 50 were females. While, 19.04 per cent were aged 19 to 34 years, 66.67 per cent were aged 45 years and above and 14.29 per cent were aged 35 to 44 years that means most of the practitioners' are matured enough to understand the proximity of medical engagement and dimensions of occupational stress<sup>6,8</sup>. In terms of professional diversification of medical practitioners', majority of the practitioners' belonged to physician and surgeon category (38.09 per cent), whereas, other class of practitioners' were 19.07 per cent, ophthalmologist and dentist (19.04 per cent), gynecologist and obstetrics pediatrics (14.28 per cent) and junior resident class had 9.52 per cent practitioners', as far as education profile, 57.16 per cent were doctorate and other certification holder, 23.80 per cent were post graduate and remaining 19.04 percent were medical graduate. It means majority of practitioners' know the exemplar approach to select their occupation prudently. As far as service engagement duration is concerned, 57.14 per cent practitioners' were of more than ten years, 19.06 per cent were of 5 to 10 years duration, 14.28 per cent were of 2 to 5 years and 9.52 per cent were of less than 2 years duration which means still practitioners are matured enough to understand the paradigm approach of their occupational stress with service engagement in the medical industry of JNMC<sup>17, 19</sup>.

**Analysis of Model and Findings:** As far as hypotheses testing, the outcomes demonstrated decidedly huge impact of determinants on occupational

related stress, for example, job-demand factor on medical practitioners' satisfaction ( $p=0.048$ ), though, its ( $\beta=.62$ ) shows 62 percent JDF measurement influence practitioners' towards occupational related stress, while the critical ratio ( $CR=6.769$ ) escalates it as a significant determinant of medicinal practitioners' satisfaction, so this hypothesis got accepted<sup>19,21</sup>. Different measurements like environmental factor ( $p=0.015$ ;  $\beta=.58$ ), structure of organization ( $p=0.177$ ;  $\beta=.65$ ) and family-work factor ( $p=0.437$ ;  $\beta=.57$ ) emphatically not impacted medicinal practitioners' satisfaction towards occupational stress created by JNMC, so these hypotheses got rejected<sup>13,16</sup>. While, medical practitioners' satisfaction ( $p=0.010$ ;  $\beta=.72$ ) is decidedly impacted towards their engagement to give JNMC benefits all the time, so this hypothesis

is accepted<sup>5,7</sup>. It additionally expressed that the medical workforce is increasingly worried about professionals' issues to develop and retain affinity with them<sup>2</sup>. So as to test the connection between measurements of occupational related stress and medicinal practitioners' engagement, all determinants were discovered having irrelevantly effect on engagement except family-work factor ( $p=0.024$ ;  $\beta=.53$ ) which had huge effect on engagement in JNMC services, so this hypothesis got accepted<sup>18,19</sup>. Thus, the investigation further expressed that environmental factor ( $p=0.682$ ;  $\beta=.56$ ), job-demand factor ( $p=0.338$ ;  $\beta=.59$ ), structure of organization ( $p=0.148$ ;  $\beta=.61$ ), were not much affecting, so these hypotheses got rejected<sup>1,13</sup>.

**Table III: Regression paths of research model, estimates, critical ratio and P-value**

Hypotheses	Effects	Estimate	S.E.	C.R.	P	Result
H1	MPS <--- EF	.642	.071	6.632	0.115	NotSupported
H2	MPS <--- JDF	.611	.68	6.769	0.048	Supported
H3	MPS <--- SOW	.532	.079	5.872	0.177	NotSupported
H4	MPS <--- FWF	.521	.073	15.232	0.437	NotSupported
H5	ENG <--- MPS	.658	.051	14.545	0.010	Supported
H6	ENG<--- EF	.669	.053	6.769	0.682	NotSupported
H7	ENG <--- JDF	.442	.047	16.872	0.338	NotSupported
H8	ENG<--- SOW	.642	.058	7.565	0.148	NotSupported
H9	ENG <--- FWF	.495	.068	5.380	0.024	Supported

Source: Survey data and prepared by the researcher

Subsequently after extracting the entire model, structure of organization ( $\beta = .65$ ) is one of the most central determinant of medicinal practitioners' satisfaction, while environmental factor ( $\beta = .58$ ), job-demand factor ( $\beta = .62$ ) and family-work factor ( $\beta = .57$ ) making a decent attempt to have a similar connection between medicinal professionals' satisfaction and determinants of occupational related stress<sup>7,17</sup>. Be that as it may, medical experts' satisfaction distinguished the greatest impact on engagement variable ( $\beta = .72$ ) to create positive proximity of connection between these two factors<sup>2,16</sup>. The consequent components of engagement are additionally impacted by determinants viz., structure of organization ( $\beta = .61$ ), family-work factor ( $\beta = .53$ ) and job-demand factor ( $\beta = .59$ )<sup>7, 20</sup>. It shows structure of organization has been the most impacting factor for engagement and medical practitioners' satisfaction

towards occupational related stress in JNMC<sup>7, 17</sup>.

**Table IV: Estimated Model's Test Statistics**

Fit Index	Recommended Values*	Observed Values
CMIN/DX	<0.30	2.121
GFI	0.90	0.935
AGFI	0.80	0.895
NFI	0.90	0.954
CFI	0.90	0.986
RMSEA	<0.70	0.052

Notes: CMIN/D. F – Chi-square value/degrees of freedom, GFI – Goodness of Fit Index, CFI – Comparative Fit Index, NFI - Normated Fit Index, AGFI – Adjusted Goodness of Fit Index, RMSEA – Root Mean Square Error of Approximation.

\*Sourced from<sup>9, 10, 12, 14</sup>.

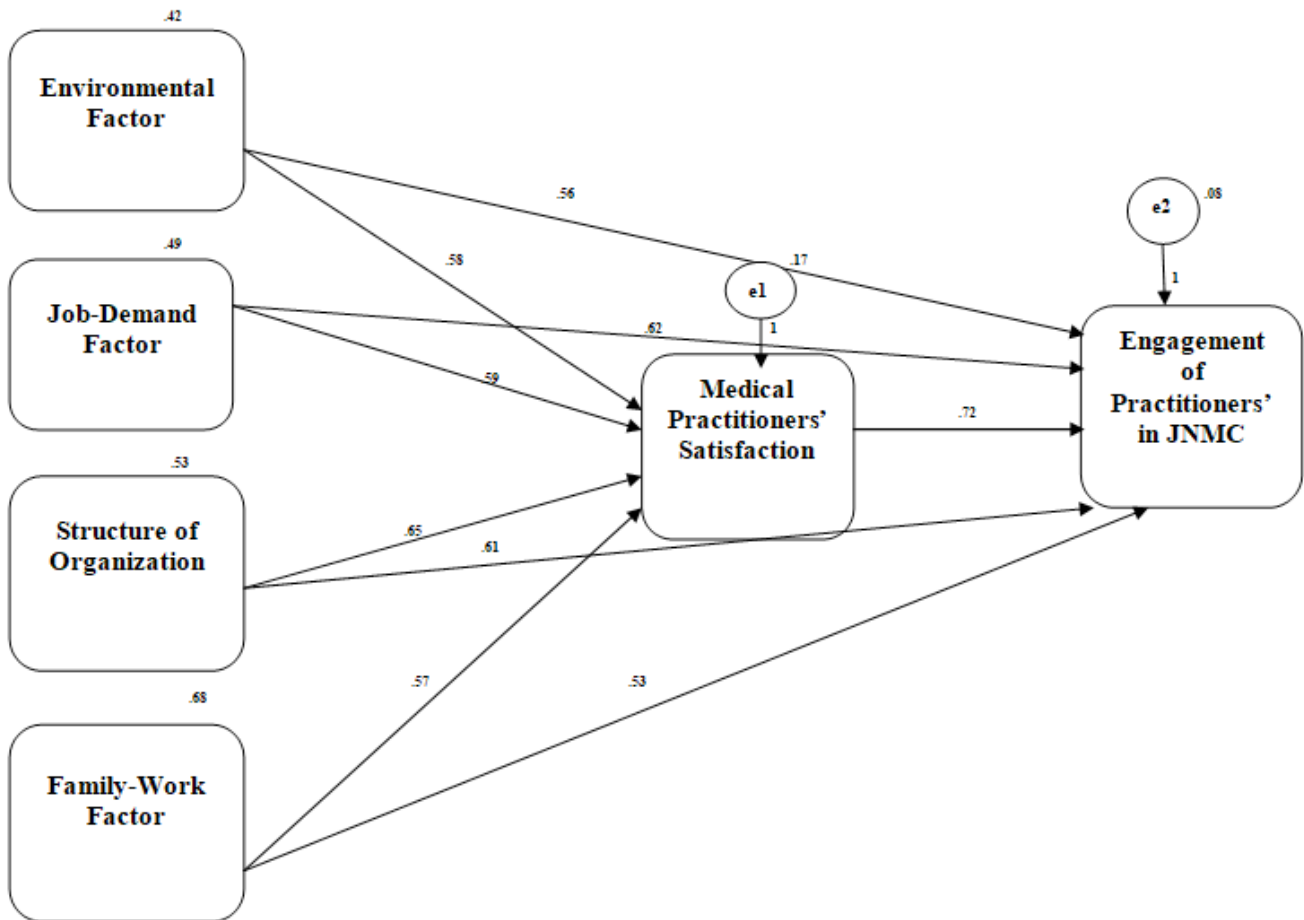
Source: Survey data and prepared by the researcher



RMSEA scores beneath 0.10 are commonly considered to be of good signal fit and our value is 0.07, which is a solid match for the model<sup>3,4,6</sup>. Taking all this into consideration, it is demonstrated that all hypotheses are essentially impacting the connection between

dimensions of occupational stress and medicinal practitioners’ that improve the hierarchical picture of JNMC through their engagement in the medical industry for better and efficient services<sup>14,15,16</sup>.

**Figure I: Empirically Validated Model for Occupational Stress and Engagement among Medical Practitioners’ of JNMC**



Source: Survey data

**Discussion and Implications:** This study distinguished the connection between the determinants of occupational related stress and medicinal practitioners’ satisfaction and inspected the effect of these measurements on engagement in JNMC including a sample of 210 practitioners’ to whom structured questionnaire was directed. The outcomes featured that the structure of organization is viewed as the most principal factor among all the measurements for medical specialists’ satisfaction<sup>19,20</sup>. Moreover, medical professionals’ satisfaction applies the best effect on engagement with due understanding of behaviour of

experts’ so that the occupational stress component may not hamper their satisfaction and engagement towards JNMC<sup>13,16</sup>. As far as engagement, family-work factor end up being the most elevated applying factor among all the dimensions created a lot of successful traits in the minds of focused medical professionals’ so they may not misjudge with their work culture, whereas, medical practitioners’ satisfaction is concerned, family-work factor is by all accounts the least ruling factor among all of the dimensions in JNMC<sup>17,18,20</sup>. All of these discoveries could fill in as recommendations for JNMC authorities to assess their relationship and its results for

medicinal practitioners' so it can give pragmatic yield to the medical service industry<sup>2,7,13</sup>.

**Limitations and future research directions:** This research was restricted to exploring the relationship of measurements of occupational related stress on medical practitioners' satisfaction in JNMC. Further examination in different sorts of organizations may give diverse knowledge into the discoveries of this investigation. As indicated by the prerequisite of the separate business, these measurements could be added or changed to fit the association explicit qualities and additional examination is proposed to be done longitudinally so as to evaluate the relationship after some time, nature and area wise. The sample comprised of medicinal practitioners' working in medical care industry and it might be additionally directed among categorical of different practitioners'.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not required as per study.

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# Validation of the World Health Organisation 5-Item Well-Being Index (WHO-5) among the Adult Population Living in a Chronically Arsenic Affected Area of Rural West Bengal in India

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## Abstract

**Objective:** The aim of this study was to validate the World Health Organisation 5-item well-being index (WHO-5) in a sample of the adult population living in a chronically Arsenic affected area in rural West Bengal.

**Materials and Method:** The reliability was measured through Cronbach's alpha. For evaluating the validity of the construct, Barlett sphericity test and the Kaiser-Meyer-Olkin sample adequacy test was conducted. Exploratory factor analysis was done to study the dimension of factors. Correlations were explored between the WHO-5 scores and study variables.

**Results:** The mean score of the total WHO-5 score was 13.09(SD=5.276). A Cronbach's alpha of 0.794 indicated acceptable internal consistency. The Bartlett's Test of Sphericity was significant (Chi =167.86, df=10, p<0.001). The KMO measure for sampling adequacy was 0.826. So the sample was factorable. Exploratory factor analysis confirmed the one-factor structure that accounted for 56.49% variance with an eigenvalue of 2.825. A significant correlation was observed for WHO-5 with health expenditure and postponement of check-up.

**Conclusion:** The WHO-5 well-being index showed acceptable internal validity and construct validity with a one-dimensional structure.

**Keywords:** *WHO-5 well-being index; Arsenic; Reliability; Validity; Factor analysis.*

## Introduction

Quality of drinking water is very much related to health and socio-economic development<sup>(7)</sup>. Arsenic contamination in groundwater has been reported in Bangladesh, India, China, Vietnam, USA, Argentina, Chile and Mexico<sup>(2)</sup>. Long term exposure to Arsenic

contamination both carcinogenic and non-carcinogenic health effects<sup>(4)(6)(10)(11)(19)(24)</sup>.

The World Health Organisation has defined the general definition of health as "a state of complete physical, mental and social well being"<sup>(27)</sup>. The quality of life is affected by health and subjective well being of the individual<sup>(23)</sup>. To assess subjective well-being of individuals, the World Health Organization (WHO), developed the WHO-Five-Well-being Index (WHO-5), a brief, self-administered questionnaire, consisting of 5 questions evaluating mood, vitality and general interests<sup>(3)</sup>. The WHO-5 has also been successfully used different researchers to assess depression in the elderly<sup>(1)(18)</sup>. However, the amount of published literature intending to ascertain the utility of the WHO-5

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as a measure of subjective well being in context to the Indian population are few. This study is carried out to test the validity of the WHO-5 as a measure of subjective well being of the adult population chronically affected by Arsenic contamination in drinking water.

## Materials and Method

**Participants:** The study has been conducted in Basirhat-1 blocks, one of the worst Arsenic affected block in North Twenty Four Praganasin West Bengal<sup>(22)</sup>. Total 14 villages were selected for the study with two villages randomly selected from each of the GP. Out of the currently functional common drinking water sources one common drinking water source was randomly selected for each of the 14 villages. All the randomly selected water sources were found to be Arsenic contaminated<sup>(20)</sup>. By multi-stage random sampling, 125 houses were selected. Door to door survey was conducted with one adult member more than equal to 18 years of age from each family. 116 respondents gave their consent and participated in the study. The study sample size of 116 meets the required sample size for conducting psychometric analysis<sup>(28)</sup>.

**Procedure:** The participants responded to a semi-structured questionnaire capturing socio-demographic characteristics, the Bengali version of the WHO-5 well-being index and the self reported health status. Correlations were studied between WHO-5 scores with socio-demographic status and health status.

The 5-item WHO-5 well-being index (1998 version) is designed with positively worded questions to measure the subjective well being over the past 2 weeks<sup>(23)</sup>. The WHO-5 is available for free in different languages<sup>(26)</sup>. The five items of the WHO-5 are:

1. I have felt cheerful and in good spirits
2. I have felt calm and relaxed
3. I have felt active and vigorous
4. I woke up feeling fresh and rested
5. My daily life has been filled with things that interest me

Each of the above items are rated on a 6 point Likert scale with responses to the questions recorded from 0 (at no time) to 5 (all of the time). The raw score ranges from 0 to 25, with 0 representing the worst possible and 25 representing the best possible quality of life. Low well-being indicates likely depression<sup>(25)</sup>. A score below 13

indicates poor well being and is an indication for testing for depression under ICD-10. It is recommended to administer the Major Depression (ICD-10) inventory if the raw score is below 13 or if the respondent has answered 0 to 1 in any of the five items. To obtain a percentage score ranging from 0 to 100, the raw score is multiplied by 4. A score below 28 is indicative of depression<sup>(16)</sup>.

**Measurements:** A pre-tested, semi-structured door to door interview schedule was carried out to collect the information. For socio-demographic characteristics, age, gender, religion, education, marital status, income and occupation were included. The English version of the WHO-5 was available at the WHO website. The WHO-5 scales were translated from its original English language into Bengali and Hindi language. The translated version was finalised after a pilot study with 13 representative samples. The health status of the respondent was recorded around BMI of the respondent, presence of any disease for more than one year, annual health expenditure of the family, whether an asset was sold for treatment in last one year, whether the respondent has missed any doctor's check-up due to financial issues.

**Data Analysis:** The study was analysed in the Statistical Package for the Social Sciences (SPSS) 20. Internal consistency of the scale was determined by evaluating Cronbach's Alpha. Item-total and inter-item correlations were calculated to assess the reliability of the scale. The validity of the construct was evaluated through exploratory factor analysis. The factorability was determined by Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy. Then Principal Component Analysis (PCA) was performed to understand the structure of factors. The eigenvalues are the amount of total variance explained by the dimension. Only eigenvalues greater than 1 were retained.

The chi-square test was used to examine the relationship of categorical variables like gender, religion, education level, marital status, occupation, having any disease and postponement of a check-up with WHO-5 scores. Correlations between the WHO-5 with variables age, income, health expenditure and BMI were explored using Pearson correlation coefficients with  $p < 0.05$  considered a significant difference.

## Findings

**Participant Characteristics:** A total of 116 elderly

individuals participated in the study, out of which 52% were women and 48% were men. The sample had a mean age of 36.85 years (SD=10.02). The sample consisted of 66% Muslims community and 34% Hindus. Majority of the study participants, 107(92.24%) were married. With regard to education, 54.3% had studied up primary, 34.5% had studied up to secondary, 1.2% up to higher secondary and rest 9.5% had studied up to graduation. 15.5% of the respondents have kucha house, 29.3% had semi-kucha house, 34.5% had semi-pucca house and 20.7% had pucca house. Agriculture and allied activities were significant livelihood for 36.2% with 21.6% dependent on business activities and 42.2% on Bidi making and other wage activities. About monthly average family income, 16.4% had income less than Rs5000/-, 63.8% had income in the range of Rs5,000/- to Rs10,000/- and rest 19.8% had income more than Rs10,000/-.

**WHO-5 well-being index:** The mean score of the

WHO-5 was 13.09 (SD=5.276) (Table-1). 52 (44.82%) out of the total respondent had total WHO-5 score below 13.31 (51.66%) female 21 (37.50%) male had overall WHO-5 score below 13.69 (59.48%) respondents, 42 (70%) female and 27 (48.21) male had score of 0 to 1 in at least one of the item (Table-2). With regards to a count of 100,16 respondents had a score below 28, out of which 11 were female and 5 were male.

**Table-1: Item Statistics of WHO-5 items and total score**

Items	Mean	Std. Deviation	N
who-1	2.76	1.406	116
who-2	2.69	1.386	116
who-3	2.71	1.451	116
who-4	2.57	1.499	116
who-5	2.36	1.274	116
Total Score	13.09	5.276	116

**Table-2: Age-group wise distribution of respondents and poor well being as per WHO-5 score**

Age (years)	N (%)	Mean Score	SD	% of total score <13	% of N with at least 1 item with score 0 to 1
<26	16(13.79)	12.75	4.31	43.75	8.62
26-35	44 (37.93)	14.55	5.20	36.36	18.10
36-45	34(29.31)	12.50	5.37	52.94	19.83
46-55	19(16.38)	10.95	5.81	57.89	11.21
>55	3 (2.59)	13.67	1.15	0.00	1.72

The Cronbach's alpha for total score was 0.794. The correlations between item scores and the total score of the WHO-5 were high ranging from 0.642 to 0.797 (Table-3). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.826, indicating sample adequacy. Bartlett's test of sphericity was 167.862 (df=10, p<0.001), confirming that factor analysis was justified in the sample. The results of the

exploratory factor analysis confirmed one factor. Only one dimension accounted for 56.49% of total variance with an eigenvalue (Fig-1) of 2.825. This means each of the questions is correlating with others. So there is an underlying dimension being observed by these questions<sup>(13)</sup>. This underlying dimension in WHO-5 is called "subjective well being". Table-4 captures the factor loading of each item.

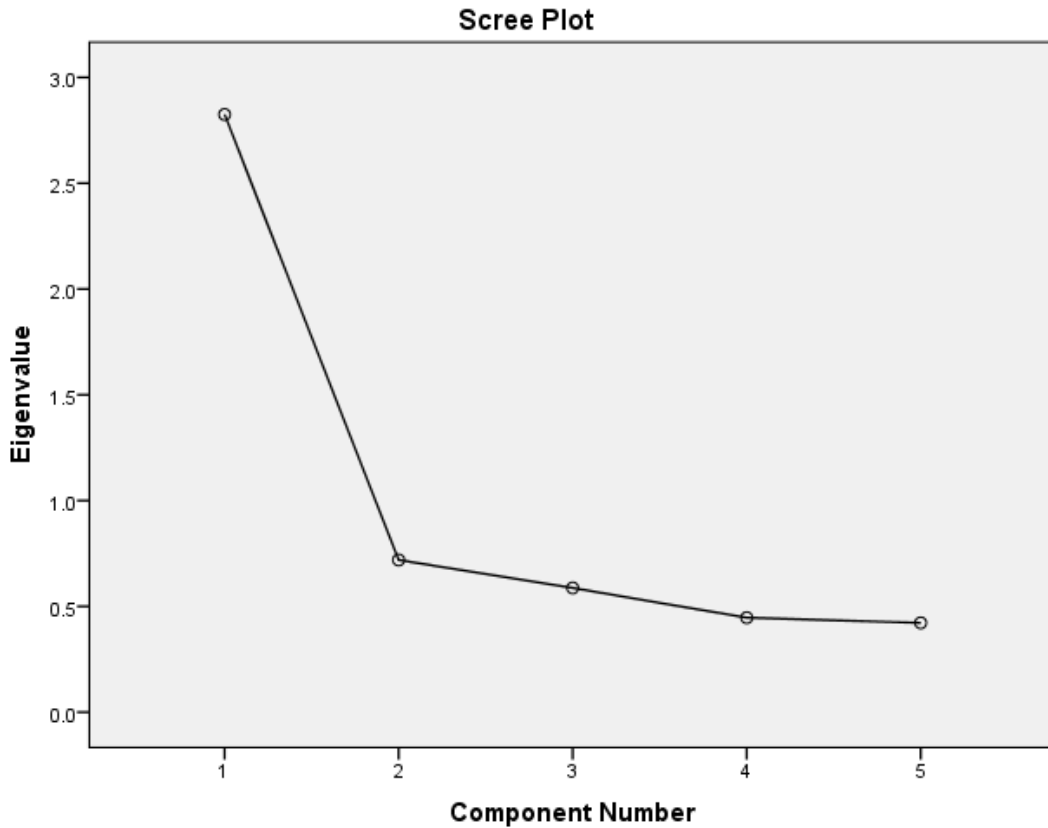
**Table-3: Inter-Item Correlation Matrix**

Items	who-1	who-2	who-3	who-4	who-5	Total Score
who-1	1	0.546	0.502	0.528	0.408	0.797
who-2	0.546	1	0.447	0.467	0.369	0.753
who-3	0.502	0.447	1	0.561	0.378	0.777
who-4	0.528	0.467	0.561	1	0.319	0.779
who-5	0.408	0.369	0.378	0.319	1	0.642
Total Score	0.797	0.753	0.777	0.779	0.642	1

**Table-4 Factor loadings of WHO-5 questions**

WHO-5 Questions	Factor loading
who-1	0.806
who-2	0.757
who-3	0.777
who-4	0.776
who-5	0.63

**Figure 1: Scree plot of Eigenvalue**



**Correlation of WHO-5 with study variables:**

WHO-5 score was not significantly associated with gender, religion, education level, marital status, occupation and having any disease. WHO-5 was found to be significantly correlated with the postponement of check-up due to financial issues with  $p=0.035$  (Chi-square test). WHO-5 did not differ for age, income and BMI. WHO-5 was found to be negatively correlated with health expenditures ( $r = -0.209, p=0.024$ ).

**Discussion**

The Cronbach’s alpha was 0.794, indicating good reliability. The internal consistency is in good agreement with the findings in other studies. An alpha of 0.88 was

obtained when the local language version of the WHO-5 tool was used for women in Odisha, India<sup>(5)</sup>. In Brazil, a Brazilian Portuguese version of the WHO-5 well-being index amongst the adult population showed an internal consistency of 0.83<sup>(9)</sup>. In a study using the Korean version of WHO-5 amongst the elderly, the Cronbach’s alpha was 0.8<sup>(18)</sup>.

The study found an one-dimensional structure of the Bengali version of the WHO-5 well-being index. Only one dimension accounted for 56.49% of the variance. This confirms that a single underlying factor is assessed by the WHO-5 well-being index. The finding concurs with the findings of the other studies<sup>(9)(18)</sup>.

The mean score of the WHO-5 in this study was found to be 13.09 (SD=5.276). Study of subjective well-being amongst elderly in Indian context has reported mean raw WHO-5 score of 14.80 (SD=5.49)<sup>(21)</sup>. In another study conducted with psychiatric patients, the Iranian version of WHO- showed a mean score of 8.95 (SD=5.49)<sup>(8)</sup>. 52 (44.82%) out of the total respondent had total WHO-5 score below 13 and 69 (59.48%) respondents had score of 0 to 1 in at least one of the item. 16 respondents had score below 28%. This signifies poor well-being status of the study population

The result of a negative correlation between the WHO-5 scores and health expenditure shows that poor well being is positively associated with health expenditure. This finding also resonates with another study <sup>(15)</sup> which found that high health expenditure affects well being and is more pronounced for patients with chronic disease.

**Strengths:** Very few studies have been done to assess the quality of life in India's context by using the WHO-5 questionnaire. This study is first of its kind which studied the subjective well-being of the adult population residing in Arsenic affected Rural West Bengal by using WHO-5 well-being index.

**Limitations:** WHO-5 have been an accepted tool for screening depression and this can be further validated by using tools which validates depressive symptoms.

### Conclusion

The study aimed to evaluate the WHO-5 well-being index scale in the local language to measure subjective well-being in rural areas chronically affected by Arsenic contamination in drinking water. The findings demonstrated that the WHO-5 well-being index is a reliable and uni-dimensional tool. This can be further used to measure subjective well being of the adult population chronically affected with Arsenic contamination in drinking water. The findings also encourage the use of the WHO-5 well-being index in researches related to environmental health.

**Conflict of Interest:** The author reports no conflicts of interest. The author alone is responsible for the content and writing of this article.

**Source of Funding:** The research has been conducted with the funding support of IIT, Kharagpur.

**Ethical Clearance:** The study protocol has been

approved by IIT, Kharagpur and the consent of the participants have been taken individually before conducting the interviews.

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# Socio-economic Determinants in the Utilization of Maternal Health Care in India: Exploring National Level Data

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## Abstract

**Introduction:** The maternal health generally refers to the health of women during pregnancy, childbirth and postpartum period. Utilization of maternal health care services has been recognized as a significant factor in influencing maternal and child mortality. The Maternal Mortality Ratio (MMR) estimate for the country indicates an overall decline from 212 in 2007-09 to 178 per one lack live births in 2012, resulting in saving lives of about 9,000 mothers per year<sup>2</sup>. The aim of maternal health care services to reduce infant mortality, maternal morbidity and mortality was recognized at the Cairo Conference on Population.

**Materials and Method:** This paper has utilized the data collected by the National Sample Survey Organization (NSSO) during January -June, 2014. It is a cross sectional dataset available in public domain. The dataset provides information on Social Consumption and Health scenario of the population. To carryout the research, descriptive statistics, bivariate and logistic regression analysis has been used.

**Findings:** The study shows that place of residence, marital status, educational status and wealth index plays an important role in determining the utilization of ante-natal care and post-natal care services. Utilization of services from private sector increases with the increase in the level of socio-economic characteristics. Southern and Western regions of India have 97 percent utilization of ante-natal care and more than 90 percent utilization of post-natal care services in India. Multivariate analysis also depicts close relationship with different predictors as urban place of residence, currently married women, higher educational status and richest wealth category.

**Conclusion:** Place of residence, educational status and wealth index plays an important role in determining the utilization of maternal health care. Western and Southern regions have better utilization of maternal health care services.

**Keywords:** *Ante-natal care, Post-natalcare, Maternal health, Place of delivery.*

## Introduction

Utilization of maternal health care services remained weak in India despite increase in the private and public sectors provision of the health care services. The high maternal mortality, majorly due to disadvantageous position of women, poor quality of services and different factors that affects the utilization of maternal health care services. Women of reproductive age group are still the most-vulnerable population in terms of their health, especially during and after pregnancy. The maternal

health generally refers to the health of women during pregnancy, childbirth and postpartum period. Due to various complications during pregnancy or childbirth, a large section of pregnant women dies annually. Developing countries contribute larger in these deaths. The decline rate of maternal mortality is very slow, but the annual decline required rate is 5.5 percent to meet the MDG target of reducing by three-quarters the maternal mortality ratio by 2015<sup>1</sup>.

There are a range of socioeconomic and cultural

factors that affects the maternal mortality i.e. Status of women, educational and economic status, availability and accessibility facility (distance, transport, etc.) and quality of care (staff, equipment, infrastructure in the health facility).

The aim of maternal health care services to reduce infant mortality, maternal morbidity and mortality was recognized at the Cairo Conference on Population. In order to accomplish it, Andersen's health care utilization and behavior model was adapted for system-level measures and to focus on the availability, accessibility and organization of services. Keeping it in mind the appropriate behavioral model for maternal health care utilization was adopted. This study has included predisposing factors, enabling factors, need factors and environmental variables<sup>2-3</sup>. Existing studies have found that people living in the poorest neighborhoods are least likely to receive adequate care<sup>4</sup>. These deaths were unadjusted and might be avoided with essential health interventions, like provision of antenatal care and medically assist redelivery<sup>5</sup>. Women's autonomy has also been found to be associated with lower child mortality and better maternal and child health<sup>6</sup>.

Differentials in utilization of maternal care services were higher across deprivation levels in the states where service coverage was low than states where service coverage was high<sup>7</sup>. Moreover, income differences in access to maternal care were widening across and within countries as poor women were receiving fewer services than those who are better off<sup>8</sup>. Health care financing between and within countries, with the changes of government. These variations not only have strong implications for income distribution, but also affect the manner of health care utilization<sup>9</sup>.

India is a developing country with a high level of maternal mortality. Government has launched many maternal health care (MHC) programmes to reduce MMR and some other maternal and child health complication. But it still lacks behind to fulfil Millennium Development Goal<sup>10</sup>. So, there is a need to analyze the situation of utilizing the maternal health care services and determining the factors that affects the utilization of maternal health care services in India.

## Materials and Method

This paper has used the data collected by the National Sample Survey Organization (NSSO) during January – June, 2014. This round provides data and information

on Social Consumption and health. The dataset provides enough information related to the prevalence, nature of treatment, level of care and financial expenditure for different morbidity in India.

Descriptive statistics is used to provide simple summaries about the sample and also about the observations that have been made. It is used to show the prevalence of ante-natal care, post-natal care and place of delivery with respect to the different socio-economic characteristics and also with respect to different regions. Binary and multi-variate logistic regression is used to find out the odds of maternal health care with respect to the different predictor variables.

In this study, complete ante-natal care comprises of tetanus injections, IFA tablets and reception of any other services. Incomplete ante-natal care depicts the services who has not received any one of the ante-natal care services. Place of delivery represents the place women has consulted for delivery or abortion.

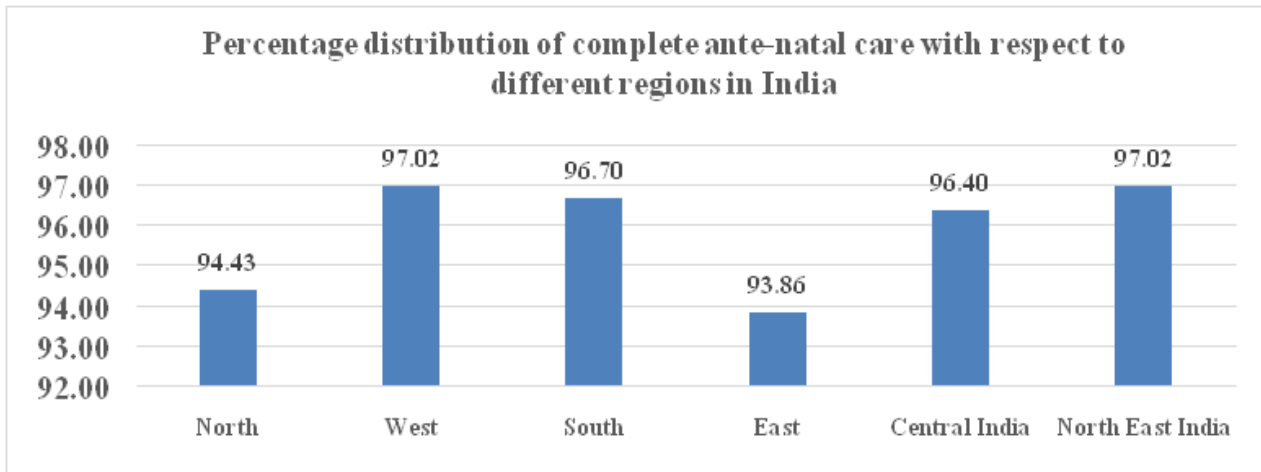
**Findings:** The table 1 represents the percentage distribution of ante-natal care and post-natal care with respect to the different predictor variables. Women residing in the urban areas show more than 95 percent utilization of complete ante-natal care services. But, the utilization of post-natal care is low in rural areas. Moreover, more than 50 percent, post-natal care in urban areas are received from private services.

Primary educated women show 94 percent of utilizing ante-natal care while secondary and higher educated women show 97 percent and 96 percent respectively. Utilization of post-natal care is also low for primary educated women than secondary and higher educated women. With the increase in educational status, reception of post-natal care from private services is higher than public services. Women belonging to other category show 96 percent of ante-natal care utilization than the women belonging to scheduled tribe (96 percent) and scheduled castes (94 percent). The utilization of post-natal care services is higher for women belonging to others category (88 percent) than scheduled tribe (82 percent) and scheduled caste (83 percent) population.

Women having religious affiliation to Islam show 93 percentage of ante-natal care services and 88 percentage of post-natal care services while Hindus show 95 percent of ante-natal care and 86 percent of post-natal care and others religious category show 96 percent of ante-natal care and 80 percent of post-natal care. Women belonging

to richest wealth quintile shows higher percentage utilization of complete ante-natal services (96 percent) than the women belonging to poorest wealth quintile (94

percent). The utilization of post-natal care also increases with the increase in the wealth quintile from poorest (83 percent) to richest (89 percent).

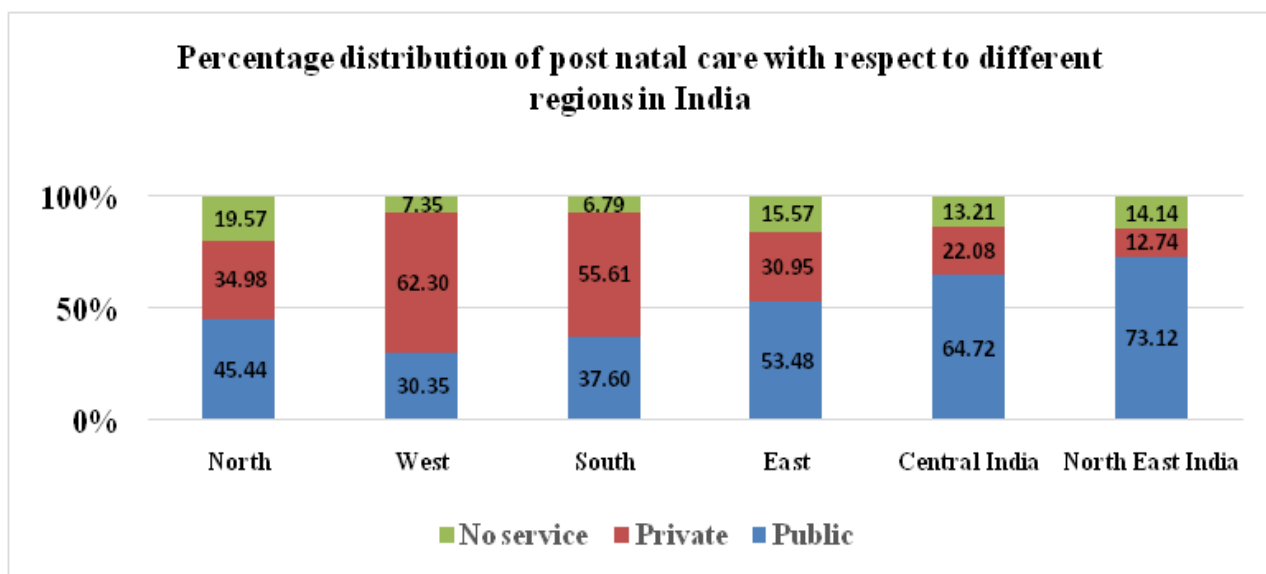


Source: NSSO 71<sup>st</sup> Round

Figure 1: Percentage distribution of Ante-natal care with respect to the different regions in India.

The figure 1 represents the percentage distribution of ante-natal care with respect to the different regions in India. East India shows 94 percentage utilization of complete ante-natal care while Western, North-Eastern

and Southern India show 97 percent, 97 percent and 96 percent utilization of complete ante-natal care respectively.

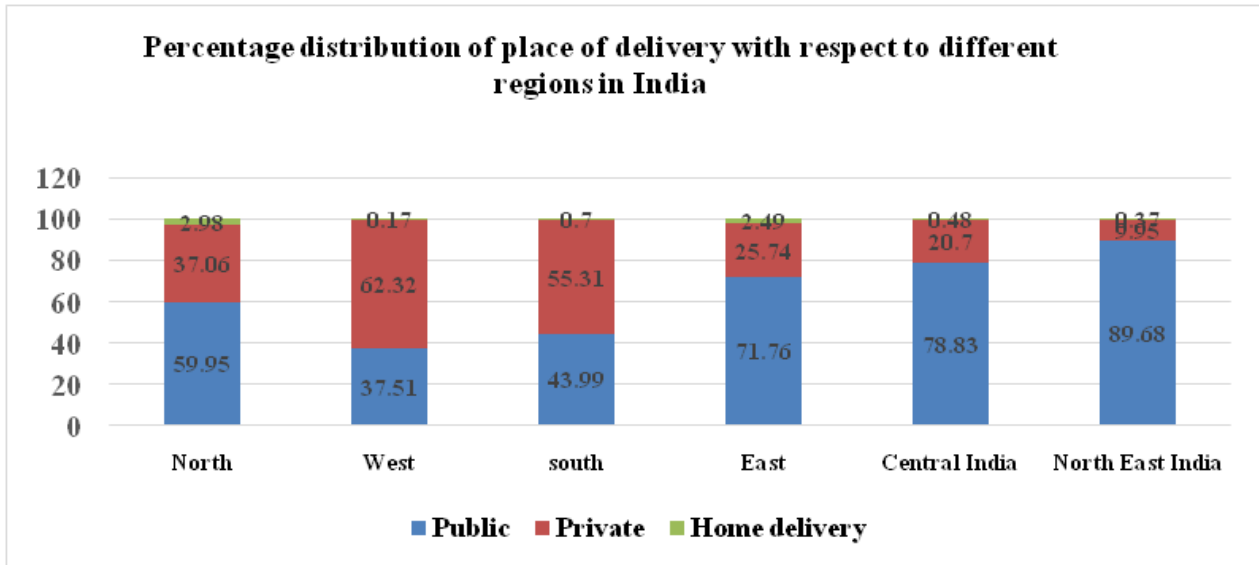


Source: NSSO 71<sup>st</sup> Round

Figure 2: Percentage distribution of Post-natal care with respect to different regions in India.

The figure 2 represents the percentage distribution of post-natal care with respect to different regions of India. Northern States of India shows less percentage utilization of post-natal care than Eastern, North East and Central India respectively. Southern and Western India show high percentage utilization of post-natal

care in India. In southern and western regions of India, mainly the services are utilized from private services i.e. 56 percent and 62 percent respectively. North East region of India show 73 percent of services from public sector followed by Central India (65 percent).

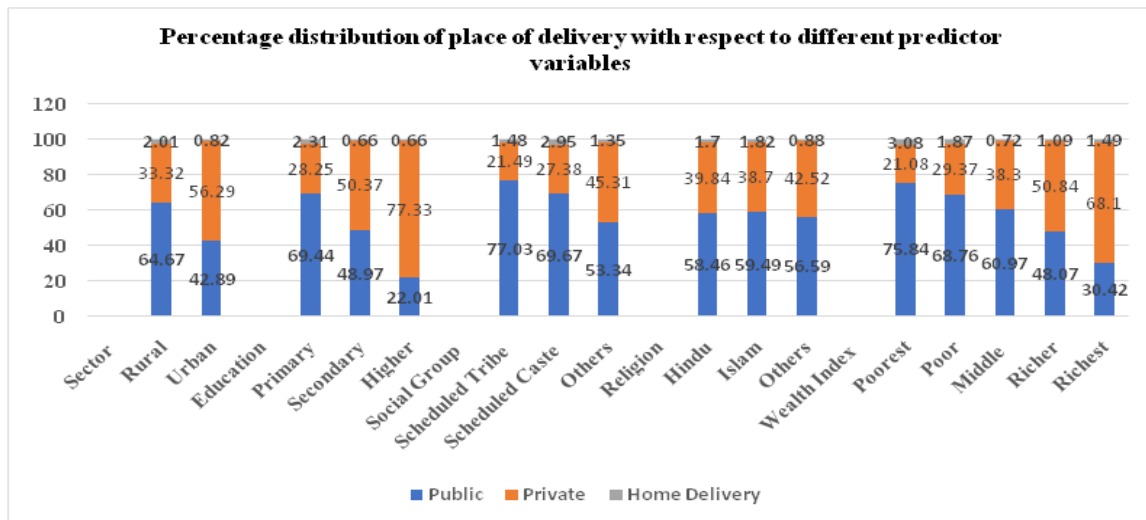


Source: NSSO 71<sup>st</sup> Round

Figure 3: Percentage of place of delivery with respect to different regions in India.

The figure 3 represents the percentage distribution of place of delivery with respect to different regions in India. Home delivery is in higher percentage in Northern India and Eastern India than other regions of India. Western and Southern region show 62 percent and 55

percent of private place of delivery respectively. North East, Central and Eastern India show 90 percent, 79 percent and 72 percentage utilization of public place of delivery respectively.



Source: NSSO 71<sup>st</sup> Round

Figure 4: Percentage distribution of place of delivery with respect to the different predictor variables.

**Table 1: Percentage distribution of Ante-natal care and post-natal care services with respect to the different predictor variables.**

	Ante-natal care			Post-natal care			
	Incomplete	Complete	Total	Public	Private	No service	Total
<b>Sector</b>							
Rural	4.67	95.33	10348	50.65	35.0	14.35	10205
Urban	4.77	95.23	4066	33.8	55.01	11.18	3990
<b>Total</b>	<b>4.7</b>	<b>95.3</b>	<b>14414</b>	<b>45.91</b>	<b>40.63</b>	<b>13.46</b>	<b>14195</b>
<b>Education</b>							
Primary	5.75	94.25	8900	54.44	30.02	15.54	8,771
Secondary	2.88	97.12	3871	38.2	50.5	11.3	3,804
Higher	3.27	96.73	1644	17.85	74.92	7.24	1,620
<b>Total</b>	<b>4.7</b>	<b>95.3</b>	<b>14414</b>	<b>45.91</b>	<b>40.63</b>	<b>13.46</b>	<b>14,195</b>
<b>Social Group</b>							
Scheduled Tribe	4.39	95.61	1212	60.86	21.89	17.25	1197
Scheduled Caste	5.86	94.14	2844	53.99	29.59	16.42	2792
Others	4.42	95.58	10358	41.95	45.84	12.2	10207
<b>Total</b>	<b>4.7</b>	<b>95.3</b>	<b>14414</b>	<b>45.91</b>	<b>40.63</b>	<b>13.46</b>	<b>14195</b>
<b>Religion</b>							
Hindu	4.38	95.62	11351	46.02	40.13	13.85	11191
Islam	6.6	93.4	2396	45.08	42.23	12.69	2344
Others	3.37	96.63	667	47.16	43.37	9.47	660
<b>Total</b>	<b>4.7</b>	<b>95.3</b>	<b>14414</b>	<b>45.91</b>	<b>40.63</b>	<b>13.46</b>	<b>14195</b>
<b>Wealth Index</b>							
Poorest	5.67	94.33	3213	59.19	24.36	16.45	3197
Poor	5.53	94.47	2927	54.7	31.49	13.81	2895
Middle	4.03	95.97	3390	47.34	38.61	14.06	3323
Richer	3.23	96.77	2385	37.83	50.9	11.26	2351
Richest	4.78	95.22	2499	23.83	65.76	10.41	2428
<b>Total</b>	<b>4.7</b>	<b>95.3</b>	<b>14414</b>	<b>45.91</b>	<b>40.63</b>	<b>13.46</b>	<b>14,195</b>

Source: NSSO 71<sup>st</sup> Round

The figure 4 represents the percentage distribution of place of delivery with respect to the different predictor variables. Women residing in the urban areas show 56 percent of private services than the women residing in the rural areas (33 percent). Primary educated women show 2 percent home delivery care than the secondary (0.66) and higher educated women (0.66) respectively. Higher educated women show 77 percent reception of services from private sector than secondary educated (i.e. 50 percent). Women belonging to other category has higher utilization of private place of delivery (43 percent) than the women belonging to scheduled tribe (21 percent) and scheduled castes (28 percent). Women having religious affiliation to Islam has 60 percent public place of delivery than Hindus (58 percent). Women belonging

to richest wealth quintile show 68 percentage utilization of private place of delivery than the women belonging to poorest wealth quintile (21 percent). Women belonging to poorest wealth quintile show 3 percentage of home delivery in India.

### Conclusion

With the increase in the educational status, wealth status, place of residence from rural to urban there is an increase in the utilization of maternal health care. Similarly, the utilization of maternal health care services from private sector also increases with the increase in the levels of these socio-economic characteristics. Western and Southern regions of India show better utilization of maternal health care services than other regions in India.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Secondary dataset, Available in public domain.

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# Catastrophic Health Care Expenditure on Maternal Health Care in India: Evidence from National Level Data

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## Abstract

**Introduction:** Catastrophic health expenditure is defined as payments for health services exceeding 40% of household disposable income after subsistence needs are met. Utilization of maternal health care services has been recognized as a significant factor in influencing maternal and child mortality. India continues to account for a quarter of all maternal and child deaths at the world level. The cost of health care is comparatively higher in private sector than the public health facilities. Households using private inpatient services are more likely to face catastrophic expenditure.

**Materials and Method:** This paper has utilized the data collected by the National Sample Survey Organization (NSSO) during January-June, 2014. It is a cross sectional dataset available in public domain. The dataset provides information on Social Consumption and Health scenario of the population. To carry out the research, descriptive statistics, bivariate and logistic regression analysis has been used.

## FINDINGS

The study shows that urban sector, primary educated and women belonging to poorest wealth quintile bear high catastrophic health expenditure than their other counterparts. Western and Southern region have low percentage of women going for catastrophic expenditure on maternal health care. The likelihood of catastrophic health expenditure on maternal health care decreases with the increase in wealth quintile from poorest to richest.

**Conclusion:** Place of residence, educational status and wealth index plays an important role in determining the catastrophic health expenditure on maternal health care. Further research needs to be done in exploring the factors that leads to inequity of the expenditure used in the utilization of maternal health care.

**Keywords:** *Ante-natal care, Catastrophic expenditure, Child Health, Maternal health care, Post-natal care.*

## Introduction

The progress in improving maternal health, as envisaged in the UN Millennium Development Goals (MDGs), critically depends on the availability, afford ability and effective use of reproductive health services<sup>1-4</sup>. India is one of the rapidly developing country where health is still a challenge at the national level, although maternal and child health indicators have shown a little or no progress.

India continues to account for a quarter of all maternal and child deaths at the global level<sup>5</sup>. The

maternal mortality ratio in India showed a decline from 301 deaths per 100,000 live births in the period 2001–03 to 254 and 212 during 2004–06 and 2007–09 respectively, but the ratio still lags behind the MDG target of 109 by the year 2015<sup>6</sup>.

People living with poverty, accessibility and unawareness are the major reasons for poor uptake of maternal health care services in India. For example, in Bihar, one of India's poorest states where over 80% of births are home births, approximately 50% of women reported financial concerns as the reason for not opting

for institutional delivery care<sup>7</sup> despite the fact that maternal health care services are provided free-of-charge in public health facilities in India. Majority of states in India has the higher utilization of public maternal healthcare services than the private health care services. The delivery care services utilization has almost equal share with the public and private sectors.

In India, the total health expenditure constituted 4.3% of GDP (2009), with private and public sectors accounting for 78 and 20% respectively<sup>8</sup>. Out-of-Pocket Expenses (OOPE) and catastrophic health expenditure contribute to over 70% and 30% of the total health expenditure respectively. These additional expenses deteriorate and makes the women vulnerable pushing their households further into poverty. Peters et al. estimated that a quarter of the Indian population fall into poverty as a direct result of the medical expenses incurred through hospitalization<sup>9</sup>. Data from the National Sample Survey Organization (NSSO) show an increase in household poverty in both rural and urban India after accounting for OOPE<sup>10</sup>. This has further deteriorated the catastrophic health expenditure on maternal health care.

So far, very less pieces of research are available on catastrophic health expenditure for maternal health care services in India. In many southern and western states of India, the utilization of maternal healthcare is high. Furthermore, catastrophic health expenditure on maternal health care services is neglected by policy makers and planners.

A recent study by Bonuet al. analyzed national data

to examine maternal health care expenditure in Indian households<sup>11</sup>. However, this study does not take into account the indirect costs associated with maternal health care expenditures. The main aim is to consider the socio-economic characteristics that determine the catastrophic health expenditure on maternal health care in India.

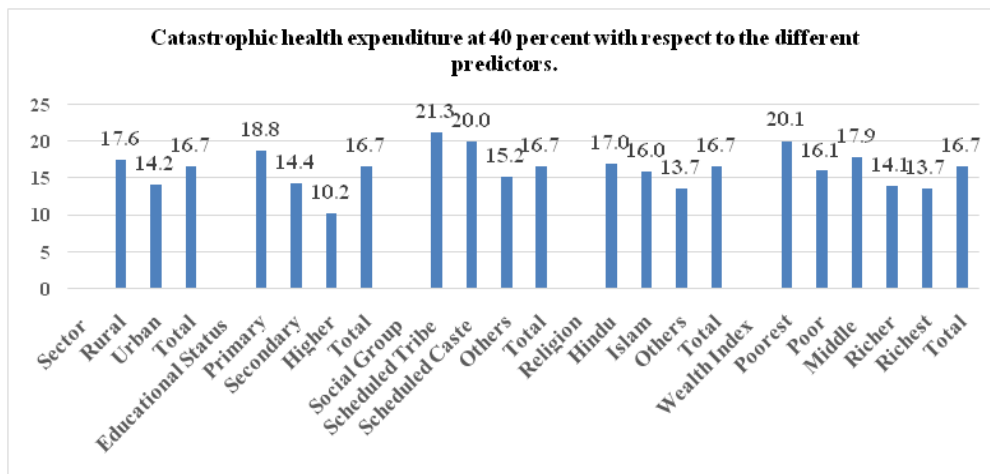
### Materials and Method

This paper has used the data collected by the National Sample Survey Organization (NSSO) during January–June, 2014. This round provides data on Social Consumption and health. The dataset provides enough information related to the prevalence, nature of treatment, level of care and financial expenditure for different morbidity in India.

Descriptive statistics is used to provide simple summaries about the sample and also about the observations that have been made. It is used to show the prevalence of maternal health care with respect to different predictor variables and also with respect to different states. Logistic regression is used to find out the odds of catastrophic health expenditure at 40 percent with respect to the different predictor variables.

In this study complete maternal health care comprises of women who has taken ante-natal care and post-natal care. Incomplete maternal health care comprises of women who has taken either ante-natal care or post-natal care. In majority of the literature available, catastrophic health expenditure is measured at 40 percent cut off levels.

### Findings:



Source: NSSO 71<sup>st</sup> Round.

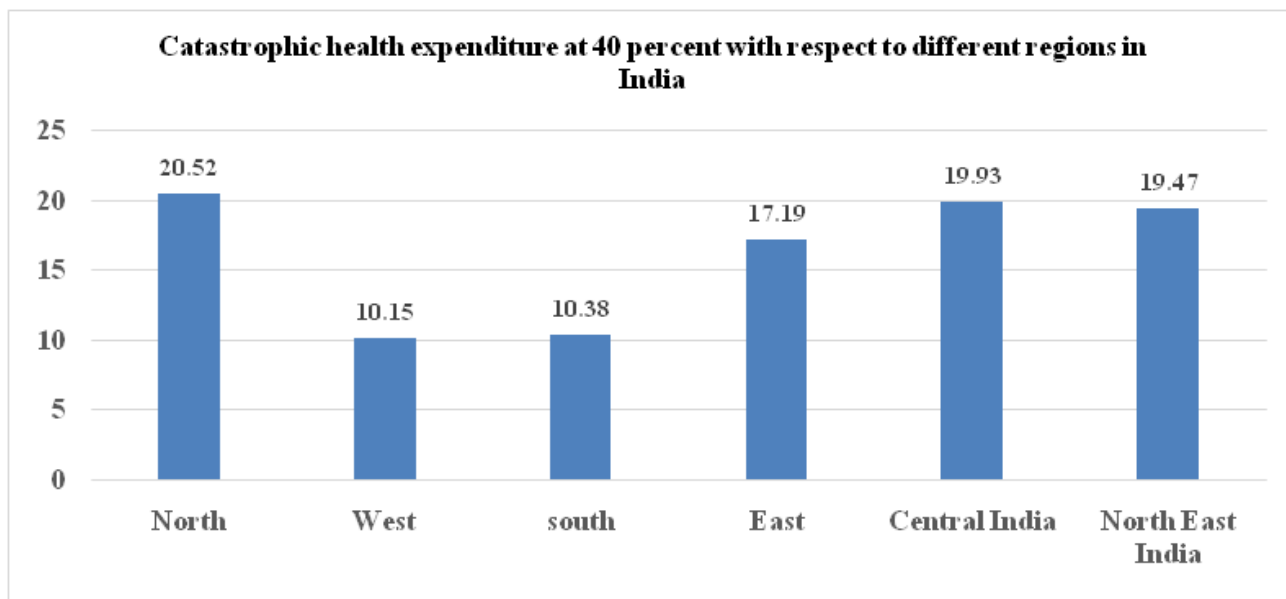
Figure 1: Catastrophic health expenditure at 40 percent with respect to the different predictor variables.



Figure 1 represents the catastrophic health expenditure at 40 percent with respect to the different predictor variables. Women residing in rural and urban areas undergoing catastrophic health expenditure is 17 percent and 14 percent respectively. Rural sector has higher percentage of catastrophic health expenditure than urban sector.

Women who have primary educational status have higher percentage levels of catastrophic health expenditure than secondary and higher educated women. Higher and secondary education status depicts 10 percent and 14 percent of women undergoing catastrophic health expenditure while primary educational status shows 19 percent level respectively. Women belonging to scheduled tribe bear higher catastrophic health expenditure than scheduled castes and others category.

Twenty one percent women of scheduled tribe, 20 percent women of scheduled caste and 15 percent belonging to other category undergo catastrophic health expenditure. Affiliation to Hindu religion depicts 17 percent of women for catastrophic health expenditure at 40 percent level. The catastrophic health expenditure beard by Hindus is higher than women affiliated with Islam (16 percent) and other religious groups i.e. 14 percent. Poorest wealth quintile shows 20 percent women undergoing catastrophic health expenditure. The catastrophic health expenditure decreases with the increase in the wealth quintile from poorest to richest category. Fourteen percent women belonging to richest wealth quintile undergo catastrophic health expenditure on the utilization of maternal health care.



Source: NSSO 71<sup>st</sup> Round.

**Figure 2: Catastrophic health expenditure at 40 percent with respect to different regions in India**

Figure 2 represents the catastrophic health expenditure on maternal health care with respect to different regions in India. Northern (21 percent) and Central Indian (20 percent) region show high percentage of women undergoing catastrophic health expenditure on maternal health care. Western and Southern region show

10 percent women undergoing for catastrophic health at 40 percent level. Twenty percent women residing in North East India show 20 percent women undergoing catastrophic health expenditure on the utilization of maternal health care services.

**Table 1: Determinants of catastrophic health expenditure at 40 percent on the utilization of maternal healthcare with respect to the different predictor variables.**

	Odds Ratio	95% Confidence Interval	
Sector			
Rural ®			
Urban	0.96	0.867	1.055
Educational status			
Primary ®			
Secondary	0.79***	0.718	0.889
Higher	0.59***	0.504	0.694
Social Group			
Scheduled Tribe ®			
Scheduled caste	0.96	0.805	1.138
Others	0.89	0.764	1.040
Religion			
Hindu ®			
Islam	0.87**	0.764	1.001
Others	0.85*	0.719	1.026
Wealth Index			
Poorest ®			
Poor	0.92	0.797	1.068
Middle	0.97	0.841	1.113
Richer	0.93**	0.730	0.991
Richest	0.85**	0.800	1.101
_cons	0.27	0.228	0.316

\*sig.at10% level; \*\*sig. at 5% level; \*\*\*sig. at 1% level; ® Reference category

Source: NSSO 71<sup>st</sup> Round.

Table 1 represents the determinants of catastrophic health expenditure at 40 percent on the utilization of maternal health care with respect to the different predictor variables. Secondary and higher educated women are 20 percent and 40 percent less likely to bear catastrophic expenditure on maternal health care than primary educational status respectively. Women affiliated to Islam is 13 percent less likely to have catastrophic expenditure on maternal health care than Hindu affiliated women. Similarly, the likelihood of women belonging to other religious category is 15 percent than Hindus. Women belonging to richer and richest wealth quintile is 13 percent and 15 percent less likely to have catastrophic health expenditure than poorest wealth quintile respectively. As the educational status and wealth quintile increases, the likelihood of women undergoing catastrophic health expenditure decreases.

### Conclusion

With the increase in the educational status, wealth status, place of residence from rural to urban there is an increase in the utilization of maternal health care. Western and Southern region in India are less prone for catastrophic health expenditure on the utilization of maternal health care. Similarly, the catastrophic health expenditure on maternal health care also increases with the increase in the place of residence from rural to urban, educational status from primary to higher and wealth index from poorest to richest.

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# Effectiveness of Planned Teaching Programme on Knowledge Regarding Child abuse among Mothers

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## Abstract

**Background:** The issue of child abuse is a major global social problem within and outside the homes and among all socio-economic groups of both the developed and the developing nations of whole world.

**Objective:** study investigated the effectiveness of Planned Teaching Programme on Knowledge regarding child abuse among mothers

**Method:** One group pretest post test design was used to conduct the study among mothers totally 100 mothers with 3-6 years of children were selected by Purposive sampling technique. Study conducted at Malkapur Anganwadi, Karad. Data was collected by using structured questionnaire. Pre-test was conducted to assess the existing knowledge of mother regarding child abuse. Then Planned Teaching Programme was conducted on child abuse. Post-test conducted after seven days of planned teaching programme.

Results: The pre-test mean was 11.75 where post-test mean was 15.81 and calculated t value was 12.907 found significant at the level of  $p < 0.0001$ .

Conclusion: Planned teaching programme was found to be very effective for improving knowledge of preschooler mothers regarding child abuse.

**Keywords:** Child abuse, planned teaching programme, mothers.

## Introduction

The issue of child abuse is a major global social problem within and outside the homes and among all socio-economic groups of both the developed and the developing nations of whole world. The World Health Organization (WHO) defines child abuse as all forms of physical, emotional and sexual abuse, neglect and exploitation leading to actual and potential damage to a child's health and development.<sup>[1]</sup> Child abuse is a state of

emotional, physical, economic and sexual maltreatment meted out to a person below the age of eighteen and is a globally prevalent phenomenon. Government of India study on child abuse the findings of the Study on Child Abuse clearly point out that a large number of children in India are not even safe in their homes.<sup>[2]</sup> Child abuse occurs all religions and at all levels of education at every socioeconomic level, across ethnic and cultural lines.<sup>[3]</sup>

Prevention of child abuse is an inevitable part of the society. The impact of child maltreatment can be profound. Child abuse has harmful outcome in children and adolescents that can extend into adulthood. Abused children often suffer physical problems and stress that may disturb early brain development. Children who are abused are at higher risk for health problems such as depression, alcoholism, drug abuse, smoking, suicide and certain chronic diseases.<sup>[4]</sup> Child abuse represents

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a deviation in a basic social function, namely caring for socializing a child until he reaches independence.<sup>[5]</sup> Family is the most important and influential factor on education. Children's are talented from the birth to get what they observe and listen from others. Therefore, the family could be the first educational environment for child. Child abuse occurs for various reasons, including risk factors in parents and caregivers, risk factors in children, relationship factors, community and social factors.<sup>[6]</sup>

Child abuse can have damaging effects not only on the children who suffer it, but on communities that must address the aftermath of abuse.<sup>[7]</sup> According to data from National Statistics on Child Abuse reports that nearly five children die every day in America from abuse and neglect. In 2011, an estimated 1,570 children died from abuse and neglect in the United State. <sup>[8]</sup> However, in India, as in many other countries, there has been no understanding of the extent, magnitude and trends of the problem.<sup>[9]</sup> It has found that in developing countries like India, the problem of child abuse exist in severe forms and is interrelated with poverty, malnutrition, communicable diseases. <sup>[5]</sup> Hence we felt there is need to select this study and to assess the knowledge of mothers regarding child abuse and improve mother's knowledge regarding child abuse.

### **Method:**

One group pretest posttest design was used to conduct the study among mothers totally 100 mothers with 3-6 years of children were selected by Purposive sampling technique. The samples included in this study were who fulfilled the inclusion criteria with who were willing to participate in the study, mothers who had child between age group of 3-6 years were included in the study. Ethical permission was obtained before the data collection. After obtaining permission from the setting, the patients were asked their willingness to participate in the study and informed consent was obtained. Study conducted at Malkapur Anganwadi, Karad. Data was collected by using structured questionnaire. Pre-test was conducted to assess the existing knowledge of mother regarding child abuse. Then Planned Teaching Programme was conducted on child abuse. Post-test conducted after seven days of planned teaching programme

Statistical analysis used: To compare the two means Paired t test was used and to find out association between demographic variables and pretest knowledge score Chi Square test was used.

## **Results**

**Description of sample characteristics:** Most of 34 (34%) mothers were in the age group of 26-28 years, the remaining 24 (24%) were in the age group of 20-22 years and age group of 23-25 years. Majority 42 (42%) mothers having two children and 40 (40%) mothers having one child. As regards to education 36(36%) mother had taken secondary education, 34 (34%) had taken under graduate education and 22 (22%) had illiterate. Most of mother 42 (42%) mother were housewife, 27 (27%) were business women. Regarding monthly income 35 (35%) had monthly income Rs. 5, 000-10,000, followed by 29 (29%) had income Rs. 11,000-15,000. Majority of mothers belonging from joint family i.e. 53 (53%) and total 47 (47%) mothers are from nuclear family. In relation to religion 50 (50%) of the mothers belongs to Hindu family, total 20 (20%) were Muslim and 18 (18%) were Christian. Majority of 43 (43%) mothers had 3-4 year and 4-5 year children's and only 14 (14%) mother had children's 5-6 year children's. Majority children's were male i.e. 59 (59%) and 41 (41%) were female children. Most of the 33 (33%) of women getting information from television and newspaper about child abuse, 22 (22%) mothers received from mobile, only 2 (2%) got information from other resources.

**Knowledge of mothers regarding child abuse:** Data presented in Table no. 1 majority of mothers 56(56%) had average knowledge, whereas 37 (37%) had good knowledge and 7(7%) poor knowledge regarding child abuse before administration of planned teaching programme. Most of the mothers 82 (82%) had good knowledge, whereas 17 (17%) had average knowledge and only 1 (1%) poor knowledge regarding child abuse after administering planned teaching programme.

**Effectiveness of planned teaching programme regarding mother's knowledge about child abuse:** Table no. 2 shows that the mean and standard deviation of knowledge score obtained before and after the administering the planned teaching programme. This is considered to be extremely significant improvement in knowledge regarding child abuse. The pre-test mean was 11.75 and post-test mean was 15.81 and calculated t value was 12.907 found significant at the level of  $p < 0.0001$ .

The association between pre-test knowledge score on mothers regarding child abuse with their demographic variables.

Table no. 3 reveals that there is significant association between mother’s knowledge with variable of Religion, Monthly income of family and Education of mother at the level of  $p < 0.05$  other variables like Age, Number of children, Occupation of mother, Type of family, Age of child, Sex of child and Source of getting information about child abuse was not found significant association between mother’s knowledge at the level of  $p < 0.05$ .

**Table No. 1: Pre-test and post-test Knowledge of mothers regarding child abuse:**

Phase	Knowledge score	Pre-test Knowledge		Post-test knowledge	
		Frequency	Percentage	Frequency	Percentage
Poor	0-6	7	7%	1	1%
Average	7-13	56	56%	17	17%
Good	14-20	37	37%	82	82%

**Table No. 2: Pretest and Posttest Mean and SD regarding mother’s knowledge about child abuse:**

Pre Test		Post Test		t value	P Value
Mean	SD	Mean	SD		
11.75	4.205	15.81	2.718	12.907	<0.0001

**Table No. 3: Association between pre-test knowledge score and demographic variables.**

Demographic variables	Option	Level of knowledge			Chi-square value	P value	Result
		Poor	Average	Good			
Age	20-22 years	3	15	6	7.968	0.2405	Not significant
	23-25 years	1	9	14			
	26-28 years	2	22	10			
	Above 28 years	1	10	7			
Number of children	1	3	18	12	6.408	0.3791	Not significant
	2	2	24	16			
	3	1	8	7			
	4	1	1	0			
Education of mother	Illiterate	0	2	6	22.071	0.0012	Significant
	Secondary	4	12	20			
	Under graduate	1	25	8			
	Graduate	2	17	3			
Occupation of mother	Housewife	1	29	17	9.932	0.1275	Not significant
	Business women	2	12	13			
	Farmer	1	8	5			
	Professional	3	12	2			
Monthly income of family	Rs.5,000-10,000	1	16	18	14.845	0.0215	Significant
	Rs.11,000-15,000	1	17	11			
	Rs.15,000-20,000	3	10	8			
	Above Rs. 20,000	2	13	0			
Type of family	Joint	5	30	18	1.243	0.5372	Not significant
	Nuclear	2	26	19			
Religion	Hindu	2	34	14	17.696	0.0070	significant
	Christian	0	11	7			
	Muslim	4	9	7			
	Other	1	2	9			

Demographic variables	Option	Level of knowledge			Chi-square value	P value	Result
		Poor	Average	Good			
Age of child	3-4 years	4	25	14	2.300	0.6807	Not significant
	4-5 years	3	24	16			
	5-6 years	0	7	7			
Sex of child	Male	3	24	14	0.2428	0.8857	Not significant
	Female	4	32	23			
Source of getting information about child abuse	T. V.	3	20	10	6.824	0.3374	Not significant
	Newspaper	0	20	18			
	Mobile	3	11	8			
	Any other	1	5	6			

### Discussion:

The present study was held to assess the Effectiveness of planned teaching programme on knowledge regarding child abuse among the mothers. The result shows that the pre-test knowledge that is 56(56%) had average knowledge, whereas 37 (37%) had good knowledge and 7(7%) poor knowledge regarding child abuse. The result shows the pre-test mean was 11.75 and post-test mean was 15.81 and calculated t value was 12.907 found significant at the level of  $p < 0.0001$ . Which means planned teaching programme was found effective to improve the knowledge of the mothers regarding child abuse. It also found that there is significant association between mother's knowledge with variable of Religion, Monthly income of family and Education of mother at the level of  $p < 0.05$ .

For confirming result of the present study it can pointed out the study of Taniya Thapa et al. The findings of the study revealed that majority of mothers 224 (77.8%) had average level of awareness regarding girl child abuse and only 21 (7.3%) had good level of awareness with mean score  $\pm$ SD of 45.94  $\pm$  9.94 (total score-76).<sup>[3]</sup>

Study conducted to Assess the Level of Knowledge Regarding Child Abuse among the Mothers in Selected Areas at Latur, findings of the study concluded that 15% (03) samples are having inadequate knowledge, 85% (17) sample are having moderately adequate knowledge and 0% samples having adequate knowledge. <sup>[2]</sup>

A study conducted by Jyotsna Jacob et al. Study results shows that majority of the mothers (60%) had average level of knowledge; about 30% of the mothers had good level of knowledge whereas only 3% had poor knowledge level. The overall mean knowledge score of

mothers on prevention of child abuse is  $16.72 \pm 2.947$ .<sup>[4]</sup>

A study conducted with title of Effectiveness of Planned Teaching Program on knowledge of "Child Abuse and its Prevention" among mothers of school aged children, study results shows that the significance of difference between pre-test and post-test knowledge scores of mothers which was tested and founded to be ( $t_{49} = 17.802$ ,  $p < 0.05$  significant). The findings of the study show that the planned teaching programme was effective in all the areas for improving the knowledge of "child abuse and its prevention" of the mothers of school of school age children.<sup>[10]</sup> The result of the present study and other studies shows that the mother had lack of knowledge regarding child abuse; there is a need of some intervention to provide awareness so that mother's knowledge gets improved regarding child abuse.

### Conclusion

Based on the analysis of the findings, the study concluded that Planned Teaching Programme was found effective to improve the Knowledge regarding child abuse among mothers.

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**Conflicts of Interest:** There are no conflicts of interest.

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# The Association between Cardiovascular Risk Factors and Dental Caries amongst Patients Visiting a Dental College in Greater Noida, U.P.

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## Abstract

**Background:** Although Dental Caries and Cardiovascular Diseases CVDs share certain common risk factors, its effect on the development of caries needs to be established.

**Objectives:** To find any association, if present between cardiovascular risk factors and dental caries.

**Material and Method:** This case-control study employed a stratified random sampling with every 10<sup>th</sup> patient visiting the OPD was asked for voluntary participation in the study. Following a written consent, participants underwent height, weight and blood pressure measurement, diagnosis of dental caries using the DMFT index and collection of blood sample (FBG and lipid profile). Increase in values in any of the above criterias (except DMF) or having a history of smoking were included as the cases. Data were transferred to SPSS version 21.0 and the students paired samples t-test and multiple logistic regression were applied. Values were considered significant when p was  $\leq 0.05$ .

**Results:** Caries incidence (mean DMF) was higher in cases (3.54 $\pm$ 2.8) as compared to controls (2.74 $\pm$ 2.1) with significant differences between mean DMF (.03), BMI (0.003) and TG (0.01) observed among cases. A statistical significance (p=.01) was observed especially when DMF was  $\geq 5$ . Multivariate logistic regression revealed a significant association in relation to DMF(0.90-1.02), FBG(0.47-0.81) and TG(0.40-0.91). The odds of the cases having elevated diastolic blood pressure and TC was 1.09 (CI:0.95-1.26) and 2.42 (CI:1.68-3.49) times higher as compared to controls.

**Conclusion:** The need of dentists as well as medical practitioners to provide anticipatory guidance to their patients having presence of cardiovascular risk factor (s) and/or increased DMF scores is emphasized to help reduce the burden of both these diseases.

**Keywords:** Cardiovascular Diseases, Dental Caries, Risk Factors.

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## Introduction

Cardiovascular diseases (CVD) have the highest mortality rates worldwide.<sup>1</sup> By the year 2020, approximately three-fourth of all deaths within developing nations can be attributed to non-communicable diseases

(NCD) amongst which, CVD shall remain a vital reason for those deaths.<sup>2-4</sup> Risk factors that make the cardiovascular system susceptible to diseases are now being embraced by young adolescents and those leading a high-risk lifestyle may have an increased susceptibility towards CVDs later in life.<sup>3,4</sup> Risk factors for CVD have also been related to dental caries and poor oral hygiene.<sup>5-7</sup>

As per WHO, an estimated 17.9 million people died from CVDs in 2016 representing 31% of all global deaths with over three quarters of these deaths taking place in low- and middle-income countries. In the India, CVDs accounted for around one-fourth of all deaths and grew at an annual pace of 9.2% between 2005-2015. The incidence of CVDs has increased significantly (24.8%) among people aged 25-69 years implying a loss of people in their productive ages.<sup>8</sup>

Dental caries can severely compromise oral health status of an individual. Dental caries and CVDs share certain common risk factors (e.g. smoking, tobacco chewing, obesity, diet and physical inactivity). In India, the prevalence of dental caries varies from 50-60%<sup>9</sup>, to 82.4% in urban<sup>10</sup> and 80% in rural areas.<sup>11</sup>

Clinicians have tried to establish a link between cardiovascular risk factors and dental caries. Kelishadi R et al. (2010) revealed a significant association between dental caries and CVD risk factors.<sup>12</sup> Similarly, in 1995 Lohman TG et al. documented that adolescents with two or more medical factors reaching unfavorable levels had significantly higher incidence of caries (when DFS $\geq$ 9), Making it seem that the presence of cardiovascular risk factors might increase dental caries in an individual.<sup>14</sup>

**Objectives:** To find any association, if present between cardiovascular risk factors and dental caries and how these risk factors could be modified for an overall benefit of the patients.

## Material and Method

The present study adopted a case-control study design among patients visiting the OPD of the Department of Public Health Dentistry, I. T. S Dental College, Hospital and Research Centre, Greater Noida. Prior to the commencement of the study, a due clearance was obtained from the Institution's Ethical Committee vide letter number IEC/PHD/02/12.

Before recruitment, a signed informed consent was

obtained from the patients which was available in both English and Hindi (local language) after duly explaining the study protocol, voluntary participation, risks and procedures involved by the investigators.

The patients were selected through stratified random sampling with selection of every 10<sup>th</sup> patient visiting the OPD. Over twelve months and keeping the case: control ratio as 1:1, the study recruited 100 patients. Patients aged 20 years and above and consenting to participate were included in the study while those suffering from any systemic disease were excluded.

Three examiners were duly standardized according to current norms (inter examiner kappa,  $\kappa$  value = 0.6-0.8) and recorded a detailed case history of the patient. The following protocol was then followed: 1). Measurement of height and weight, 2). Measurement of Blood pressure (BP) using mercury sphygmomanometer. The readings at the first and the fifth Korotkoff phase were taken as systolic and diastolic BP (S BP and DBP), respectively.<sup>14</sup> The average of the three BP measurements was recorded and included in the analysis. 3). Diagnosis of Dental Caries: Using direct illumination from the dental chair, dental caries was checked using a sickle explorer, flat-surface mouth mirror after drying teeth with sterile gauze (ADA type 3 examination) and was evaluated using the DMFT index (Klein, Knutson & Palmer, 1997 modification) and 4). Collection of blood sample: On the next day after oral screening, the patients were instructed to fast overnight for 12 hours and report to the attached hospital. The compliance with fasting was determined by an interview in the morning. Blood samples were taken from the antecubital vein between 8:00 and 9:30 AM and were centrifuged for 10 min at 3000 rpm within 30 min of venipuncture. Fasting blood glucose (FBG), total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and triglycerides (TG) were measured by enzymatic method using autoanalyzer (Merck microlab 300). HDL-C was determined after dextran sulphate-magnesium chloride precipitation of non-HDL-C.<sup>15</sup> The autoanalyzer was calibrated prior to the commencement of the study. Participants were given refreshments and were advised to have a proper meal before commencing their daily duties.

CVD risk factors were defined by identification of study subjects who were at a high risk of developing CVD which were BMI $\geq$ 85th percentile for age and sex, TC >200 mg/dL, LDL-C >100 mg/dL, TG >160mg/dl

(males), >135mg/dL (females), HDLC < 35 mg/dL was considered to be low as well as systolic and diastolic blood pressure >90th percentile for age, sex and height. According to the recommendations of the Indian Diabetic Association, FBG  $\geq$  110 mg/dL was considered to be elevated. Patients with any of these risk factors, or having a history of smoking (in combination to the above factors or alone), were considered as the cases (Figure 1). Data were transferred to SPSS version 21.0<sup>16</sup> via a blinded operator. After application of descriptive statistics, students paired samples t-test and multiple logistic regression were applied for statistical analysis. Values were considered significant when p was  $\leq$  0.05.

## Results

The assessed variables are shown in table 1. Among cases, there were an equal number of males and females (25 each), while the control group consisted of 27 males and 23 females. The mean age of cases and controls were 41.6 $\pm$ 17.02 and 42.8 $\pm$ 17.3 respectively. Caries incidence was seen to be higher in cases (3.54 $\pm$ 2.8) as compared to controls (2.74 $\pm$ 2.1). Significant differences between the mean values of DMF (.03), BMI (0.003)

and TG (0.01) between the case and control groups were observed.

The mean DMF scores of cases and control are depicted in table 2. Analysis revealed a statistical difference in the t-values of both the groups, respectively (p=.03). The DMF values were further divided into four categories: DMF=0, DMF $\leq$ 3, DMF $\leq$ 5, DMF>5 and a statistical significance (p=.01) was seen DMF was >5, leading to an indication that people with presence of cardiovascular risk factors might be prone to have increased DMF scores.

Table 3 depicts the analysis of the multivariate logistic regression between the cardiovascular risk factors and dental caries among the study population. A significant association between the cases and controls in relation to DMF (0.90-1.02), FBG (0.47-0.81) and TG (0.40-0.91) while as compared to other variables. (p>0.05). It was revealed that the odds of the cases having elevated Diastolic Blood Pressure (1.09, CI: 0.95-1.26) and TC levels (2.42, CI: 1.68-3.49) was higher as compared to the controls.

**Table 1. Comparison of variables studied in the case and control groups.**

Characteristic	Cases (Mean $\pm$ SD)	Controls (Mean $\pm$ SD)	$\chi^2$	p
n	50	50	-	-
<b>Gender</b>				
- Males	25	27	-	-
- Females	25	23		
<b>Smokers</b>				
- Males	18	-	-	-
- Females	04	-		
Mean Age	41.6 $\pm$ 17.02	42.8 $\pm$ 17.3	-	-
Mean DMF	3.54 $\pm$ 2.8	2.74 $\pm$ 2.1	2.321	.03*
<b>Mean Blood Pressure (BP)</b>				
- Systolic	127.9 $\pm$ 12.4	125.9 $\pm$ 12.6	112.26	0.85
- Diastolic	95.1 $\pm$ 9.9	93.8 $\pm$ 10.6	55.24	0.64
Mean BMI	29.4 $\pm$ 6.1	26.4 $\pm$ 6.5	19.530	0.003*
Mean FBG	92.8 $\pm$ 17.7	90.9 $\pm$ 16.8	1.103	.24
Mean TC	181.5 $\pm$ 27.5	182.8 $\pm$ 27.6	1.831	.58
Mean LDL-C	86.7 $\pm$ 24.9	86.8 $\pm$ 25.5	0.373	1.1
Mean HDL-C	51.5 $\pm$ 11.9	52.3 $\pm$ 11.8	301.395	1.8
Mean TG	128.9 $\pm$ 25.3	104 $\pm$ 33.8	32.661	0.01*

**Table 2. Comparison of DMF in Cases and Controls**

Characteristic	Case	Controls	Significance (p Value, obtained from $\chi^2$ )
DMFS	3.54±2.8	2.74±2.1	.03*
DMF=0	7	7	.25
DMF≤3	18	26	.63
DMF≤5	10	11	.32
DMF>5	15	6	.01*

**Table 3. Multiple logistic regression analysis among the cases and controls \*: Significant (p<0.05)**

Variable (Case=constant)	$\beta$	SE	Odds Ratio	95% Confidence Interval (CI) for OR
DMF	-0.04	0.03	2.96	0.90-1.02*
<b>BP</b>				
- Diastolic	0.09	0.07	1.09	0.95-1.26
- Systolic	-0.01	0.06	0.97	0.95-1.03
BMI	-0.17	0.13	0.52	0.38-0.73
FBG	-0.48	0.14	0.62	0.47-0.81*
TC	0.89	0.19	2.42	1.68-3.49
LDL-C	0.23	0.074	0.002	1.1-1.5
HDL-C	0.25	0.06	<0.001	1.1-1.4
TG	-0.50	0.21	0.61	0.40-0.91*

**Discussion**

The significant association found between dental caries and cardiovascular risk factors in the present study can often make a clinician the first line to suspect the presence of potential cardiovascular risk factors and ultimately help reduce the global burden of such a disease and promote healthy lifestyles among patients.

The significant differences in DMF (p=.03) and in particular, among cases having DMF>5 (p=.01) was one of the main highlights of the study and is supported by Kelishadi et al.<sup>12</sup> Although there is a strong evidence of a relationship between periodontal disease and cardiovascular disease, very few studies have explored the association between dental caries and the presence of cardiovascular risk factors.<sup>17</sup> Despite all efforts (use of mass media, regular screenings, promoting tooth brushing, using fluoride in either systemic and topical form) directed towards improving the oral hygiene among people, dental caries still remains as one of the most common prevalent dental diseases across the globe.<sup>18</sup> In contrast, although case control studies by Simonka M et al.<sup>19</sup> and Ziebolz et al.<sup>20</sup> did not find any significant differences between acute coronary syndrome and dental caries, we can safely assume that

difference in DMF in cases can be related to the presence of cardiovascular risk factors as both groups belonged to the same region and used the same aids for oral hygiene maintenance.

Among the five lipid profile variables assessed, only FBG and TG were seen to have a significant association with DMF among cases and is partially supported by Kelishadi R et al.<sup>12</sup>, Loyola-Rodriguez JP et al.<sup>21</sup> and Johansson I et al.<sup>22</sup> Concepts regarding dental caries in the 20th century indicated the presence of lipids in the dentin of carious teeth with decays being described as “fatty degradation” of the tooth.<sup>23</sup> Studies have documented that saliva of people without carious lesions contains lesser amounts of less free fatty acids, triglycerides, cholesterol esters and phospholipids and slightly lesser concentrations of cholesterol and mono and di-glycerides.<sup>24,25</sup> Adolescents have been documented to show increased concentration of triglycerides and total cholesterol in saliva during the course of dental decay.<sup>26</sup> The above associations were however, contradicted by the results documented by Timonen P et al.<sup>27</sup> and Larsson B et al.<sup>13</sup>

The odds of the cases having elevated Diastolic Blood Pressure was found to be 1.09 (CI:0.95-1.26). A

thorough literature search did not present the evidence of any direct association, however few patients belonging to the sample of hypertensive patients (Kumar P et al.) documented an increased incidence of dental caries attributed to the hypo salivation in patients under anti-hypertensive therapy; and also reported association between hypertension and gingival/periodontal pathology in their sample population.<sup>28</sup>

A limitation of the study in could be the erroneous reporting of fasting duration by the study participants. Barring three cases (who could not be contacted), the remaining were advised to undergo further medical screening and/or adopt healthy lifestyle practices and this is the strength of the study as it promotes an early intervention leading to a reduction in burden of disease among cases. In future studies of the same kind but with a bigger magnitude, we hope that the cases of the present study could be included as controls.

### Conclusion

The results of the present study provides an avenue for future research to further furnish evidence on the effect of cardiovascular risk factors on dental caries. We advise both dentists and medical practitioners to be aware of such an association and provide anticipatory guidance to potential patients. The need for interdisciplinary co-ordination with dieticians, nutritionists and other departments can lead to adoption of healthy lifestyles among patients and is strongly advised.

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# A Review of Glass Ionomer as ‘ART’ Sealant

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## Abstract

Pit and fissure sealants are a highly effective method for prevention of dental caries by forming a physical barrier, preventing accumulation of micro-organisms and food debris in the fissures. Currently, resin-based sealants and glass-ionomer sealants are the two main forms of sealants used clinically. Resin-based sealants are highly moisture sensitive and hence, glass-ionomer sealants which are less sensitive to moisture are used. With the advent of the Atraumatic Restorative Treatment (ART), high-viscosity glass-ionomers were introduced as ART sealant, which are retained longer than low and medium viscosity glass-ionomers, but shorter than resin-based sealant materials. Use of ART sealants is an effective caries preventive approach in partially erupted young permanent molars of children and in community based dental programs where electrically powered dental equipment is not available.

**Keywords:** *Atraumatic restorative treatment, Resin-based sealants, Glass-ionomer sealants.*

## Introduction

Pit and fissure sealants are highly effective method that helps in preventing caries development and arresting caries progression, by forming a physical barrier which helps in preventing accumulation of micro-organisms and food debris in the fissures<sup>(1)</sup>. In the current scenario, resin-based sealants and glass-ionomer sealants are the two main forms of sealants used clinically. However, the efficiency of resin-based pit and fissure sealant in preventing occlusal caries is dependant primarily on the retention of sealant mainly the moisture control, which may not be available in some situations like community

based dental programs, uncooperative children, partially erupted permanent molars and contamination of the operating field.<sup>(2,3)</sup> In these conditions, the rate of failure are higher for resin-based sealants and hence glass-ionomer based sealants can be used which are less moisture sensitive.<sup>(2)</sup>

Glass-ionomer materials are easy to apply than resin sealants and chemically bond to the tooth structure and release fluoride, which contributes to caries prevention.<sup>(4)</sup> Glass-ionomer sealants have the disadvantage of poor retention and reduced strength, hence strengthened high viscous glass-ionomer sealant can be used, using Atraumatic Restorative Treatment (ART) technique.<sup>(4,5)</sup> ART is a preventive and restorative technique implemented 25 years ago, in management of dental caries in underprivileged populations. ART approach involves the restoration of tooth cavities and sealing of caries-prone pits and fissures.<sup>(6)</sup> For ART, the material of choice is strengthened highly viscous glass-ionomer cement, which has rapid setting property, significantly decreased sensitivity to moisture during the initial setting stage and decreased solubility in oral fluids, which makes it suitable to be used as sealants.<sup>(7)</sup> Application of ART sealant uses a form of glass-ionomer cement material to seal pits and fissures

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using a “finger-press” technique similar to that used in the ART restoration procedure. When comparing to low viscosity glass-ionomer sealant it has been observed that retention rate of ART sealants was higher.<sup>(8)</sup> For a long term, low-viscosity glass-ionomers with the powder liquid ratio less than 1.5:1 was used although it had poor retention and did not provide caries preventive effect. Till mid 1990s medium-viscosity glass-ionomers sealants but over the years it was replaced by the high-viscosity glass-ionomers.<sup>(9)</sup>

**When are ART sealants indicated?:** Children with high caries risk, with presence of decay in primary dentition, tortuous pits and fissures on non-carious teeth and persistent enamel lesions are indicated for use of ART.<sup>(10)</sup> Application of sealants to deep pits and fissures, regardless of child’s risk status must be deemed over-treatment.

In comparison to the resin-based sealants, glass-ionomers are hydrophilic in nature and hence they are indicated in partially erupted molars, where the operculum covers the distal half of the tooth and releases crevicular fluid. In case of moist to dampened conditions, application of resin-based pit and fissure sealant is contra indicated as they are Bis-GMA based materials, which are mainly hydrophobic in nature and necessitates a dry field. Electrically powered dental equipment and good clinical conditions are required for placement of high quality resin-based sealant. In community based programs where availability of modern equipment is limited, ART sealants should be the choice of sealants.<sup>(2)</sup>

**Placement of ART sealants:** The technique is characterised by the “press-finger” method, which ensures that the sealant penetrates deep into the pits and fissures.<sup>(8)</sup> A thorough oral prophylaxis and polishing, is followed by rinsing with water to remove any traces of polishing material. Isolation of the tooth is done with cotton rolls and kept free from saliva. 10% polyacrylic acid conditioner is applied on the fissures for 20 sec, rinsed with water for 20 sec and dried by blotting with cotton pellets and gently blowing with an air syringe. Care should be taken not to desiccate the enamel surface. Glass-ionomer cement is mixed in accordance to the manufacturer’s instruction and applied using the round end of the ART applicator/carver in all pits and fissures or agitate the encapsulated glass-ionomer in an appropriate mixing machine and the material is expelled into deep retentive grooves. A thin layer of petroleum jelly is applied on to the gloved finger and

pressed against the sealant, such that the sealant is pressed deeply into the grooves and after 10-15 sec, the finger is removed sideways and excess cement which is visible is removed using carver/excavator (press finger technique).<sup>(11)</sup> Bite is checked using articulating paper and adjusted until comfortable. When the mixture is partially set, petroleum jelly is removed from the top surface and a new layer is applied. To surmount the problem of moisture sensitivity and to retain the water balance during maturation, petroleum jelly is applied over the sealant material immediately following the initial set. Patient is asked not to eat for at least one hour.<sup>(4,12)</sup>

**Clinical performance of low viscosity ART sealants:** In a systematic review by Beirut et al<sup>(5)</sup> on the effectiveness of prevention of caries by resin sealants in comparison to low-viscosity glass-ionomer sealants, out of 12 eligible publications analyzed, two studies depicted statistically significant difference in caries prevention. After 3.8 years, in one study, low viscosity glass-ionomer sealant performed better, while after 3 years the auto-curing resin composite sealant performed better in another study. Four studies reported results of more than 3 to 7 years, of which two studies reported statistically significant difference in the two forms of sealants in preventing development of dentine lesions. However, due to lack of enough studies the systematic review was unable to prove that either of these materials was superior to the other. A critical review by Simonsen<sup>(13)</sup> suggested that the efficiency of caries-prevention was equivocal between composite resin and glass-ionomer sealants. However, retention rate of composite resin sealants is higher in comparison to low viscosity glass-ionomer sealants. Torppa-Saarinen and Seppa<sup>(14)</sup> also reported low retention rate of low-viscosity glass-ionomer. They examined the pits and fissures of recently erupted permanent second molars and premolars under scanning electron microscope (SEM) which had partial or complete loss of low-viscosity glass-ionomer sealant after 4 months. In majority of the cases examined, the deepest part of the grooves showed presence of low viscosity glass-ionomer. The small quantities of sealants are left at the bottom of the fissures tend to release fluoride and serves as a plug and the tags of glass-ionomer cement persist when applied even under moist conditions.<sup>(9,15)</sup> The remnants render the pit and fissures to be of less than normal depth, thus permitting better plaque control and prevention of demineralization.<sup>(12)</sup> In vitro studies<sup>(15,16)</sup> have revealed



initial release of large amount of fluoride from the glass-ionomer cement (burst effect). The fluoride release continues over the next few weeks, possibly due to slow dissolution of the glass particles into acidified water of the hydrogel matrix. Thus, inspite of the loss observed during examination, protection of the fissures against dental caries continues both due to physical presence of the tags, release of fluoride which help in enamel remineralization and increase in surrounding enamel resistance to demineralization.<sup>(17)</sup>

**Clinical performance of high viscosity ART sealants:** With the introduction of high-viscosity glass-ionomers, the rate of retention of glass-ionomer (ART) sealants increased significantly compared with that of previously used low and medium viscosity glass-ionomers.<sup>(6,8)</sup> Better retention of ART sealants is due to better mechanical strength and due to application procedure using press finger technique, resulting in better penetration of the material into the fissures.<sup>(18)</sup> A meta-analysis exhibited a weighted mean score of 71% after 3 years for completely and partially retained ART high viscosity glassionomer sealants, while during the 3 year observation period the caries-preventive value was 97%<sup>(8)</sup>. Systematic review by Mickenautsch and Yengopal<sup>(19)</sup> suggested that teeth sealed with high viscosity glass-ionomer cement are 71% less likely to be affected by dentine carious lesions than if sealed with composite resin.

Multiple studies have shown that the effectiveness of caries-prevention of high viscosity glass-ionomer sealants applied using ART was higher than that of resin sealants.<sup>(3,5)</sup> In a study carried out in newly erupted permanent molars, where it is difficult to isolate the tooth from saliva contamination during sealant application, at 5 year follow up, 29% of glass-ionomer sealants applied with ART procedure were retained, whereas only 21% of resin sealants were retained. 22% of teeth developed caries in the resin group in comparison to 11% in the glass-ionomer group<sup>(3)</sup>. Similar findings were seen by Taifour et al.<sup>(20)</sup> They concluded that ART sealants is an effective measure for caries prevention in newly erupted molars among children with high risk of caries. Compared to the complete and partial-retention survival percentage of resin-based sealants, the comparable retention survival of high viscosity glass-ionomer sealants used according to ART technique is lower.<sup>(6,12)</sup> On the other hand, Hilgert et al<sup>(18)</sup> did not find difference between the retention rate of resin sealants and glass-ionomer ART sealants at 3 year follow up. In this study<sup>(18)</sup>, as well as

a study carried out in Chinese population<sup>(6)</sup>, occurrence of new carious lesion lagged sealant survival. Caries prevention remained high, 85% at 6 year follow up. However, to prevent cavitation it was recommended that missing sealants should be further resealed.

Use of additional measures such as application of topical fluorides or application of curing light does not improve the caries preventing ability of ART sealants. This was shown in a study by Liu et al<sup>(4)</sup>, where application of sodium fluoride or silver diamine fluoride did provide any additional benefit. In another study, Chen et al<sup>(21)</sup>, did not find any additional benefit in caries preventing ability of ART sealant by addition of light curing of the glass-ionomer sealant.

For describing the success rate of a sealant, retention of sealant alone should not be considered as the endpoint, as the biological outcomes take preference over mechanical outcomes.<sup>(12)</sup> Complete retention of fissure sealants is therefore not a valid surrogate endpoint for evaluating their caries-preventive effect. The caries preventive effect is more significant than sealant survival.<sup>(19)</sup> The reason for better caries prevention ART sealants was further investigated by Frencken and Wolke.<sup>(15)</sup> They evaluated high viscosity glass-ionomer sealants placed according to ART technique under SEM. Traces of high viscosity glass-ionomer sealant material were left behind in the deeper parts of pits and fissures that clinically appeared to be free of sealant material. These remnants of sealants retain probably because unlike resin-based materials, which tend to have adhesive fracture, glass-ionomer fractures cohesively.

**Comparison of ART sealants with other pit and fissure caries prevention method:** A study by Cabral et al<sup>(22)</sup> compared the effectiveness of preventing caries and the retention rates of resin modified glass-ionomer based fluoride varnish used as pit and fissure sealants and high viscosity glass-ionomer sealant applied according to ART approach. High-viscosity GIC performed better than the resin modified GIC based fluoride varnish over 2 years in terms of retention, however, results were not statistically significant for caries prevention. Monse et al<sup>(23)</sup> measured and compared the impact of a single application of 38% SDF with ART sealants and no treatment for the prevention of caries on the occlusal surfaces, with a school-based tooth brushing program with fluoride over 18 months. They concluded that single application of 38% SDF is not an efficient technique in preventing carious lesion.

Thus, in comparison to other materials like glass-ionomer based fluoride varnish and silver diamine fluoride, ART sealants have better retention as well as caries preventing ability.

Adding to the benefit of glass-ionomer as ART sealants, most of the resin-based sealants release Bisphenol A (BPA) derivatives which have been known to cause various biological disorders.<sup>(12)</sup>In accordance with this evidence a policy statement on BPA was issued by the World Dental Association (FDI). This policy discouraged the need of manufacturing of BPA containing dental materials, raised awareness and emphasized the need of preventing caries.<sup>(24)</sup> Therefore use of ART sealants with their high level of effectiveness, has a future scope in caries management.

Further studies are required to prove the effectiveness of high viscosity glass-ionomer sealants in caries prevention as the current studies are limited by risk of bias, lack of sufficient sample size and inadequate randomization. Hence, the choice of high viscosity glass-ionomer sealant for caries prevention of fully erupted permanent molars should be done cautiously based on clinical indications.

### Conclusion

Retention and caries prevention of high viscosity glass-ionomer sealant appears to be longer in comparison to low and medium viscosity, although it is shorter than resin-based sealants. The use of ART sealants in permanent teeth to prevent and treat tooth decay is shown to be highly appropriate, effective and acceptable. It is an effective caries preventive approach in partially erupted young permanent molars of children and in community based dental programs where electrically powered dental equipment is not available.

**Ethical Statement:** There were no ethical issues/concerns in the making of this review

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# Treatment Seeking Pattern of Relapse Cases of Substance Use Disorder in Bangladesh

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## Abstract

**Background & objective:** Despite the high prevalence and numerous adverse health consequences, many individual with substance uses don't seek proper treatment. Therefore, this study was aimed to explore the treatment seeking pattern of relapse cases of substance use disorder in Bangladesh.

**Method:** Cross-sectional study was conducted among 911 relapse cases from all over Bangladesh during January to December 2018. Data were analyzed by SPSS v 23. Descriptive statistics were performed and results were expressed by number and percentage.

**Results:** Majority (48.0%) of the substance users were young adult (19-30 years). Most of them were businessman (35.0%) or unemployed (29.7%) and lived with family (96.3%). In multiple response, 70.0% of them received money to purchase drug from parents and 56.1% their own. 70.0% of relapse cases came to treatment center unwillingly and mostly with family (63.2%) and majority (98.9%) received residential treatment. Individual (68.4%) and group counseling (61.3%), psycho-social session (50.5%), life-skill session (48.0%), medical treatment (45.9%), family counseling (36.6%) and couple counseling (11.1%) was treatment approaches. Detoxification and rehabilitation alone or combination was most common rehabilitation.

**Conclusion:** Combination of treatment is common in Bangladesh for relapse cases of substance use disorder. Long term follow up is needed to see the ultimate outcome.

**Keywords:** Relapse, substance use, drugs, treatment, Bangladesh.

## Introduction

It is estimated that globally, around 164 million

people had substance use disorder in 2016. The proportion is usually being higher among male in compare to female which is 68%<sup>1</sup>. The prevalence of substance use disorders varies from region to region and is highest across Eastern Europe and the United States, which is 5-6% of the total population. This means around 1 in every 20 people suffers from substance use disorder in that part of the world. Across Western and Central Europe, the Americas and Oceania, this prevalence typically ranges from 2-5%. Across Africa, the Middle East and Asia this is typically lower at 1-2%<sup>2</sup>. Globally around 318,000 deaths occurred due

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to direct result of substance use disorder (both drug and alcohol) in 2016. It has been strongly argued that, this statistics significantly underestimate the true mortality impact because it only account for direct deaths from alcohol and drug use but not the suicidal death related to substance use<sup>3</sup>. It's estimated that an individual with alcohol, opioid, or psychostimulant dependence has 10, 7 and 8 times increased risk of suicide compare to the individual without dependence<sup>4</sup>.

Despite the high prevalence and numerous adverse health consequences, many individual with substance uses do not seek proper treatment<sup>5, 6</sup>. Although they seek treatment but often a decade or even more after the onset of symptoms (Ronald et al., 2001). One of the reason is lack of developmentally appropriate and effective methodology for treatment of substance use<sup>7</sup>. Some other factors are; negative social support, fear of treatment, privacy concerns, time conflict and admission difficulty. These factors are moderateto highly correlated, suggesting that they interact with one another<sup>8</sup>. Scientific research since mid-1970s shown that, treatment can help drug users to stop using it, avoid relapse and successful recover their lives. Researches also suggested that single treatment is not effective and medications are important elements of treatment and effective when it combines with counseling and other behavioral therapies. Moreover, for effective treatment, there is a need to understand the profile, family dynamics and associated problems of substance users<sup>9</sup>. Until now, there is no study in Bangladesh to explore the treatment seeking patterns of relapse case of substance use disorder. That's why aim of our study was to explore the treatment seeking pattern of relapse cases of the substance users in Bangladesh. This is the first ever study in Bangladesh of its kind.

## Materials and Method

We have conducted this descriptive type of cross-sectional study to assess the treatment seeking pattern of relapse cases of substance use disorder among Bangladeshi population during January to December 2018. Sample size was estimated by using 30.42% prevalence rate, 3.0% design error, 96% confidence interval and adjusting 10.0% non-response. By considering all those parameters, our sample size was 994. A total of 50 drug treatment centres were randomly selected from Narcotics department's enlisted 171 treatment centres from all over the country including the centre of Dhaka North City Corporation. We have

planned to recruit the relapsed drug use cases from those 50 centres, where maximum 20 patients from each centre have been taken. But in case we did not find sufficient number of patients from a centre, they were recruited from nearby centre out of those 50 centres. Ultimately we had to visit 138 centres, as many of the selected centres did not have the desire number of patients. Considering all those things, we could able to recruit 939 relapsed cases, out of them, 28 cases were excluded due to incomplete data. Finally, we could analyse data of 911 cases. The patients who has been at least one relapse after getting his/her treatment for drug addiction was defined as relapse case and was eligible to be recruited in our study. Who were suffering from any severe psychiatric disorder and were not able to communicate properly were excluded from the survey.

Permission from the centre's owners were obtained before data collection. A written permission letter was sent to all selected centres from the chief investigator of this study. Before starting data collection, a day long training has been provided to all data collectors including individual practice to ensure quality data from the respondents. Trustworthy rapport has been built with respondents before data collection. Information was collected through an in-depth interview using a structured questionnaire. All interviews were conducted by maintaining privacy and confidentiality of the respondents. Informed written consent was obtained from each respondent before data collection. Ethical approval was obtained from the institutional review board of North South University before start of data collection.

## Results

In terms of source of money for drug among the users, we found that most of the users used more than one source for money. Majority (70%) of them used parent's money, 56.1% used own money, 20.7% used the money from selling household goods, 15.6% used friend's money, 15.5% used to do robbery and 14.2% used relative's money for drug (table 1).

The study explored the treatment seeking pattern of the participants and found that majority (70.0%) came to the treatment centre unwillingly and the remaining (30.0%) came willingly. Majority (63.2%) of the participants came to treatment centre with their family members, 16.1% came by themselves, 14.9 by forcefully and 3.8% with their relatives. A very few

number of substance users came with social workers, law enforcement agency, drug recovered person and NGO (table 2). Regarding the participant's treatment of drug addiction, majority (98.9%) received residential treatment. Among the residential treatment receiver (901), times of treatment received varied where 33.5% received treatment twice, 18.6% received only once, 17.1% received 3 times, 8.9% received 4 times, 8.8% received 5 times and the remaining received more than 5 times. Among the non-residential treatment receivers' majority (60.0%) received the treatment only one time (table 3).

Table 4 represented the type of treatment received by the participants and the findings showed that respondents received more than one type of treatment. Most of the substance users (65.8%) received rehabilitation (31-90 days), followed by 31.9% received detoxification and rehabilitation (90-180 days), 25.2% received rehabilitation (16-30 days), 14.5% received detoxification and rehabilitation (180 days+) and 12.5% received only detoxification (1-15 days). Table 5 revealed that, most of the participants received more than one type of treatment. Out of many approaches, 68.4% of the participants received individual counselling, 61.3% received group counselling, 50.5% received psycho-social session, 48.0% received life skill session, 45.9% received medicine treatment, 44.2% received general health treatment, 36.6% received family counselling, 30.8% involved with nothing, 29.6% assessed by counsellor, 29.1% planned on drug free life during discharge, 20.6% received treatment planning and 11.1% received couple counselling.

**Table 1: Source of money for drug use (n = 911)**

Source of money for drug	Number	Percentage
Parent's money	638	70.0
Own money	511	56.1
Selling household goods	189	20.7
Friend's money	142	15.6
Robbery	141	15.5
Relative's money	129	14.2
Selling assets	82	9.0
Hijacking	54	5.9
Selling drugs	43	4.7
Keep the property mortgaged	38	4.2
Others	15	1.6

\* Multiple responses

**Table 2: Treatment seeking of relapse cases of drug use (n = 911)**

Came to treatment center	Number	Percentage
Willingly	273	30.0
Unwillingly	638	70.0
Total	911	100.0
With whom	Number	Percentage
With family	576	63.2
By self	147	16.1
Forcefully	136	14.9
With relatives	35	3.8
With social worker	6	0.7
By private drug rehabilitation & treatment center	3	0.3
By law enforcement agency	3	0.3
By drug recovered person	1	0.1
By govt. Hospital or drug rehabilitation & treatment center	1	0.1
NGO	1	0.1
Other	2	0.2
<b>Total</b>	<b>911</b>	<b>100.0</b>

**Table 3: Types and timing of treatment received by the drug abusers (n=911)**

Type of treatment received	Number	Percentage
Residential	901	98.9
Non-residential/outdoor	10	1.1
<b>Total</b>	<b>911</b>	<b>100.0</b>
Times of treatment received (residential)	Number	Percentage
1	168	18.6
2	302	33.5
3	154	17.1
4	80	8.9
5	79	8.8
6	30	3.3
7	31	3.4
8	31	3.4
9	9	1.0
10	16	1.8
11	1	0.1
<b>Total</b>	<b>901</b>	<b>100.0</b>
Times of treatment received (non-residential)	Number	Percentage
1	6	60.0
2	2	20.0
3	2	20.0
<b>Total</b>	<b>10</b>	<b>100.0</b>

**Table 4: Types of medication/rehabilitation during treatment of substance users**

Types of treatment	n*	Percentage
Detoxification (1-15 days)	114	12.5
Rehabilitation (16-30 days)	230	25.2
Rehabilitation (31-90 days)	599	65.8
Detoxification and Rehabilitation (90-180 days)	291	31.9
Detoxification and Rehabilitation (180 days+)	132	14.5

\* Multiple Responses

**Table 5: Types of counselling/treatment received during the treatment phase**

Types of treatment	n*	Percentage
Individual Counseling	623	68.4
Group Counseling	558	61.3
Psycho-social session	460	50.5
Life skill session	437	48.0
Medicinal treatment	418	45.9
General health treatment	403	44.2
Family counseling	333	36.6
Couple counseling	104	11.1
Involved with Self Help Group	10	1.1
Received outside counseling or psycho-treatment	5	0.5
Others	17	1.9

\* Multiple Responses

## Discussion

In our study, 98.9% relapse cases of substance use disorder were male. It is very common scenario worldwide that most of the substance users are male and the results is supported by a recent published article from Kathmandu<sup>10</sup>. Study also found that majority of the participant's age were in between 19 to 45 years. Several recent studies from different parts of the world have found similar results<sup>11</sup>. Businessman (35.0%) and unemployed (29.7%) were most common occupation among the relapse cases of substance use disorder. Probable cause might be the businessman have more flexibility in terms of family time and economy. On the other hand, unemployed people have more time to hang around and make friends with similar status. That's why these two groups are more vulnerable in compare to the others. Our finding in accordance with a recent published article from Spain<sup>12</sup>. Majority of our study participants (96.3%) were living with family. It is might be due to

young age group of the participants and extended family structure of Bangladesh. However, socio-cultural trend and family structure has been changing and many people are started living either in nuclear family or alone and soon or later it will be increased<sup>13</sup>. Majority (70.0%) of the substance users in our study used parent's money to buy drugs, most probably because of many were unemployed and living with family.

70.0% of relapse cases came to treatment centre unwillingly and whoever came, mostly (63.2%) with family members. It is very common that substance users don't seek treatment willingly and don't go to treatment centre alone. 98.9% of the relapse cases of substance use in our study took residential treatment. Various authors have studied the effectiveness of residential treatment for substance users, predominantly in non-randomized and uncontrolled pre and post-tests, leading to little evidence about its efficacy or effectiveness. Also for illicit drug users, residential treatment has been found to be more effective<sup>14</sup>. Rehabilitation of 31 to 90 days was most common treatment approach in Bangladeshi substance users, followed by Detoxification and Rehabilitation (90-180 days) and Rehabilitation (16 to 30 days). Previous study has supported that substance users should undergo rehabilitation, counseling, behavioural therapy and physiotherapy<sup>15</sup> which is supportive to our study. Our study found most common treatment approaches were individual and group counseling, psycho-social session, life skill session, family counseling and couple counseling. Previous study done in the field of treatment approach for substance use disorder found that similar approaches were effective<sup>16</sup>. Strength of this study are nationwide survey and large number of relapse cases of substance use. Limitation is, we could not see any risk factors for relapse.

## Conclusion

Young adult population are mostly engaged with drug use in Bangladesh, that's why relapse cases are more common among this group of population. Majority of the drug users used either their parents money or own money to buy drug. Most relapse cases of drug use got residential treatment and came to treatment centre unwillingly. Multiple treatment approach was the most commonly used to get maximum benefit of the treatment such as, individual and group counselling, psycho-social session, life-skill training, medical treatment, family and couple counselling etc. Among the medication; detoxification and rehabilitation alone or combination

was most common approach. A long term study is recommended to follow up their ultimate outcome.

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**Conflict of Interest:** Authors declare that they have no financial or scientific conflict among them.

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# Predicting effect of Personality Traits and Age on Emotional Intelligence

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## Abstract

People who have high emotional intelligence create understanding or know how to manage their own emotions and they know how to read emotions of others. Emotional intelligence was positively connected to physical, psychosomatic and mental health. The studies on the predictors of emotional intelligence, particularly in India are limited. For this purpose focus of the present study was to investigate the predicting effect of personality traits (neuroticism & extraversion) on emotional intelligence among the student of Raipur, India. A sample of the study comprised 300 P.G. students (male=50; female=50). Mangal Emotional Intelligence Inventory and Eysenck's Maudsley Personality inventory (M. P. I.) were used to measuring emotional intelligence (EI) and personality traits. SPSS 16<sup>th</sup> version, structure equation model (SEM) with ADANCO, jamovi. (Version 1.0) were used for analysis. Measurement model was excellent fit in the samples [CFI = .968, TLI=0.904, SRMR=.033 and RMSEA = 0.11 (RMSEA 90% CI: Lower-0.0495, Upper-0.189)]. The findings revealed that personality traits, neuroticism emerged as significant predictors of emotional intelligent, intra personal awareness, inter personal awareness and inter personal management. Age emerged as significant predictors of emotional intelligent and its dimension. The findings also revealed that gender and extraversion have no impact on emotional intelligent and its dimension. A stable personality, age and their psychological wellbeing are important in enhancing the emotional intelligence of young students as there is a possibility in improving their emotional intelligence.

**Keywords:** Emotional Intelligence, Neuroticism, Extraversion, Structure equation model.

## Introduction

The ability of individuals to recognize their own emotions and those of others determine between different feelings and label them is emotional intelligence, appropriately emotional information useful to guide

thinking and behavior and manage emotions to adapt to environments or achieve one's goal<sup>(1-2)</sup>. There are several models of emotional intelligence namely: ability, trait and mixed emotional intelligence models. The ability model is perceives and integrate emotion, as well as to understand and regulate emotion to promote personal growth<sup>(3)</sup> it is proposed by Mayer and Salovey<sup>(4)</sup>. Trait model as described by Petrides and Furnam<sup>(5)</sup> it encompasses behavioral dispositions and self-perceived abilities and is measured through self report<sup>(6)</sup>. Mixed model as described by Golemann, (1995)<sup>(3)</sup> it can be viewed as the set of interrelated competencies skills, abilities, personal qualities and personality trait.

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Emotional Intelligence is the biggest predictor

of workplace performance compare to IQ. Emotional competence is another term of emotional intelligence: refers to one's ability to express or release one's emotions. It also decides one's ability to successfully and effectively lead. Emotional Intelligence (EI) competency is evaluation method of interpersonal communication skills, behaviors and patient care <sup>(7)</sup>. Competences of emotional intelligence and empathy are necessary components for physician in 21th century <sup>(8)</sup>. Emotional intelligence can be contributes to, increased empathy, communication skills, stress management, organization commitment, leadership, teamwork and higher academic performance <sup>(9-11)</sup>. For the reason that emotional competence can be helpful to enhanced empathy, higher stress tolerance, greater flexibility to change, better health and recovery from illness. People with high emotional intelligence have better mental health Spiritual well-being <sup>(12)</sup> job performance and leadership skills.

Both emotional intelligence and empathy associated to the personality of students and their ability as successful physicians. Evidence for a strong association between emotional intelligence and various personality traits has been established <sup>(13)</sup>. Personality traits have an impact on the development of the emotional quotient and emotional quotient has an influence on the application and development of the personality of the individual <sup>(4)</sup>. The significant relationship between emotional intelligence and all Big Five personality factors was observed <sup>(14-15)</sup>. Extraversion, Openness to experience, Agreeableness and Conscientiousness have been found to be positively correlated with emotional intelligence, whereas, Neuroticism negatively correlated with emotional intelligence, it is a vulnerability factor for stress, <sup>(16-18)</sup>. McCrae and Costa, (1987), McCrae and John, (1992) described neuroticism are regarded as depression and low self-esteem tendency for experiencing anxiety, tension, self-consciousness, hostility, impulsiveness, timidity, illogical thinking. Extraversion is (sociability, positive affect and energetic behavior). Emotional intelligence and empathy have been found to be affected by gender and culture <sup>(13,19)</sup>. Females have to be more empathetic <sup>(20-21)</sup>. The students, especially in Asia, are reported lower empathy scores compare to Western students <sup>(18, 20)</sup>.

After the education of a P.G. degree, Most of the students while performing as leadership role in different institutes and faced some problems that influenced their performance and mental wellbeing. One foremost

important factor leading to this problem was the low emotional intelligence and unstable personality. There are very few studies to report the association of personality traits with emotional intelligence in India. Therefore this study was conducted to find out the predicting effect of personality trait, age, gender on emotional intelligence among the Indian P.G. students.

## Material and Method

**Sample:** A sample of the present study consisted of 300 P.G. students (male = 50%; female = 50%) studying in University of Raipur, India from ninth UTD departments: Geography, Economics, History, English, Hindi, Anthropology, Master of social worker, Rural development and Sociology. The age range of the participants was 20–25 years. Participants fulfilling the inclusion/exclusion criteria and who gave written informed consent were included for the study. The sampling technique applied for drawing out the sample was an incidental random sampling method.

### Inclusion Criteria:

1. Adult Men or women aged between 20-25 years.
2. Graduate Educated.
3. Able to understand and participate independently in survey.

### Exclusion Criteria:

1. Past or current history of any psychiatric illness.
2. Patients whose current condition limits their participation in a prolonged interview (ex. Debilitating physical condition, agitation, intoxication or drug withdrawal, etc)

**Design:** In the present piece of research, the correlational research design was employed. Here, the criterion variable is emotional intelligence and its dimension; age, gender and personality (neuroticism & extraversion) acted as predictive variables in this study.

**Instruments:** The Mangal emotional intelligence inventory was used it is developed by S.K. Mangal and Mrs. Shubra in 1971. Items of the test relate to the four dimension of emotional intelligence (a) intera personal awareness, (b) intera personal management (c) inter personal awareness (d) inter personal management.

The Eysenck's Maudsley Personality inventory was used it is adapted in Hindi language by Jalota and Kapoor (1964). The test contains 48 items and 2 personality

dimensions in Bi-polar Dimensions- Neuroticism-stability and Introversion-extraversion.

A demographic sheet was used it measured variables like subjects, age, gender and education.

**Procedures:** The students were contacted in UTD department of University invited to participate in a survey. Participants were assured that their involvement was voluntary and anonymous and that they maintained the right to withdraw their participation at any time. Written consent in printed Performa was obtained from the individual participants of the sample included in the study. This study was approved by the departmental research committee. The investigator explained the purpose of the research to the participants. Then after the instructions are given on the questionnaire were explained to them. The participant first completed a Mangal emotional intelligence inventory and then the Personality inventory with demographic. At the completion of the inventory, participants were thanked for their contribution and provided with pertinent contact information should they want to request the results of the study upon completion.

**Statistical Analysis:** Data obtained was analyzed with the help of SPSS (16th) version, ADANCO version 2.0.1. and jamovi. (Version 1.0.). ADANCO

(advanced analysis of composites) software was used for the estimation of variance through structure equation modeling.

### Results

First, a measurement model was tested for all samples using confirmatory factor analysis (CFA) with jamovi. (Version 1.0.)<sup>(21, 22)</sup>. In this model, an emotional intelligence (EI) predicts the four measures comprised in the dimension: intra personal awareness, intra personal management, inter personal awareness and inter personal management. Several types of research have suggested that all the indexes are supposed to be above 0.90 to be a good fit<sup>(23-26)</sup> as cited by Kumar & Shrivastava (2019)<sup>(27)</sup>. The inconsistency in chi-square is the level of acceptance once > 0.05. RMSEA should be accepted in the range of 0.05 to 1.00 the lower value is said to be a good level. Model fit was excellent in the samples [CFI = .968, TLI=0.904, SRMR=.033 and RMSEA = 0.11 (RMSEA 90% CI: Lower-0.0495, Upper-0.189)]. Figure 1 shows the regression weights. All values depicted in Fig. 1 for the all students - intra personal awareness, inter personal awareness and inter personal management show the largest values (>.67). Intra personal management shows the lowest weight for the sample (0.664).

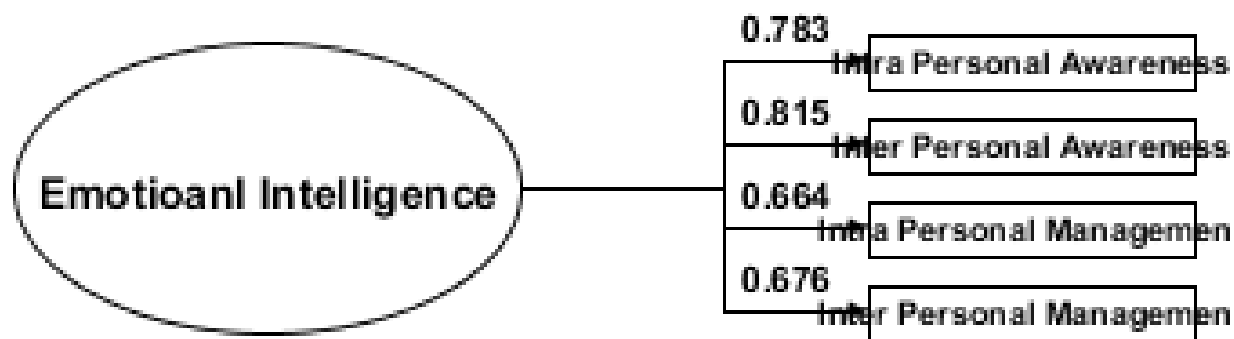


Figure 1: Measurement model (Confirmatory factor analysis) for all samples.

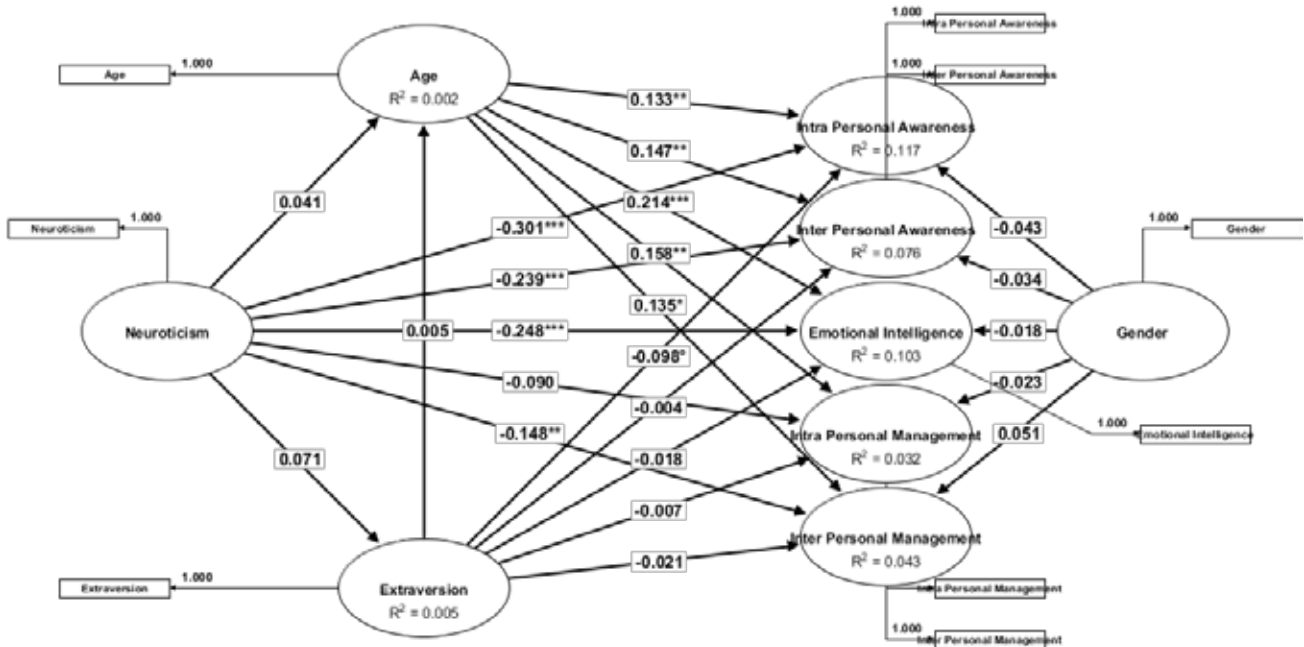
The direct and indirect effect of personality trait (Neuroticism & Extraversion) age, gender on emotional intelligence and its dimension

Direct effect hypotheses testing analyses were performed with structural equation model using ADANCO version 2.0.1. Software. Maximum likelihood estimation was performed with standardized estimates.

The goodness of Model fit analysis was performed for the direct and indirect effect. The fitness of model was excellent with the data (table-1) and was evaluated with guideline [{the Unweighted least squares discrepancy ( $d_{ULS}$ )  $P < .01$ , the geodesic discrepancy ( $d_G$ )  $P < .01$  and the standardized root mean squared residual (SRMR)  $P < .01$ }].

**Table 1 Goodness of model fit value**

	Value	HI95	HI99
SRMR	0.0000	0.0000	0.0000
d <sub>ULS</sub>	0.0000	0.0000	0.0000
d <sub>G</sub>	0.00	0.0000	0.0000



**Figure 2: Direct and Indirect effect of Neuroticism, Extraversion, age and gender on emotional intelligence and its dimension**

Figure 2 which indicate the estimation variance of the predictors (neuroticism, extraversion, age and gender) accounting (R<sup>2</sup>=0.103), 10.3% of variance for emotional intelligence; (R<sup>2</sup>=0.117), 11.7% of variance for intra personal awareness; (R<sup>2</sup>=0.076), 7.6% of variance for inter personal awareness; (R<sup>2</sup>=0.032), 3.2% of variance for intra personal management; and (R<sup>2</sup>=0.043), 4.3% of variance for inter personal management (figure-2). The neuroticism was negatively related to emotional intelligence (-0.2480, p<0.001), intra personal awareness (-0.3006, p<0.001), inter personal awareness (-0.2394, p<0.001) and inter personal management (-0.1482p<0.01). The age of the participants was positively related with the emotional intelligence (0.2136, p<0.001), intra personal awareness (0.1326, p<0.001), inter personal awareness (0.1470, p<0.001) intra personal management (0.1577, p<0.001) and inter personal management (0.1350, p<0.01). Whereas, extraversion and gender were not showing a significant role in emotional intelligence, intra personal awareness, inter personal awareness, intra personal management and inter personal management. Results

of the study reveals that age as a mediator variable does not have any significant role in the association between emotional intelligence and personality trait (neuroticism & extraversion). Extraversion as a mediator variable does not have any significant role in the association between neuroticism and age. The insignificance of mediation was examined by bootstrap. This study shows that the personality trait neuroticism and age were significant predictors for the progression of emotional intelligence; meaning thereby that increase in the level of neuroticism, there is an increase in risk for low emotional intelligence in students.

### Discussion

The main objective of the present study was to find out the predictors of Environmental factors for the development of Emotional Intelligence. Here, 300 Indian post graduate students were considered from five independent and large representative samples of Chhattisgarh from Urban areas. Their EI level was measured by the mangal emotional intelligence scale 2.

This study shows that the personality trait neuroticism of the participants was negatively related to emotional intelligence and its dimension. That means high neurotic personality students reported a lower level of emotional intelligence. Similar findings are reported by Park et al, (2015)<sup>(16)</sup>, Saklofske, et al. (2007)<sup>(17)</sup> and Petrides et al. (2010)<sup>(18)</sup> high neurotic personality a vulnerability factor for stress, negatively correlated with emotional intelligence. Findings also indicated that there is no significant impact of gender on emotional intelligence and its dimension. The findings are supported by Nawal et al., (2017)<sup>(28)</sup> and the similar results by a study “Women’s Leadership Edge: Global Research on Emotional Intelligence, Gender and Job Level” conducted in 2012<sup>(31)</sup>.

The present study also found a positive relationship of age with emotional intelligence and its dimension. It is indicated that older adults may obtain higher emotional intelligence due to lifelong learning and accumulating knowledge<sup>(29)</sup>. The reason for such findings of the study could be that neurotic personalities have suffered from anxiety, fearfulness and insecurity in relationships. Age-related changes during life circumstances such as physical health, income and social support education competition that can influence on a wide variety of social relationships. Some experts even suggest that emotional intelligence may actually be more important than IQ in determining overall success in life. Future researches are needed for improving emotional intelligence with the changing life circumstances to maximize their wellbeing. Emotional intelligence can be learned and is trainable<sup>(20)</sup>.

### Conclusions

Neurotic personality and age emerge as a significant predictor for emotional intelligence and its dimension. A stable personality, age and their psychological wellbeing are important in enhancing the emotional intelligence of young students as there is a possibility in improving their emotional intelligence. Results of the present study can be applied in educational institutions to draw out of improvement of emotional intelligence.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Taken from the departmental research committee

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# Synthesis of Rosemary Oleoresin Mediated Silver Nanoparticles and its Characterisation Using UV-Vis Spectrophotometry and TEM

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## Abstract

Preparation of nanosized silver based materials, is amongst the most emerging areas in the field of nanotechnology. Green synthesis of silver nanoparticles using different plant extracts and its resources are received many appreciation due to its environment al friendly capping and reducing properties. In this study, silver nanoparticles were synthesised using rosemary oleoresin. The synthesised nanoparticles were confirmed using UV-spectrophotometer and the size and shape were characterised by Transmission electron microscope. TEM analysis showed the size of silver nanoparticles from 10 – 25 nm. In conclusion, the reduction of the silver nitrate ion through rosemary oleoresin important to the formation of silver nanoparticles with so much of economic viability and valuable.

**Keywords:** Rosemary oleoresin, silver nanoparticles, Transmission electron microscope, UV-Vis spectrophotometer.

## Introduction

Nanoparticles are in the size from 1 to 100 nm<sup>1</sup> and has certain characters such as stability, distribution, size and structure reveal a completely new and better properties compared to other materials. Nanoparticles with decrease in size present a pertinent for catalytic reactivity and other applications such as antimicrobial activity of silver nanoparticles<sup>2</sup>. Silver has been recognised to have inhibitory effect towards bacterial strain and microorganisms<sup>3</sup>. Silver and silver nanoparticles are widely implemented in medical industry. Silver containing topical ointments are used to prevent infection in exposed wounds<sup>4</sup>.

Another widely implemented use of silver is in medical devices prepared with silver impregnated polymers<sup>5</sup>. Many synthetic process have been used for the production of silver based nanoparticles which include physical, chemical<sup>6</sup> and biological techniques<sup>7</sup>. The synthesis of chemical based nanoparticles are discouraged as they involve toxic substance like sodium borohydride<sup>8</sup> and toxic solvent<sup>9</sup>. Synthesis by biological method using microorganism<sup>10</sup> enzyme<sup>11</sup>, plant extract<sup>12</sup> are of recent interest. There is an increased focus on green chemistry as it is eco friendly and reduces toxicity . Hence, compounds like glucose<sup>13</sup>, microorganism and plant extract<sup>14</sup> are widely used. This has attracted research interest as it is a safer alternative. The herbal plants are having beneficial importance and widely used to control the shape and size of the silver nanoparticle<sup>15</sup>. Silver nanoparticles hold the guarantee to kill microorganism. Silver nanoparticle have a wide scope of target locales both extracellularly also intracellularly<sup>16</sup>. In fact, organisms have a harder time creating protection from silver than they do to antibiotics<sup>17</sup>. In this study, rosemary oleoresin was used for the synthesis of silver nanoparticles. Rosemary extracts have been

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utilised in the treatment of diseases because of its hepatoprotective potential<sup>18</sup> restorative potential for Alzheimer's ailment<sup>19</sup> and its antiangiogenic impact<sup>20</sup>. They have been used in food conservation, since they block oxidation and microbial contamination. Rosemary extract could therefore be used for reducing chemical antioxidants in food. As additives, rosemary offer a few technological focal points and advantages.

### Materials and Method

**Synthesis of nanoparticles:** Silver nanoparticles were synthesized using 1 mM of silver nitrate with 10 mL

of the Rosemary oleoresin extract was added with 90 mL of metal solution and mixed well and kept in a magnetic stirrer for the synthesis of silver nanoparticles. The colour change was observed visually and photographs were recorded<sup>21</sup>. [Figure 1 a & Figure 1b]

**Confirmation of nanoparticles:** The synthesised nanoparticle solution was preliminarily confirmed by UV-Vis spectroscopy; 3 mL of the solution was taken in a cuvette and scanned in double beam UV-Vis spectrophotometer from 300 nm to 700 nm wavelength. The results were recorded for the graphical analysis. [Figure 2]

### Results and Discussion

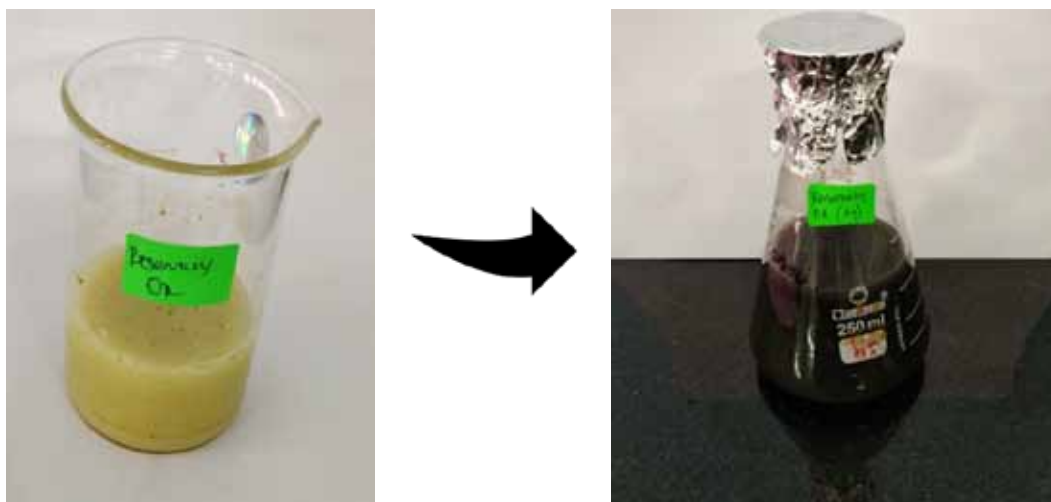


Figure 1 a: Rosemary Oleoresin extract and 1b: Rosemary oleoresin mediated AgNPs

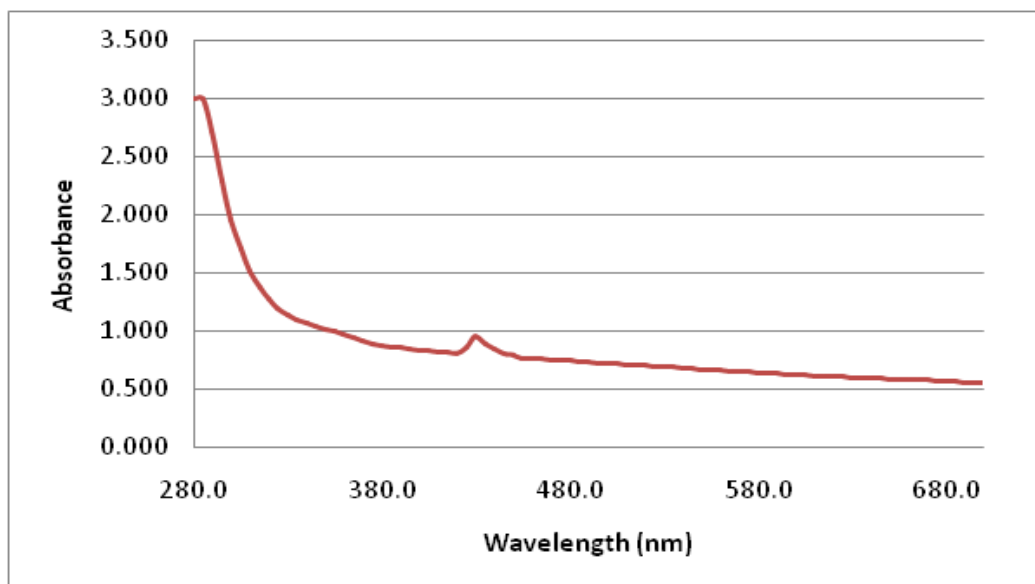
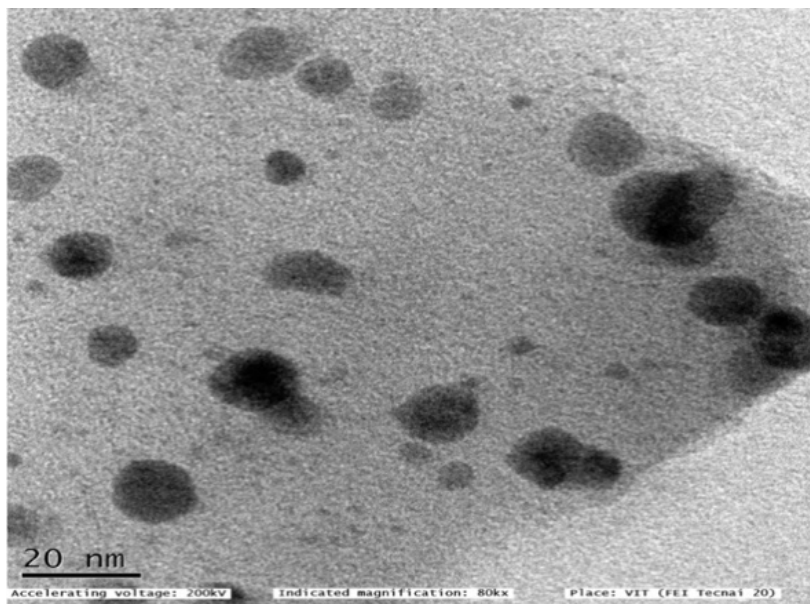


Figure 2: UV-Vis Spectroscopy of Rosemary oleoresin mediated silver NPs



**Preparation of nanoparticle powder:** The nanoparticles solution was centrifuged using to Lark refrigerated centrifuge. The solution was centrifuged at 8500 rpm for 10 minutes and the pellet were collected and washed with distilled water twice. The final purified pellets were collected and dried at 60 °C for 24 hours. Finally, the nanoparticles powder were collected and stored in air tight eppendroff tube.

**TEM analysis of silver nanoparticle:** The silver nanoparticle was analysed for its morphological character using TEM. The morphology such as size and shape of the silver nanoparticles were clearly analysed using this technique.[Figure 3].



**Figure 3: TEM analysis Rosemary oleoresin**

In the present work, silver nanoparticle have been synthesised, the reduction of silver ions were done with rosemary oleoresin and colour changes clearly shown in figure 1. It was notable that silver nanoparticles display yellowish-darker shading in aqueous arrangement because of excitation of surface plasmon vibrations in silver nanoparticles (22). Decrease of the silver ions to silver nanoparticles due to the exposure to extract could be seen by colour change and was further confirmed by UV-Vis spectroscopy (Figure 2). The size and shape of the prepared nanoparticles were evaluated by transmission electron microscopy (Figure 3). The majority of the particles in the TEM pictures were not in physical contact but rather are isolated by a genuinely uniform inter particle distance. This TEM analysis showed particles size ranging from 10-25 nm. The prepared rosemary oleoresin mediated silver nanoparticles may be further studied for its antioxidant, antiinflammatory and antidiabetic activities.

## Conclusion

The present study used rosemary oleoresin for the synthesis of silver nanoparticles. The synthesized nanoparticles were less than 100 nm confirms the usage of silver nanoparticles for the biomedical applications in future. This study indicates the role of rosemary oleoresin in the stabilization and capping properties of the AgNPs. The applications of rosemary oleoresin in already proved and in this study highly applicable silver nanoparticles were synthesized using this novel materials may use in many applications in future.

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**Conflict of Interest:** Nil.

**Ethical Clearance:** Not required as it is an in vitro study.

**Source of Funding:** Self

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# Serum Cotinine Level as a Biomarker for Tobacco-Related Oral Cavity Malignancy

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## Abstract

**Background & Objective:** Relationship between cotinine and oral cancer is still an unexplored area. Limited availability of studies embarks to investigate its importance in cancer. This study aims to quantify serum cotinine level as a biomarker for tobacco exposure related oral cavity malignancy.

**Methodology:** Patients (n=150) of either sex, aged between 31-80 years, were distributed into group A (Oral cancer), group B (Chronic tobacco chewers) and group C (Control) with 50 in each group. Details of gender, age and tobacco habit were recorded. For Group A, clinical data for anatomical site of tumour, type of lesion and pathology oral hygiene were collected. Serum cotinine levels were estimated by ELISA. Chi-square test, unpaired t-test, two-sample proportion test were performed using SPSS software.

**Results:** Significant difference was observed in the duration, frequency of tobacco consumption and serum cotinine levels among group A and B (P<0.01). Group B showed higher levels of serum cotinine (32.458 ±0.31ng/ml). The mean serum cotinine levels in group A, B and C were 6.218±0.34ng/ml, 5.753±0.62ng/ml and 0.245 ±0.81ng/ml.

**Conclusion:** Chronic tobacco chewers had high serum cotinine levels and could be at high-risk group for oral cavity cancer indicating the effectiveness of serum cotinine as a tobacco exposure related biomarker in oral cancer.

**Keywords:** Oral hygiene, Oral cancer, Tobacco chewers.

## Introduction

Oral malignancy, the sixth most recurrent cancer in the world, has high mortality rate, 7% in case of males and 4% in females.<sup>[1]</sup> In India, it accounts for around 40% of cancer mortality<sup>[2]</sup> with 48,000 deaths and 70,000 new cases.<sup>[3]</sup> Tobacco chewing is major risk

factor and is due to nicotine<sup>[4]</sup>. Cotinine, metabolite of nicotine, is detected in body fluids by economical techniques.<sup>[5,6]</sup> Studies have investigated serum levels of cotinine to differentiate between tobacco users and non-users as it is a long-term marker of nicotine<sup>[7-9]</sup> with greater specificity and sensitivity.<sup>[10,11]</sup>

In majority of previous studies, biomarkers of tobacco exposure have been analysed for smokers.<sup>[12,13]</sup> Studies have targeted biomarkers among smokeless tobacco users<sup>[14]</sup> and have evaluated the serum cotinine levels among tobacco chewers for clinical use.<sup>[8,15]</sup>

The purpose of this study was to quantify serum cotinine levels as a biomarker for tobacco-related oral malignancy in controls, chronic tobacco chewers and oral cavity cancer patients.

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## Materials and Method

With the institutional ethics committee approval, this case-controlled study was conducted at tertiary care hospital in Karad (Maharashtra) for two years. For effect size (Cohen's  $d=0.6$ , medium), significance level 95%, power 80%, the sample size is ~46 in each group for independent sample t test. The study involved 150 patients, aged between 31–80 years, who were distributed into three groups—Group A included 50 patients diagnosed with oral cancer and had not undergone chemotherapy/radiotherapy prior to inclusion; Group B (chronic tobacco chewers) included 50 patients taking half pouch (1 pouch=70-80 gm) of tobacco per day for >5 years; and Group C (control) included remaining 50 patients with no tobacco consumption, in any form. Patients suffering from cancer other than oral cancer, patients with smoking habit, chronic tobacco chewers with abstinence of >15 days (after 15 days of abstinence, cotinine level cannot be detected in serum),<sup>[16]</sup> and patient already treated for oral cancer were excluded

from the study. Informed consent was obtained from all the subjects included in the study.

Demographic data and details of tobacco consumption—type, duration, frequency was collected. For Group A, clinical data including anatomical site of origin of tumour, type of lesion, adjacent structure involved with tumour, pathology of tumour patient and oral hygiene, was also collected. Blood samples were collected and analysed by Enzyme-linked immunosorbent assay.<sup>[17-19]</sup>

Data was analysed in R software. Quantitative variables were analysed by using t-test and Qualitative variables were analysed using chi-square test, sample proportion test at 95% confidence interval.

## Results

The three groups are comparable in terms of demographic parameters and the results were presented in table 1.

**Table 1: Age and gender distribution**

		Age (Years) N (%)					Total	P value <sup>c</sup>
		31-40	41-50	51-60	61-70	71-80		
Group A		7(14)	15(30)	12(24)	13(26)	3(6)	50(100)	0.483
Group B		11(22)	15(30)	10(20)	11(22)	3(6)	50(100)	
Group C		12(24)	22(44)	9(18)	5(10)	2(4)	50(100)	
<b>Total</b>		<b>30</b>	<b>52</b>	<b>31</b>	<b>29</b>	<b>8</b>	<b>150</b>	
		Gender distribution N (%)						
Group A	Male	07 (14)	13 (26)	09 (38)	09 (38)	03 (6)	41 (82)	0.02
	Female	00 (0)	02 (4)	03 (6)	04 (8)	00 (0)	09 (18)	
Group B	Male	11 (22)	13 (26)	07 (14)	07 (14)	03 (6)	41 (82)	
	Female	00 (0)	02 (4)	03 (6)	04 (8)	00 (0)	09 (18)	
Group C	Male	10 (20)	18 (36)	06(12)	04 (8)	02 (4)	40 (80)	
	Female	02 (4)	04 (8)	03 (6)	01 (2)	00 (0)	10 (20)	
<b>Total</b>		<b>30</b>	<b>52</b>	<b>31</b>	<b>29</b>	<b>8</b>	<b>150</b>	

C = Chi-square test; N=Number

Age distribution of patients among the groups had no significant difference ( $P>0.05$ ). Majority of patients were between 41-50 years. However, a significant difference was observed with respect to gender distribution ( $P<0.05$ ) as males were found to be more affected than

females. Majority of oral cavity malignancy patients were male (82%) and 18% were female, while in chronic tobacco chewer group also male preponderance was clearly visible (Table 1).

**Table 2: Tumour Distribution of Clinical data of Group A**

	Number (Percentage)	P value
<b>Anatomical Site</b>		
Buccal mucosa	26(52)	3.50e <sup>-07c</sup>
Bucco-gingival sulcus	9 (18)	
Tongue	7 (14)	
Hard Palate	1 (2)	
Lip	7 (14)	
Retromolar region	0(0)	
<b>Lesion Type</b>		
Ulcerative	16(32)	0.00*
Ulcerproliferative	34 (68)	
Proliferative	0 (0)	
<b>Adjacent Structures Involved</b>		
Lymph nodes	22 (36.66)	2.46e <sup>-10c</sup>
Mandible	5 (8.33)	
Skin (cheek)	5 (8.33)	
Mandible + Lymph node	4 (6.66)	
Mandible + Skin (Cheek)	1 (1.66)	
Skin (cheek) + Lymph node	4 (6.66)	
Mandible + Skin (Cheek) + Lymph node	1 (1.66)	
None	18 (30)	

c-Chi-square; \*-2-sample proportion test

In group A, anatomical site of origin, type of lesion and adjacent structures involved with tumour was significant (P<0.05); majority of patients had tumour in the buccal mucosa site with ulcer proliferative lesions and involvement of adjacent lymph nodes (Table 2).

**Table 3: Type of tobacco consumption among Group A and B**

	Number of Patients, N (%)		Total	P value <sup>c</sup>
	GroupA	Group B		
<b>Types of tobacco consumed</b>				
Tobacco Chewing	22(44)	26(52)	48	0.86
Mishri application	9(18)	8(16)	17	
Tobacco Pan + Gutakha	13(26)	10(20)	23	
Tobacco + Smoking	6(3)	6(3)	12	
<b>Duration of tobacco consumption (in years)</b>				
5-10	5(10)	20(40)	25	0.00
11-15	9(18)	8(16)	17	
16-20	11(22)	14(28)	25	
>20	25(50)	8(16)	33	
<b>Frequency of tobacco chewing consumed (packets per day)</b>				
6 to 10 (90 to150 g)	23(46)	20(40)	43	0.279
10 to 15 (150 to 225 g)	16(32)	12(24)	28	
>15/day (>225g)	11(22)	18(36)	29	

C=Chi-square test; N-Number; %-Percentage; g. -grams

No significant difference was observed among the two groups ( $P>0.05$ ) with respect to type of tobacco chewing. Although, as compared to mishri, pan and gutakha consumption, majority of patients were only into tobacco chewing (Table 3).

**Table 4: Duration of tobacco consumption, on serum cotinine level**

	Serum Cotinine Levels (ng/ml)		P value <sup>t</sup>
	Group A (M±SD)	Group B (M±SD)	
<b>Duration of tobacco consumption (in years)</b>			
5 to 10	7.397 ±0.372	6.539 ±0.37	0.00
11 to 15	33.050 ±0.221	37.452 ±0.29	2.87e <sup>-08</sup>
16 to 20	32.361 ±0.273	30.731 ±0.61	3.32e <sup>-08</sup>
>20	28.268 ±0.244	32.458 ±0.31	9.94e <sup>-12</sup>
<b>Frequency of tobacco chewing/amount of tobacco consumed (packets/day)</b>			
6 to 10 (90-150 g)	6.744±0.24	9.563±0.12	8.54e <sup>-33</sup>
10 to 15 (150-225 g)	10.119±0.22	12.562±0.34	3.32e <sup>-14</sup>
>15 (>225 g)	27.923±0.34	25.325±0.48	1.06e <sup>-15</sup>

M±SD- Mean± Standard deviation; t-t test.

In both the groups, most subjects had tobacco 6-10 times/day indicating no significant difference ( $P>0.05$ ) and duration of tobacco consumption indicated a significant difference among the groups ( $P<0.05$ ), with many subjects consuming tobacco for more than 20 years. (Table 4).

The levels of serum cotinine and duration of tobacco consumption among the groups was observed to be significant ( $P<0.001$ ). Similar observations were made upon analysis of serum cotinine levels with frequency of tobacco chewing/consumption ( $P<0.001$ ; Table 4). These results show that longer the duration and frequency of tobacco consumption, more the chances of having higher levels of serum cotinine, which could be an indicator of being in high risk group for oral cancer.

During the histopathological examination in Group A, majority of the patients observed to have well-differentiated squamous cell carcinoma (48%); the distribution of patients with respect to histopathology was significant ( $P=6.52e^{-05}$ ). A significant difference was observed among the patients in terms of oral hygiene in Group A ( $P=7.21e^{-06}$ ) stipulating that majority of patients demonstrated poor oral hygiene.

**Table 5: Serum cotinine levels in squamous cell carcinoma patients in Group A**

Serum Cotinine Level (ng/ml)	N (%)	P value <sup>c</sup>
<b>In well differentiated squamous cell carcinoma</b>		
1 to 10	11 (45.83)	0.03
11 to 20	2 (8.33)	
>20	11 (45.83)	
Total	24 (100)	
<b>In moderately differentiated squamous cell carcinoma</b>		
20 – 40	3 (18.75)	0.44
41 – 60	6(37.5)	
>60	7 (43.75)	
Total	16(100)	

c- Chi-square test

A significant difference in the serum cotinine level was observed among the well differentiated squamous cell carcinoma patients in Group A ( $P<0.05$ ) with majority of patients having serum cotinine level between 1-10 ng/ml and >20 ng/ml (Table 5). This indicates that well differentiated squamous cell carcinoma patients show varying degree of serum cotinine levels depending on the extent of spread of carcinoma among the cells.

**Table 6: Mean serum cotinine among groups**

Study Groups	Serum Cotinine (ng/ml)		P value <sup>t</sup>
	Study Groups	Group C (N=50)	
Group A (N=50)	6.218±0.34	0.245 ±0.81	0.00
Group B (N=50)	5.753±0.62	0.245 ±0.81	3.26e <sup>-14</sup>

t- sample t-test; M±SD- Mean± Standard deviation

Mean serum cotinine values showed a significant difference between Group A and Group C (P<0.05) and significant difference between Group B and Group C (P<0.01) stipulating that the presence of high levels of serum cotinine indicates tobacco exposure (Table 6).

**Discussion**

This study aimed at determining the serum cotinine levels as a biomarker for tobacco related oral cavity malignancy. In this study, the average age of tobacco chewers was between 41-50 years, this is complying with the literature where the average age of tobacco chewers is around 36.5–45 years,<sup>[20]</sup> indicating early-age addiction of tobacco chewing.<sup>[15]</sup>

Male preponderance was clearly visible in majority of oral cavity malignancy patients and in chronic tobacco chewers group. However, this fact cannot be ignored that females do use tobacco exclusively in smokeless form. Similar findings were observed by Dhanya.<sup>[8]</sup> High usage of tobacco among males could be attributed to culture-based reasons.

In India, consumption of betel quid is strongly associated with risk for oral cancer.<sup>[21]</sup> In contrast to this, in our study the average type of tobacco consumption was tobacco chewing<sup>[21]</sup>. In Gupta et al. study<sup>[9]</sup> maximal risk of oral cancer was for the cases who chewed tobacco more than ten times/day.<sup>[9]</sup> However, in our findings the chewing of tobacco for 6 to 10 times/day increased the chances of oral cancer. Further, in tobacco chewers, duration of chewing is strongly associated with risk of oral cancer as majority of them were chewing tobacco for > 20 years. These findings are consistent with previous epidemiological study.<sup>[22]</sup>

In the current study, majority of patients suffered with well-differentiated squamous cell carcinoma. In a previous study also the higher rates of oral cancer were associated with buccal mucosa causing widespread exposure and squamous cell carcinoma.<sup>[23]</sup> This is

due to increased and localized absorption of tobacco products and also depends on duration of chewing, pH value, amount of nicotine.<sup>[15]</sup> On comparing the effect of duration of tobacco chewing, the levels of serum cotinine were significantly higher (32.458 ±0.31ng/ml) for chronic tobacco chewers with duration of tobacco chewing > 20 years as compared to oral cancer patients (28.268 ±0.244ng/ml). Similar results were observed by Rostron et al.<sup>[24]</sup>

The serum cotinine levels increased with increasing frequency of tobacco use in oral cancer patients and chronic tobacco chewers and agreed with Castelino et al. <sup>[25]</sup> Poor oral hygiene is related with a significant risk of oral cancer in our study and was in accordance with previous literature.<sup>[26]</sup> The study should be conducted on bigger sample size and other techniques estimation serum levels should be analysed.

**Conclusion**

This study identified that serum cotinine level in chronic tobacco chewers was high and near to serum cotinine level in oral cancer patients, they can be included in high risk group for oral malignancy. Consequently, these levels offer advantage as biomarker for oral cancer screening.

**Ethical Clearance:** Taken from institutional ethics committee

**Conflicts of Interest:** Nil

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# To Assess the Capacity to do Breast Self Examination among Non-Medical Female Employees of Tertiary Care Hospital from Western Maharashtra

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## Abstract

**Background:** The breast cancer is most common cancer found among women in developed countries. Early detection plays a very important role in breast cancer. The Breast self-examination is simple, non-invasive and inexpensive method for early detection of breast cancer.

**Objectives:** (1) To assess the level of knowledge of self breast examination among non-medical female employees. (2) To assess the capacity to do regarding self breast examination among non-medical female employees. (3) To find the association between pre-test knowledge score and selected socio demographic variables.

**Method:** The research approach adopted for this study was an evaluative approach, where the research design was used one group pretest posttest research design. The study was conducted in tertiary care hospital, Karad. The sample consists of 49 non medical female employees. A purposive sampling technique was used to select the sample. The data were collected by structured questionnaire. The data were analyzed using descriptive and inferential statistics.

**Results:** The mean pre-test knowledge score was 4.551 and post-test mean score was 17.265. The t-test value was 61.053 and was found significant at  $p < 0.0001$  level.

**Conclusion:** The result of study shows that non-medical female employees have improved their knowledge and practice regarding self breast examination.

**Keywords:** *Breast Self Examination, Non-Medical Female Employees, Capacity to do.*

## Introduction

The breast cancer is most common cancer found among women in developed countries. In the world over 1.15 million cases of breast cancer are diagnosed every year and 502,000 women die from the disease each year.<sup>[1]</sup> In India the breast cancer is second most

common cancer in women and it is stated that 90% of the times breast cancer is first noticed by the person herself.<sup>[2]</sup> Early detection plays a very important role in breast cancer. The screening method like Breast self-examination mammography and clinical breast examination which is used to detect early breast cancer. The Breast self-examination is simple, non-invasive and inexpensive method for early detection of Breast cancer. <sup>[3]</sup> Early detection of breast cancer has an important part in decreasing mortality and morbidity and breast self-examination is an important screening way for early detection.<sup>[4]</sup>

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Breast self-examination can be carried out by women

themselves and its not required to visit hospital. Breast self-examination method involves women looking at and feeling each breast for possible lumps, distortions or swelling as an approach in detecting early stage breast cancer. Knowledge and skills of Breast self-examination can saves life of women's. For increasing the knowledge and skills regarding Breast self-examination more health teaching programmes and demonstration need to be conducted.<sup>[5]</sup> The study conducted by Pravin N Yerpude et al. concluded that the level of knowledge and practice of breast self examination among female is unacceptably low. Efforts should be made to increase level of knowledge and practice of breast self examination through health education programmes.<sup>[6]</sup> The nurses plays a vital role in to educate people about breast cancer their risk factors and types of screening practices and to influence behaviors that will reduce the risk of future breast cancer morbidity and mortality. In context, the present study was intended to assess the capacity to do Self Breast examination among non-medical female employees of tertiary care hospital.

### Material and Method

The pre-experimental design was used to conduct the study among non-medical female employees in Tertiary Care Hospital from Western Maharashtra. The 49 employees selected by purposive sampling technique. The samples included in this study were who fulfilled the inclusion criteria with the age above 30 year and who were willing to participate in the study and available during data collection period. Ethical permission was obtained before data collection. After obtaining permission from setting, the employees were asked their willingness to participate in this study and informed consent was obtained. After collecting the demographic data, the pre-test level of knowledge and practice among non-medical female employees was assessed with using structured questionnaire and observational checklist. At the end of the seventh day, the post-test level of knowledge and practice was assessed by using the same tool.

**Description of the tool:** The structured questionnaire comprised three sections covering the following areas.

**Section I:** It consist of socio demographic data include age, religion, marital status, education, pair occupation, type of family, Residence, number of

children, history of breast cancer.

**Section II:** The questionnaire on knowledge regarding breast self examination.

**Section III:** The questionnaire on capacity to do self breast examination.

**Statistical Test:** Paired t test was used to compare the means and chi square test was used to find out association between pre-test knowledge score regarding Breast self Examination and selected socio demographic variables

### Results

**Description of sample characteristics:** Table No. 1 reveals that among all of the participants 44.89% were within the age group of 30-39 year and 44.89% within the age group of 40-49 year and most of them 65.30% were Hindu religion. Nearly 75.51% they were married. The data concerning 51.02% were from joint family and it was found 48.97% had primary education. The majority of samples 95.91% were not having any pair occupation. In relation to residence 61.22% were in rural area. Majority of women's 67.34% were having two children's and Majority 100% was not having history of breast cancer.

**Knowledge among non-medical employees regarding Breast self examination:** Table 2 indicates that most of the samples (98%) were having poor knowledge and (2%) were having average knowledge in pre-test. In the post-test knowledge 100% of non-medical employees were having good knowledge.

**Practice among non-medical employees regarding Breast self examination:** The data presented in table No. 3 shows that 100% of samples practice of Breast self examination before and after the demonstration 100% of samples done the practice of Breast self examination.

The data presented in Table 4 show that the mean difference between the pre- and post-test knowledge score was 12.714 and computed paired t-test value was  $t=61.053$  was found significant at  $p<0.001$  level. Hence, there was a significant improvement of knowledge among the non-medical female employees.

**Association between pre-test knowledge score and selected socio demographic variables:** There was no significant association between the knowledge score

and selected socio demographic variables at the level  $p < 0.05$ .

**Table 1: Frequency and percentage distribution of socio-demographic variables of samples**

Sr.No.	Variables	Frequency	Percentage	
1.	Age	30yr-39yr	22	44.89%
		40yr-49yr	22	44.89%
		Above 50yr	5	10.20%
2.	Religion	Hindu	32	65.30%
		Christen	0	0%
		Muslim	8	16.32%
		Other	9	18.36%
3.	Marital Status	Married	37	75.51%
		Unmarried	1	2%
		Widow	11	22.44%
		Separate	0	0%
4.	Type of Family	Joint	25	51.02%
		Nuclear	24	48.97%
5.	Education	Primary	24	48.97%
		Secondary	12	24.48%
		Higher Secondary	0	0%
		None	13	26.53%
6.	Pair Occupation	Yes	2	4.089%
		No	47	95.91%
7.	Residence	Urban	19	38.77%
		Rural	30	61.22%
8.	Number of Children's	One	3	6.12%
		Two	33	67.34%
		Three	12	24.48%
		Four	1	2%
9.	History of breast cancer	Mother	0	0%
		Sister	0	0%
		Aunty	0	0%
		None	49	100%

**Table 2: Frequency and percentage distribution of pre-test and post-test knowledge scores among non medical female employees**

Grade	Score	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
Poor	0-6	48	98%	0	0
Average	7-13	1	2%	0	0
Good	14-20	0	0	49	100%

**Table 3: Frequency and percentage distribution of pre-test and post-test practice score among non medical female employees**

Pre-test Not done practice before	Post-test Done practice after demonstration
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Frequency	Percentage	Frequency	Percentage
49	100%	49	100%

**Table 4: Comparison of pretest and posttest level of knowledge among the non-medical female employees.**

Sample	Pre-test		Post-test		Paired 't' value
	Mean	SD	Mean	SD	
Non- medical female employee's	4.551	0.792	17.265	12.714	61.053 Significant

teachers was average before the administration of the PTP. The post-test knowledge scores showed significant increase in the level of knowledge of teachers. Hence the PTP is an effective teaching method for providing information and improving the knowledge of teachers.<sup>[8]</sup>

**Discussion**

The results of the present study show that there was a significant difference in knowledge score among non-medical female employees. The knowledge and practice was improved among non-medical female employees after demonstration. The findings of different studies also show that the knowledge and practice regarding breast self examination was poor but after planned teaching programme improvement was seen in knowledge and practice regarding breast self examination. Confirming the results of the present study, it can be pointed to the study of John Molly et al. study showed that the knowledge and practice of breast self- examination among women were very less. The planned teaching programme on breast cancer and Breast self examination carried out in the study was found to be effective in improving the knowledge and skill of mahilamandal women as evidenced by the significant difference between pre-test and post-test knowledge score. So the health personnel should intensify health education on knowledge of breast cancer and should be initiated to improve women’s practice of Breast self examination.<sup>[7]</sup>

A study conducted by Salomy Chacko with title of “Effectiveness of Planned Teaching Programme on Knowledge of Early Detection of Breast Cancer among School Teachers. The result reveals that the mean post-test knowledge score (O2 =24.05) was higher than the mean pre-test knowledge score (O1=12.48). The computed ‘t’ value (24.14) was higher than the table value (t (59) = 1.67) at 0.05 level of significance, suggesting that the PTP was effective in increasing the knowledge of female teachers on early detection of breast cancer. Interpretation: The result showed that the PTP was effective in increasing the level of knowledge of teachers on early detection of breast cancer. The findings of the study showed that the knowledge of

**Conclusion**

The result of study shows that non-medical female employees have improved their knowledge and practice regarding Breast Self examination. Awareness programs are needed to be conduct so that all women can know and practice Breast Self Examination, which is going to help to the women to identify any abnormal changes in the breasts so that they will be able to seek medical advice immediately.

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**Conflicts of Interest:** There are no conflicts of interest.

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# TOMON (Tooth Monster Hunter): Educative Media for Teaching Toothbrushing to Children

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## Abstract

**Background:** This study presents “Tomon” or Tooth Monster Hunter for assisting the parents or medical staffs to help children for learning proper brushing skills. The importance of maintaining oral health needs to do since the best time to instil the values of positive behaviour maintaining dental health is the age of children. The problem within the oral counselling method is that cannot change the dental health behaviour of children.

**Method:** The research is an experimental study with a pre-test and post-test control group design. Our research uses a technological approach to create educational wearable sensor for children. This experimental method is testing cause and effect. The cause in this research is the Tomon game and the effect is dental health status. We also analyse the brushing behaviour change of the children.

**Results:** The results show that Debris Index of the experimental group change from the moderate category which is 66.7% and poor category which is 33.3% to all good category. In the control group, there is a change from the poor category which is 66.7% and the moderate category in 33.3% to all good category. The statistical analysis show that there is a significant change influence of Tooth Monster Hunter in the brushing behaviour of children.

**Conclusion:** The research suggest Tomon improve the health promotion towards the children’s dental and oral health.

**Keywords:** *Children, debris index, dental and oral health, tooth monster hunter.*

## Introduction

The development of the industrial revolution 4.0 brings changes to human life, which now relies on technology such as in the health field. Dental and oral health is crucial for the body. Damaged and untreated teeth and gums can cause dental and oral diseases such as pain, dental caries and interfere with other bodily health. In 2018, in Indonesia the proportion of dental and oral problems reached 57.6% with only 10.2% of medical staff. In addition, it is known that the proportion of daily tooth brushing behaviour in the population aged more than 3 is 94.7% but the proportion of proper tooth brushing behaviour is only 2.8%<sup>(1)(2)</sup>. The importance of maintaining dental and oral health needs to be taken into account early, in which the most appropriate time to instil

the values of positive behaviour to maintain dental and oral health is in the age of children. This is because pre-school or kindergarten age is a good age for practicing children’s motor skills. The risk of dental disease in children can cause disruption or difficulty in mastication, reduced nutritional intake so that weight loss decreases and the result is the child growth and development is not optimal. The failure on keeping the dental and oral health can affect other body health<sup>(3)</sup>. On average, 5-years-old children brush their teeth only about 25% of the entire tooth area. This is because children are not perfect in the act of brushing their teeth<sup>(4)</sup>. Thus, the solution is to instil in themselves about the behaviour of maintaining dental and oral health.

So far, the various research efforts have been carried



out in maintaining oral health. Dental and oral health was done by psychologists to change behaviour as a basis for intervention and the level of patient knowledge can be done through verbal oral health from a health practitioner. The leaflet method and written material were also carried out as a step to promote health. The success in providing health promotion depends on health practitioners. However, it cannot guarantee the output.<sup>(5)</sup>

The first effort can be done to prevent plaque formation is brushing thoroughly and regularly. Because maintaining dental and oral health at an early age affects the development of dental health in adulthood. Tooth brushing behaviour is related to plaque scores. Knowledge of good tooth brushing has an opportunity not to experience dental caries<sup>(6)</sup>. This maintenance effort becomes a challenge for parents and teachers to provide motivation to children in the behaviour of maintaining dental and oral health. Because verbal persuasion is not enough to motivate children. So there must be a way to give an interesting demonstration to children about brushing their teeth<sup>(7)</sup>. In addition, Smart Toothbrush has been made as an assistant in detecting human behaviour in maintaining healthy teeth in a vision-based system. This system cannot classify good and proper brushing

of teeth<sup>(8)</sup>. The dental plaque estimation system using camera images has also been carried out as healthcare management. This method is used as a teaching tool for brushing teeth. The tool used is compatible with all types of cameras. However, it is still difficult to maintain individual dental health<sup>(9)</sup>. Children need a tool to play in order to develop their abilities<sup>(10)</sup>.

Based on the above problems, then in this study with a background of industry 4.0, it will use a technological approach as an educational aid for dental health games for children.

### Methodology

This research is an experimental study. This experimental method will answer the question “If a virtual game is given to a group under study, then can it improve dental health status?”. Figure 1 shows the research model in which the range of experimental research is more than one group with pre-test and post-test. There are two groups that are given different treatment with the aim to test the health status of their teeth both for the Tomon game intervention or not.

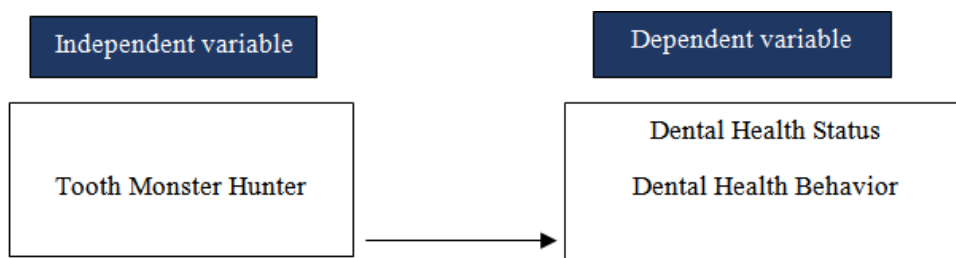


Figure 1: Research Model

Based on the data had been obtained, the it was analysed by doing the calculation tabulation process. Next an analysis of comparative studies on the results of dental health status was produced. We used paired sample T test analysis. The T test was used to test the effect of independent variable on the dependent variable. This test is done by comparing T arithmetic with T table . If the p-value is less than 0.05, then  $H_0$  is rejected, which means there is an influence of Tooth Monster Hunter on dental health status. If the p-value is more than 0.05, then  $H_0$  is accepted which means there is no Tooth Monster Hunter effect on the dental health status. In addition,

the dental behaviour and health was analysed based on observations.

### Results

**A. Univariate Analysis:** Dental and oral hygiene can be measured using an index. The Index is a clinical condition which is obtained when an examination is held. Analysing the degree of dental and oral health of children is by looking at the OHIS (Oral Hygiene Index Simplified) score before and after the treatment is given. The standardization used in calculating OHIS score is according to the Ministry

of Health of Republic of Indonesia Year 1995 is through examination of debris on certain teeth and on certain surfaces of the teeth. The examination was divided into 6 sextans in the buccal, lingual and palatal sections. The Debris Index assessment standards classified into Good, Moderate and Poor category. Good category stands on score 0 to 3.333. Moderate category stands on score 3.444 – 6.666 while Poor Category stands on 6.777 – 10.

Table 1 shows the Debris Index of experimental group. It is known that the Debris Index of the experimental group before the intervention of Tooth Monster Hunter game media is mostly in the sufficient criteria in 66.7%, while after the intervention using Tooth Monster Hunter game media, the criteria for overall children’s Debris Index score is in good criteria.

**Table 1: Frequency Distribution of Debris Index Score of Experimental Group**

Category	Before		After	
	Frequency	%	f	%
Good	0	0	9	100
Moderate	6	66.7	0	0
Poor	3	33.3	0	0
<b>Total</b>	<b>9</b>	<b>100</b>	<b>9</b>	<b>100</b>

Table 2 shows the Debris Index of control group. Almost all of the frequency is categorized poor as much as 66.7%. After the manual brushing, which means without intervention, the category change into good, in 100%.

**Table 2 Frequency Distribution of Debris Index Score of Control Group**

Category	Before		After	
	Frequency	%	f	%
Good	0	0	9	100
Moderate	3	33.3	0	0
Poor	6	66.7	0	0
<b>Total</b>	<b>9</b>	<b>100</b>	<b>9</b>	<b>100</b>

Table 3 shows the brushing skill of experimental group. Before the treatment using Tooth Monster Hunter game media, most of the criteria are sufficient in 66.7%, while after the treatment, the criteria are mostly in good criteria in 77.8%.

**Table 3 Frequency Distribution of Brushing Skill of Experimental Group**

Category	Before		After	
	Frequency	%	f	%
Good	0	0	7	77.8
Moderate	6	66.7	2	22.2
Poor	3	33.3	0	0
<b>Total</b>	<b>9</b>	<b>100</b>	<b>9</b>	<b>100</b>

Table 4 shows the brushing skill of control group without using Tooth Monster Hunter. Before brushing, most of the criteria are poor in 66.7%, while after manually brushing, the criteria are still in poor category in 44.5%.

**Table 4: Frequency Distribution of Brushing Skill of Control Group**

Category	Before		After	
	Frequency	%	f	%
Good	0	0	3	33.3
Moderate	3	33.3	2	22.2
Poor	6	66.7	4	44.5
<b>Total</b>	<b>9</b>	<b>100</b>	<b>9</b>	<b>100</b>

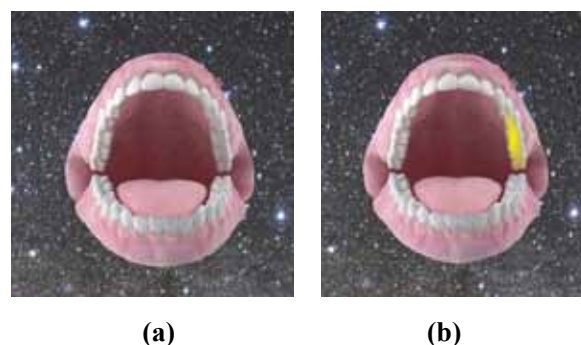
**B. Bivariate Analysis:** Table 5 shows the bivariate analysis on brushing skill. The first output on experimental group shows that the mean treatment before intervention is 6.65 with a standard deviation of 1.52 while after the treatment is 0.257 with a standard deviation of 0.275. Then the Mean value is greater before the treatment with difference of 6.393. The Tvalue is 12.41 with a degree of freedom of 16 and a P-value of 0.000 where this result is less than the critical limit of 0.05 so that the hypothesis answer is reject  $H_0$ . meaning that there is a significant difference between before and after the treatment.

While on the control group, the output shows that the mean treatment before is 7.41 with a standard deviation of 1.33 while the after treatment is 1.028 with a standard deviation of 0.727. Then the Mean value is greater in the treatment before the difference of 6.382. It can be seen that the result at t arithmetic is 12.61 with a degree of freedom of 16. It is seen that the p-value produced is 0,000 where the value is less than 0.05 so it is concluded that there is a significant difference between the Debris Index values before and after brushing teeth. The results of the significant differences in the before and after conditions in both the experimental and control groups give an idea that brushing has an effect on dental and oral hygiene.

**Table 5: Brushing Skill Analysis on Experimental and Control Group**

Variable	Pre-test		Post-test		Mean Treatment Gap	P -value
	Mean treatment	Std. D	Mean treatment	Std. D		
Brushing skill on Experimental Group	6.65	1.52	0.257	0.275	6.393	0.000
Brushing skill on Control Group	7.41	1.33	1.028	0.727	6.382	0.000

Changes in the value of the degree of dental health affect the skill of brushing. The change in behaviour was assessed from a questionnaire filled out by the research team. The indicators used are the stages of brushing teeth from the right, left, top, bottom and front. The results of the ability to brush teeth are given in the form of tooth brushing practice. Skills are measured by adding up scores on the observation sheet with a score technique of yes = 1 and no = 0. Figure 2 shows that Tooth Monster Hunter game has 7 game steps, so that a block of yellow dental reports will reduce the number of teeth that are scrubbed correctly. This tooth brushing skill assessment com are brushing skills between the experimental groups that were given the TOMON treatment game with the control group.



**Figure 2: Dental Report in Tooth Monster Hunter**

To see the results whether there is a significant comparison between Debris Index of the post-test of the experimental group and the control group, we conducted p-value test that produces the value shown in Table 6.

**Table 6: Debris Index Analysis on Experimental and Control Group**

Variable	Pre-test	
	Mean treatment	Std. D
Debris Index on Experimental Group	0.257	0.275
Debris Index on Control Group	1.028	0.727

Based on the calculation results, it shows that the post Debris Index score on the experimental group 0.257 with a standard deviation of 0.275. While on post Debris Index score on the control group shows 1.028 with a standard deviation of 0.727. The difference between the experimental and control group is -0,771 and the resulting T value is -2.98, not to mention the p-value is 0.009. This value is less than the critical standard of 0.05. That is, there is significant difference between the experimental and control group, meaning that Tooth Monster Hunter game have an effect on children’s dental health status compared with a control group that was not given Tooth Monster Hunter game treatment.

**Discussion**

Our research results show that there is a change of Debris Index of the experimental group from the moderate category in 66.7% and poor in 33.3% to overall good. In the control group there is a change from the poor category of 66.7% and moderate which is 33.3% to all good. However, the percentage of reduction is significantly found in the experimental group, reaching 100%.

To prove whether there is a significant influence on the experimental group on pre and post-test, p-value analysis was used. The results of paired T test statistic obtained p-value less than 0.05, that is, there is a significant difference to the Debris Index once Tooth Monster Hunter is given. The results of this study indicate that the educational media of the game TOMON has an effect on decreasing the children’s Debris Index score compared to manual brushing. This is supported by the theory put forward by Putra et al, 2016 that the game has a function that is useful in children, that is, children can understand computer technology so they can follow directions and rules, practice solving problems and logic, train motor nerves and spatial abilities.

The results of the study of tooth brushing skill on the experimental group show that there is a change from most in the moderate category of 66.7% to a good

category in 77.7%. On the control group, there is a change from the sufficient category of 66.7% to a good number of 33.3%. The percentage increase in the group given Tooth Monster Hunter game is higher than the group that was not given counselling using Tooth Monster Hunter. To prove whether there is a significant influence on the experimental group before and after the Tooth Monster Hunter treatment was given; p-value analysis was used. The results of paired T test statistic obtained p-value less than 0.05, which means reject H<sub>0</sub>, so it is concluded that there is a significant influence on teeth brushing skill using the Tooth Monster Hunter game. This shows that the group given counselling using the Tooth Monster Hunter game media has better skills than in the control group, because the Tooth Monster Hunter game can increase children’s active participation through game play so that the skills increase. Educational games are games that are not only entertaining but contain knowledge conveyed to its users<sup>(11)</sup>. Where someone who has knowledge, will use his skills to use material that he has learned in actual situations or conditions, for example a child will brush his teeth every day when he has understood dental health material<sup>(12)</sup>.

**Conclusion**

In conclusion, there is a significant influence on the dental health status of children with treatment using the game media TOMONS (Tooth Monster) into the Good category as indicated by the p-value test that produces a value of 0.009. Besides, there is a significant influence on the ability to brush children’s teeth with treatment using the game media TOMONS (Tooth Monster) into the Good and Enough category with the p-value test producing a value of 0.014.

**Conflict of Interest:** The author has no conflict of interests related to the conduct and reporting of this research.

**Source of Funding:** Source of the fund for this research was by Indonesia Ministry of Health.

**Ethical Clearance:** Before conduct of the study, written permission was obtained from Poltekkes Kemenkes Semarang, Indonesia. The consent and willingness were established from all the subjects who meet the criteria for this research.

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# Infant Massage Promotes Growth in Full-term Infants

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## Abstract

The achievement of optimal growth is the result of the interaction of various factors, such as genetic factor, environment, behavior and stimulation. There are several other factors that influence the increase in the infant's weight including drugs, congenital abnormalities or chronic diseases of the infant, the sex of the infant, family socioeconomic conditions, nutrition and provision of baby massage stimulation. The study aims to assess the effectiveness of baby massage in promoting baby growth, i.e. weight, length, chest circumference and head circumference.

The study uses a quasi-experiment with pretest-posttest control group design. Subjects were recruited from visitors in integrated service post (in Indonesian: Posyandu), independent midwifery practices and community health sub-centers. We collected data of baby growths in Malang regency where the residents are a homogeneous group. 30 infants were included in the study. They, subsequently, were randomly divided into experimental and control group. The experimental group babies aged 3-6 months participated in the baby massage for four weeks. The control group (N=15) was paired with the experimental group (N=15) by matching the baby's age and sex. The growth indicators were measured two times and statistically analysed using independent t-test and eta-squared test.

Growth assessment used measurement results from variable body length, weight, chest circumference, head circumference. After four weeks of massage, we found that weight, length, chest circumference and head circumference increased among babies aged 3 to 6 months who received stimulation of baby massage. Overall, the results of this study reassure that baby massage affects the growth of the infant.

**Keywords:** *Baby massage, infant growth, length, weight, chest circumference, head circumference.*

## Introduction

Massage is ordered physical stimulation, such as holding, causing movement and/or pressuring to the body that is used to treat medical conditions<sup>1,2</sup>. Massage

has been used for intervention purposes in China in 2760 Bc<sup>3</sup>. In the 21<sup>st</sup> century, it became more popular in North America. Since 1980s, many researchers, clinicians and academicians started to pay attention to massage for pre-term and term babies<sup>4, 5</sup>. Many literatures reported that growth and development of term and preterm babies as a result of baby massage<sup>6-9</sup>. Moderate pressure stroking as well as the flexion and extension of the upper and lower extremities in baby massage could increase bone mineral density and improve bone growth<sup>10</sup>.

Indonesian cultures have recognized traditional massage for an infant for more than a decade and most of them have been done by Traditional Birth

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Attendants (TBAs). To the present, Indonesia becomes more interested in modern infant massage. Some health professionals have been implementing it for recent years. Nevertheless, to the present, there is no national guideline on baby massage. In addition, less is known about the effect of infant massage to baby growth with full-term babies in Indonesia. Thus, the aim of this study was to explore the effect of baby massage to growth among babies with normal birth weight.

The present study focuses on baby aged 3 to 6 months old as it is the period of time for baby growth. It is important to seek a treatment in optimizing baby growth in order to prevent growth delay. We assessed the effect of baby massage in autonomous midwifery practices and integrated service post (in Indonesian: Posyandu) in Malang Regency using quasi-experimental design. Malang is a homogenous population regency in Indonesia where baby massage is popular and usually given by TBAs. Lessons about in this study are relevant to others who look for a treatment for optimizing baby growth.

## Method

**Design:** The research used quasi experiment, with the pre-test post-test with control group design. The population in this study was 3-6 months old healthy babies in 1 integrated service post (in Indonesian: Posyandu) and 5 autonomous midwifery practices in Malang regency, totaling 30 babies. The sample of the study was 30 babies who were divided into 2 groups of observations, i.e. the control group and the experimental group. The first group was a control group or infants without massage treatments consisting of  $n = 15$  infants and another group as a massage experimental group consisting of 15 infants. The total of respondents in the study was limited because the baby in the regency generally had been received a massage by health care professional or Traditional Birth Attendants (TBAs) before they turned to 3 months old.

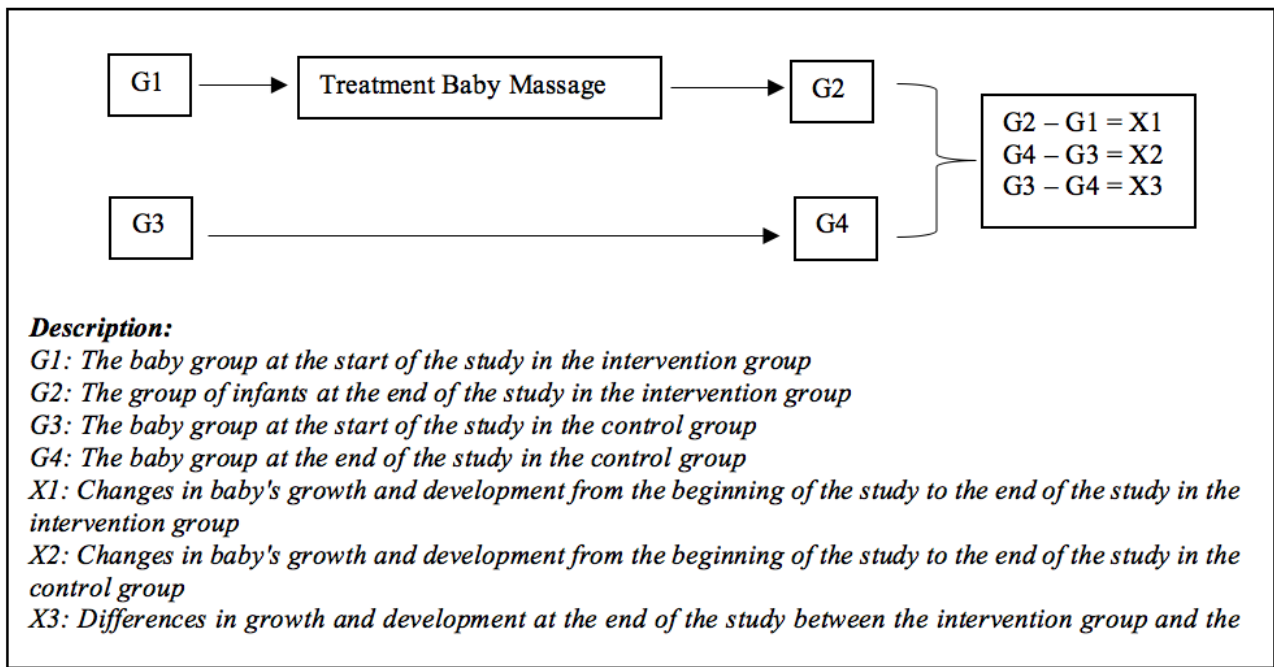
**Sample:** The respondents were selected using consecutive sampling method. The samples were matched on their characteristics, such as age, sex, number of siblings and characteristics of parents. The samples,

moreover, were divided into two groups randomly. The odd sequence numbers were the group receiving massage therapy (the experimental group) while the even numbered numbers were the group that did not receive massage therapy (the control group). Hence, 15 babies would be treated and 15 babies would be used as controls. The inclusion criteria in this study were full-term healthy infants with exclusive breastfeeding while the exclusion criterion was the baby who had congenital abnormalities and received baby massage.

## Data collection

We asked midwives in integrated service post and autonomous midwifery practices to select respondents who met the inclusion criteria. At the first meeting, we measured infants' weight, length, head circumference and chest circumference which the results were recorded in notes. We used baby weight scale for weight measurement, infantometer for length measurement and midline for head circumference and chest circumference measurement. We, subsequently, taught the mothers by demonstrating the baby massage. The massage was performed by the team who were lecturer midwives and student midwives from Universitas Brawijaya who had been trained of baby massage. The steps of baby massage followed the standardized standard operational procedure of baby massage by the Indonesia Holistic Care Association (IHCA)<sup>11</sup>.

After the demonstration, we let the mothers performing the baby massage directly to their baby. In the process, the mothers were observed by the team. After the meeting, we provided the mothers a leaflet containing the steps of baby massage and asked them to do a baby massage twice a week for a month. We reminded them to do the massage by a phone call. In the process of massage, the team observed the mother while performing the massage to ensure the steps and techniques. In the duration of research, the mothers were encouraged to not massage the baby by other people, including health care professionals and TBAs in order to prevent bias. In general, every baby received approximately 15 to 30 minute massage in one time massage. After receiving massage for one month, the four criteria of growth were remeasured by the team.



**Figure 1. Design of the study**

**Data Analysis:** Data were analyzed using SPSS for Windows version 25 and presented descriptively to indicate means and standard deviations. Independent sample t-test was used to analyse the difference (deviation) in the variables studied in the control group and the experimental group. Finally, to measure the effect of baby massage to variables studied, we used Eta-squared test<sup>12</sup>. All parents of the respondents agreed to participate in the research by signing informed consent form. Informed consent was obtained from all parents and each experimental group parent was provided with a leaflet on baby massage steps.

**Results**

**Parent Characteristics:** The observed characteristics of the baby's parents consisted of the mother's age, mother's occupation, mother's education

level, mother's parity number, father's age, father's occupation, father's education level and parents' income level. The characteristics of the parents chosen were similar after the characteristics of the baby were matched.

The table 1 reveals that the distribution of mother's age data between the control group and the experimental group are similar. With regard to parents' age data, the mothers' and fathers' age of the experimental group is older than the age of the control group. The data on the types of mothers' work are spread almost equally and evenly between the two groups while father's occupation types show exactly the same between the two groups. In terms of parents' education, fathers' and mothers' education data are spread almost equally and evenly. This is also the same with parity data and income level that are spread almost equally and evenly.



**Table 1. Parents characteristics**

V a r i a b e l	Parents group	
	Control	Experiment
Mother's age (years old)	26.4±5.9	29.4±5.3
Father's age (years old)	29.6±4.8	34.1±5.2
Mother's occupation:		
<i>Unemployment (housewife)</i>	10	10
<i>Private</i>	5	2
<i>Entrepreneur</i>	0	3
Father's occupation:		
<i>Private</i>	13	13
<i>Entrepreneur</i>	2	2
Mother's highest educational level:		
<i>Primary</i>	2	1
<i>Junior high school</i>	5	5
<i>Senior high school</i>	7	8
<i>University</i>	1	1
Father's highest educational level:		
<i>Primary</i>	1	2
<i>Secondary</i>	3	3
<i>High school</i>	9	8
<i>University</i>	2	2
Parity (number of delivery):		
<i>1</i>	8	5
<i>2</i>	6	8
<i>3</i>	1	2
Income per month (Indonesian Rupiah) :		
<i>&lt;2.000.000</i>	5	9
<i>2.000.000 - 2.500.000</i>	9	2
<i>2.500.000 - 3.500.000</i>	0	2
<i>&gt; 3.500.000</i>	1	2

**Baby Characteristics:** The characteristics of the observed infants consisted of the age of the baby, sex and number of siblings. The selection of research subjects was based on the similarity or compatibility of the three characteristics.

**Table 2. Infant characteristics**

Variabel	Infant group	
	Control	Experiment
Infant's age (months old)	3.53±0.8	3.53±0.8
Number of siblings:		
0	8	6
1	6	7
2	1	2
Sex :		
Male	8	8
Female	7	7

Table 2. shows that baby age data in the control group and experimental group with mean ± stan.dev is 3.53 ± 0.8 months showing the age of infants spread between 2.73 months and 4.33 months. Data on the number of siblings in the control group and experimental group is spread almost equally and evenly while the sex data in the control group and the experimental group are

the same, consisting of 8 babies (53.33%) and 7 babies (46.67%).

**Effect of infant massage on growth of 3-6 month infants:** The study used an independent t-test to determine whether there was a difference in infant growth before and after the infant massage in the experimental group and the control group.

**Table 3. Before and after the infant massage**

Variable	Group	Before treatment (x <sub>1</sub> )	After treatment (x <sub>2</sub> )	p-value (x <sub>2</sub> -x <sub>1</sub> )	η <sup>2</sup> (Eta-squared)
Body length	Control	60.87±3.96	63.27±4.71	0.35	0.03
	Experiment	59.60±3.51	62.70±3.93		
Weight	Control	6246.7±946.3	6763.3±944.1	0.04	0.14
	Experiment	6100±920.4	6986.7±1080.3		
Chest circumference	Control	40.47±2.68	41.77±2.60	0.46	0.02
	Experiment	40.80±2.49	42.43±3.01		
Head circumference	Control	40.10±2.02	41.23±1.94	0.86	0.00
	Experiment	40.12±1.23	41.32±1.68		

Table 3 shows that he growth of infants in the intervention group and the control group, the t-value was 0.35 for body length, 0.04 for body weight, 0.46 for chest circumference and 0.86 for head circumference. P-value calculated was used to assess the value of the effectiveness of a treatment using Eta-squared test. The value of Eta-quared test in this study is 0.03 for the body length category, 0.14 for the weight category, 0.02 for chest circumference and 0.00 for head circumference. Thus, baby massage has a small effect for the growth of body length, chest circumference and head

circumference. In addition, baby massage has a great effect for infants growth.

**Discussion**

This study found that there was a great effect for weight gain among babies aged 3 to 6 months who received regular baby massage. Several studies also confirm that baby massage supports weight gain and growth in term babies<sup>6,13,14</sup>. The findings of experimental study confirm that 6 week baby who received four week

massage increased in weight gain<sup>6</sup>. Another experimental also found that baby massage supports weight gain among five- to ten-week term neonates born from HIV mothers who who were massaged a week for ten weeks<sup>14</sup>. A study found that weight gain after receiving baby massage might be because of variety of massage parts and the longer massage duration<sup>15</sup>. Baroreceptors are innervated by tactile stimulation that release food absorption hormones and increase insulin level<sup>16-17</sup>. As a result, it stimulates vagal activity that supports preterm infant weight gain<sup>16-17</sup>. Better food absorption due to increased activity of *nervusvagus* causes the baby to feel hungry fast, so that the baby will suckle the breast milk more often<sup>18</sup>.

We found that infant massage only had a slight effect on the growth of the baby's length. The growth of infant length in the two groups is in accordance with the growth curve of the National Center for Health Statistics (NCHS), where the curve shows body length increased approximately 1 inch (2.5 cm) every month for the first 6 months. A study reported a more significant growth in length in the group treated with infant massage with a longer duration of treatment and more frequent of measurements in the study<sup>13</sup>. Growth in length occurs due to changes in cartilage to hard bone<sup>18</sup>. At the beginning of infant growth, more *osteoblasts* are formed than *osteoclasts*, both of which are influenced by growth hormones. The growth hormones can be stimulated through infant massage therapy, with baby massage treatments causing secretion of serotonin. In infant physiology, it is mentioned that serotonin secreted by the nervous system in the *hypothalamus* will increase the speed of growth hormone secretion<sup>18</sup>. Reducing tactile sensation will increase *beta-endorphine neurochemical* release which will reduce the formation of growth hormone due to decreased amount and sensitivity of ODC (*Ornitin Decarboxilase*) tissue activity<sup>18</sup>. ODC only responds actively to stimulation, so touch stimulation or baby massage will help the responsiveness of ODC<sup>18</sup>.

The mean of chest circumference in the experimental group was greater than the mean of the control group, yet it had a small effectiveness value. These finding is similar with a study discovering that when baby turned to 3 months old, only a few variables could affect the growth of chest circumference<sup>19</sup>. Prenatal life and early baby's life are most of the factors that can affect chest circumference<sup>19</sup>. The results of measurements on head circumference showed no significant growth between the experimental group and the control group. This

means that baby massage did not increase infants' head circumference. Predisposing factors of a baby's head circumference have been widely studied, maternal age, height, weight gain during pregnancy, socioeconomic background, lifestyle and environmental exposure were identified as significant factors.

Our study explored the effectiveness of baby massage in homogenous populations and discovered that baby massage supports growth of babies aged 3 to 6 months. Yet, we acknowledge that our study has limitation. Our findings maybe influenced by the babies who dropped out from exclusive breastfeeding. It could shows that although there were babies in the experimental group stopped receiving exclusive breastfeeding, their growth increased significantly compared to those who were not massaged.

## Conclusion

Stimulation of infant massage at 3-6 months old had an effect on increasing in infant growth, such as weight, length, chest and head circumference. Suggestions are given for further researchers to increase the number of samples; extend the duration of the study; examine more closely the factors related to the growth and development of infants such as: hormonal, genetic, parenting, nutritional patterns (both mother and baby), rest patterns (sleep quality) and patterns of infant activity; and do more infant massage stimulation. With the frequency of massage more often by parents, it is expected that the increase in growth and development in infants is more significant, besides bonding attachments between parents and babies will be formed properly.

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**Abbreviations:** Posyandu: Pos pelayanan terpadu (integrated service post).

**TBA:** Traditional Birth Attendant

**Conflict of Interest Statement:** The authors declare that there is no conflict of interest.

**Source of Funding:** the Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia.

**Ethical Clearance:** taken from the Ethics Committee (No. 236/EC/KEPK/05/2016), the Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia.

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# The Outcome of Myringoplasty with and without Cortical Mastoidectomy Comparative Study between Elastic Nail Versus Plates and Screws in the Treatment of Diaphyseal Both Bone Forearm Fracture in Children

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## Abstract

**Objective:** Evaluate the outcome of myringoplasty with and without cortical mastoidectomy regarding the graft take and hearing improvement in none-cholesteatomatous chronic suppurative otitis media.

**Materials and Method:** This prospective study was done on 50 patients who suffered from long-standing perforation of the tympanic membrane. Among these patients who underwent surgery 34 patients were subjected to myringoplasty with cortical mastoidectomy (Group I) and in the remaining 16 patients had myringoplasty alone (Group II).

**Results:** The hearing gain (dB) in myringoplasty combined with cortical mastoidectomy in (group I) after 6 months was (16.03) dB and in (group II) who underwent the only myringoplasty was (15.31) DB. Overall Graft uptake was 88.0 %. Although myringoplasty with cortical mastoidectomy was better than a group of myringoplasty alone in hearing improvement and graft take the differences between the two groups were statistically not significant. Age, sex and the side of perforation had no bearing on graft take in this study.

**Conclusion:** Myringoplasty is an effective method for closure of the tympanic membrane perforations and for hearing improvement.

**Keywords:** Myringoplasty, Cortical mastoidectomy, Graft uptake, Hearing improvement, tympanic membrane.

## Introduction

Tympanic membrane (TM) perforation represents a defect in the function and integrity of the eardrum that needs repairing in most cases as it may lead to significant

morbidity like hearing loss, recurrent otorrhea, middle ear infection<sup>1</sup>. Although most acute TM perforations heal spontaneously, large or chronic TM perforations, especially from chronic suppurative otitis media, always fail to heal and require grafting<sup>2</sup>.

Myringoplasty is the surgical procedure used to reconstruct the perforated tympanic membrane without dealing with any pathology in the middle ear cleft, such as chronic infection, cholesteatoma, or problems with the ossicular chain<sup>2</sup>.

Different graft materials and techniques have been described like temporalis fascia, perichondrium, periosteum, vein, duramater and cartilage<sup>3</sup>.

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The most commonly used grafting material is temporalis fascia because of its accessibility at the surgical site. Although, in situations such as advanced middle ear pathology, large perforations, atelectatic ears or retraction pockets, temporalis fascia may cause lower success rates regardless of the surgical technique used<sup>4</sup>.

On the other hand, the cartilage is found to be resistant to; the retractions, middle ear pressure and infections during the healing period due to its rigidity and stiffness, as well as it is assumed to be minimally contributive to the inflammatory tissue reaction due to lack of capillary feed and is well incorporated with tympanic membrane layers<sup>5</sup>.

In cartilage myringoplasty, the graft material can be harvested from tragus, concha, crus of the helix, or costal cartilage. Cartilage for myringoplasty is prepared by several method like perichondrium/cartilage island graft, cartilage shield, palisade, inlay butterfly graft and others.<sup>6</sup>

Myringoplasty can be performed through many techniques but the most used are; overlay technique (lateral grafting); graft put lateral to the remaining tympanic membrane, underlay technique (medial grafting); graft put medial to tympanic sulcus and lateral to the malleus handle and<sup>7</sup>.

The aim of the current study to assess the final outcome of myringoplasty with and without cortical mastoidectomy regarding the graft take and hearing improvement in none-cholesteatomatous chronic suppurative otitis media.

## Method

**Study setting and time:** This study was carried out during the period from July 2017 till July 2018 at otolaryngology department, at Rizgary Teaching Hospital/Erbil.

**Study Design:** Prospective randomized comparative study.

**Patients:** This study included 50 patients in which 34 patients underwent tragal cartilage myringoplasty with cortical mastoidectomy (Group I) and 16 patients underwent tragal cartilage myringoplasty alone (Group II).

### Inclusion Criteria:

1. More than 14 years

2. Dry perforation for 3 months at least
3. Chronic perforation of the tympanic membrane, the perforation was medium to large size central perforation
4. Tubotympanic type of CSOM
5. Ct-scan of temporal bone revealed a well-pneumatized mastoid and middle ear included in the study.

### Exclusion Criteria:

1. less than 14 years
2. Persistent discharging ear or CT-scan show the feature of possible cholesteatoma
3. Marginal or attic perforation
4. Associated otitis externa
5. Previous mastoid operation
6. Diabetes mellitus
7. Patients that were lost in the post-operative follow-up
8. Ossicular chain problem
9. Patient with sensorineural hearing loss
10. Suspected Eustachian tube dysfunction with severe septal deviation and persistent Allergic Rhinitis.

**Pre-operative Planning:** The examination begins with an inspection of the auricle for any scar, sign of inflammation, perichondritis or discharge. Microscopic ear examination to evaluate tympanic membrane perforations size, site and state of remainder of the tympanic membrane if there is any tympanosclerosis.

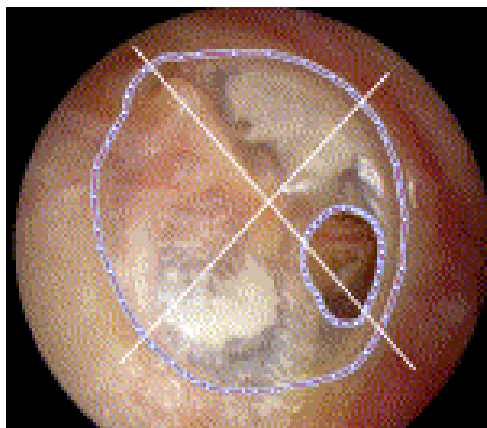
Size of perforations according to the surface area of the perforated tympanic membrane. The sizes of the perforations were graded according to the surface area of the perforated tympanic membrane, in which ( $\leq 25\%$ ) considered small size, (26%-50%) considered as medium size perforations, while (51%-100%) regarded as large size one.

Endoscopic images were taken for each TM perforation by a digital camera and using a 4 mm diameter, 0-degree angulation endoscope (Karl Storz, Germany) connected to a Sony TV screen. By using Adobe acrobat 8 professional software which computes the surface area of the perforation separately then the surface area of the whole TM. The percentage of the perforation was calculated by the equation:

**TM area** = 9644.03 mm<sup>2</sup> and **perforation area (Pa)** = 782.34 mm<sup>2</sup>

The percentage of the perforation area = 100 x Pa/ TM area = 8.1%

This perforation is classified in the grade I (small perforation = perforation less than 25% of the TM surface).



**Figure 1: Percentage of TM perforation**

**Hearing Assessment:**

The preoperative hearing level was assessed using:

- Tuning fork 512 Hz (Rinne and weber’s test)

- Pure tone audiometry to evaluate the air-bone gap and bone conduction depending on the following frequencies (500, 1000, 2000, 4000 Hz) all of the results were recorded to evaluate the air-bone gap of each side. and a minimum hearing improvement of 10 dB was regarded as an audiological success.

**Tragal cartilage harvesting:** After an injection to the tragus, a small incision is made on the medial aspect of the tragus, both sides of the tragal cartilage dissected using curved scissors leaving perichondria on both sides of cartilage than a large part of cartilage together with perichondrium are resected.

**Postoperative Outcome:** Successful operation (regarding graft) was considered if the graft was still in situ with the absence of residual perforation. Operation failure was labeled if the graft was rejected or residual perforation was present after 6 months. Hearing improvement was achieved if there was a hearing gain for at least more than 10 dB by comparing it to the mean of the air-bone gap of the preoperative results.

**Statistical Analysis:** All analysis carried out using the chi-square test, or independent t-test and SPSS version 20.0 was used to perform the analysis

**Results**

**Table 1: Assessment of demographic and clinical data**

Variables	Group I	Group II	p-value
Number	34	16	
Age (years), mean ± SD	30.21 ± 8.78	31.38 ± 9.87	0.675
<b>Gender, n (%)</b>			
Female	22 (64.7%)	7 (43.8%)	
Male	12 (35.3%)	9 (56.3%)	
<b>Side of perforation, n (%)</b>			0.960
Right	13 (38.2%)	6 (37.5%)	
Left	21 (61.8%)	10 (62.5%)	
<b>Size of perforation, n (%)</b>			0.175
Medium	12 (35.3%)	2 (12.5%)	
Large	22 (64.7%)	14 (87.5%)	
<b>Site of perforation, n (%)</b>			0.727
Anterior	26 (76.5%)	14 (87.5%)	
Posterior	6 (17.6%)	1 (6.3%)	
Subtotal	2 (5.9%)	1 (6.3%)	

**Table 2: Assessment of postoperative outcomes**

Outcomes	Group I	Group II	p-value
Number	34	16	
<b>Graft uptake after 3 months</b>			0.699
Take	29 (85.3%)	13 (81.2%)	
Failure	5 (14.7%)	3 (18.8%)	
<b>Graft uptake after 6 months</b>			0.999
Take	30 (88.2%)	14 (87.5%)	
Failure	4 (11.8%)	2 (12.5%)	
<b>Discharge ear</b>			0.650
No	31 (91.2%)	14 (87.5%)	
Yes	3 (8.8%)	2 (12.5%)	

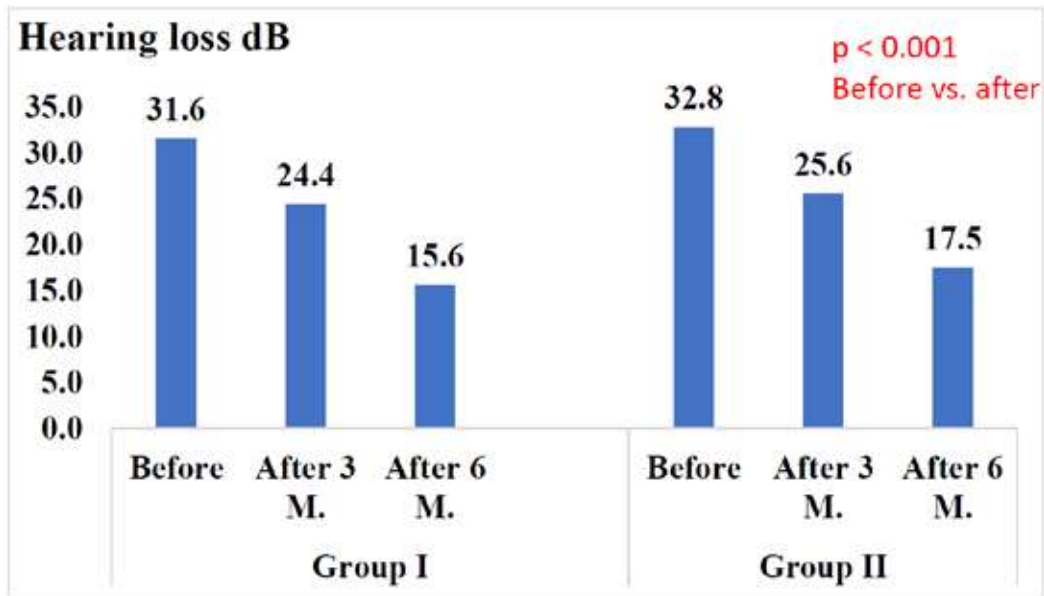


Figure 2: Hearing loss before and after the intervention in each of the two groups

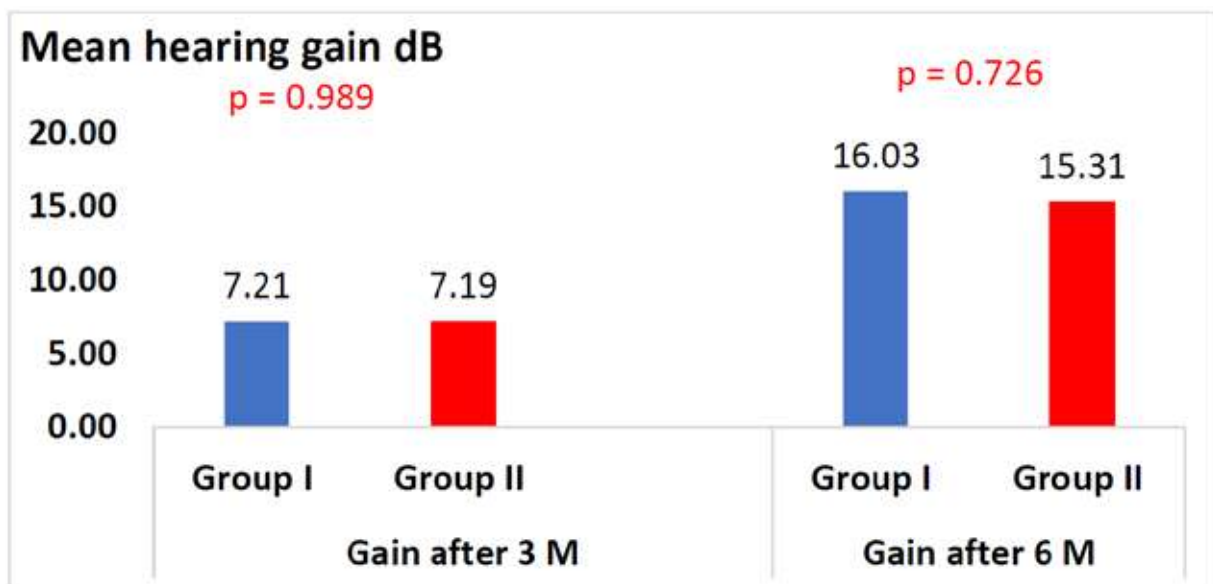


Figure 3: The hearing gain in each of the two groups, 3 and 6 months after the operation



**Table 3: Mean hearing gain by graft uptake, three and six months after the operation**

	Graft uptake		p-value
	Take	Failure	
<b>After 3 Months</b>			
Group I	7.59 ± 3.92	5.0 ± 3.54	0.178
Group II	7.31 ± 5.25	6.67 ± 2.89	0.844
<b>After 6 Months</b>			
Group I	18.0 ± 4.07	1.25 ± 2.5	<0.001
Group II	16.79 ± 5.75	5.0 ± 0.01	<0.001

## Discussion

Regarding the side of perforation in this study, the left-sided ear was found to be affected in 31 cases (62.0%) and the right side was affected in 19 cases (38.0%) and this side predominance could not be explained. This was in agreement with Nagle et al, perforation was more on the right side<sup>8</sup>.

There was a high prevalence of large perforation (72.0%) in subjects. This was in agreement with Vybhavi et al study in which most of the patients had a large central perforation in both groups 50% in the group of myringoplasty and 56.66% in the group of myringoplasty with cortical mastoidectomy<sup>9</sup>. This was contrary to another study done by Biswas *et al* medium-sized perforation was commonest one<sup>10</sup>.

The site of perforation was highly prevalent in anterior (80%) with no significant differences between the two groups. Site is one of the factors contributing to graft failure, (anterior superior perforations) has more incidence of graft failure. This may be due to technical difficulty with anterior perforation.

Total success rate in our study was 88% which was higher in group I (88.2%) than group II (87.5%) the differences was statistically not significant, this was comparable to Doifode et al study<sup>11</sup> and Vybahvi et al<sup>9</sup> in which they observed success rate of 92% and 86.6% for myringoplasty with cortical mastoidectomy compared to 79% and 93.3% for myringoplasty alone, however, the result was statistically not significant.

While graft success rate was higher than Bhat et al<sup>12</sup> and Albu et al<sup>13</sup> in which they observed a success rate of 82.85% and 82.8% for myringoplasty with cortical mastoidectomy compared to 75% and 76% for myringoplasty alone. However, the result was non-significant between the two groups.

Regarding hearing improvement in our study, the mean of overall hearing gain in dB of the whole sample was 16.2. The present study revealed that in group I pre- and postoperative pure tone average was 31.62 and 15.59 respectively and this was statistically significant. While in group II pre- and postoperative pure tone average was 32.81 and 17.50 respectively and this was statistically significant. But when these values are compared between the two groups, it was non-significant.

In Toroset al study the mean hearing gain was higher in the group of myringoplasty alone  $10.52 \pm 10.49$  as compared to the group of myringoplasty with cortical mastoidectomy  $9.66 \pm 9.0$  and the difference was not statistically significant<sup>14</sup>.

In Vybavi et al study the mean pre- and postoperative pure tone average was  $42 \pm 10.43$  dB and  $34.9 \pm 9.94$  dB in the group of patients who underwent myringoplasty with cortical mastoidectomy with a mean hearing gain of  $7.1 \pm 8.85$  dB. The mean pre- and postoperative pure tone average was  $42.4 \pm 10.53$  dB and  $32.8/13.02$  dB (inpatient underwent myringoplasty alone) with a mean hearing gain of  $9.5 \pm 11.33$  dB, no statistical significance between two groups<sup>9</sup>.

Kawatra et al reported mean change in the air-bone gap was slightly higher in the group of myringoplasty with cortical mastoidectomy  $10.13 \pm 6.65$  as compared to group II of myringoplasty alone  $9.75 \pm 5.99$ <sup>15</sup>.

Agrawal et al stated that the hearing improvement was 12.5 dB in patients who underwent myringoplasty with cortical mastoidectomy and it was 9.41 dB in the group of patients who underwent myringoplasty alone<sup>16</sup>. Their result of hearing gain was lower than the present study.

Graft failure in our study was seen in 6 years 12%. the graft failure rate in group I was 4 (11.8%), whereas in

group II was 2 (12.5 %) but it is not significant. A study done by Tawabet al included 40 patients. The failure rate was 25% which was higher than ours, in a group of myringoplasty with cortical mastoidectomy failure rate was 4(20%) while 6(30%) in the group of myringoplasty alone. They emphasize that overall satisfactory hearing outcome with air-bone gap closure can be achieved irrespective of cortical mastoidectomy in the surgical treatment of tubotympanic disease<sup>17</sup>.

### Conclusion

The study showed that myringoplasty with and without cortical mastoidectomy carries similar surgical success, there was no significant difference between them. The hearing gain was significant for both myringoplasty with cortical mastoidectomy and myringoplasty alone and the differences between these two groups were not significant.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent was obtained from all the participants in the study and the study and all its procedures were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by the Iraqi Board of Medical Specializations.

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# Determinants of Unmet Need for Family Planning among Married Women Age 15-49 in Sumatera Utara Province (Analysis of 2017 RPJMN Data)

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## Abstract

Unmet need is still a serious problem that has relevance to development in the field of population. The Indonesian Demographic and Health survey shows the percentage of unmet need for family planning increased in 2017 by 11%. This analysis aims to find out the important determinants that contributed to unmet need for family planning in Sumatera Utara Province.

The analysis used secondary data from 2017 National Mid-Term Development Plan (RPJMN) Data carried out by National Population and Family Planning Board (BkkbN). The population in this analysis are all married women of childbearing age and the samples are married women of childbearing age who did not use contraception. The dependent variable is unmet need and determinant variables are socio-demographic characteristics (age, education, occupation, wealth quintile, number of living children and residence), knowledge of contraceptive method and service delivery factors namely exposure to family planning information and family planning officers visit.

There are 795 women childbearing age who do not use contraception as many as 37.5% have unmet need (9.6% of unmet need for spacing pregnancy, 27.9% of unmet need for limiting pregnancy). Thus, 1 out of 6 married women has unmet need. Variables of women's age, number of children still alive, knowledge, family planning officers visit are important determinants that contributed to unmet need for family planning in Sumatera Utara Province with the most contributed variable is age. Communication, Information and Education (IEC) efforts need to be improved on married women using mass media and family planning officers visit. Collaborating with local community and traditional leaders in the paradigm shift about the number of children are important part in reducing unmet need for family planning in Sumatera Utara Province.

**Keywords:** *Unmet need, married women, number of children, knowledge, officers visit.*

## Introduction

Sumatera Utara Province in 2017 has a population

of 14,262,147 and with the population growth during the period 2000-2010 is 1.22 percent per year<sup>1</sup>. The trend of the Total Fertility Rate (TFR) projection shows a decline from 3.00 in 2012 to 2.79 in 2017<sup>2</sup>. The results of the 2017 RPJMN survey report a TFR of 2.66 in Sumatera Utara Province and a prevalence of 52.3% in the use of contraceptive method among women of childbearing age, which do not meet the 2017 national target of 2.33 for TFR and 60.9% for contraceptive prevalence established by BkkbN<sup>3</sup>. The decrease in TFR is not followed by a significant decrease in unmet need,

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which actually increased from 10.2% in 2012 to 25.3% in 2017<sup>4</sup>.

Unmet need is a need for contraception that is not fulfilled. Women of childbearing age are said to be unmet need if they want to delay pregnancy or end pregnancy for the next two years but they do not use contraception<sup>5</sup>. The high number of unmet need influence the tight birth spacing and the high number of children born so that there is a high risk of maternal and infant mortality<sup>5</sup>.

The 2017 Indonesian Demographic and Health Survey (IDHS) of Sumatera Utara Province reports the level of unmet need for family planning decreased from 13% in 2012 to 11%. There are several different characteristics between provinces in Indonesia that affected the magnitude of unmet need for family planning<sup>5,6</sup>.

The high number and population growth will be a big problem if it is not addressed immediately. In 2015-2020 the population growth of Sumatera Utara Province is projected at 1.08%<sup>2</sup>. Such population growth is caused by the high rate of TFR. The 2017 IDHS includes Sumatera Utara's TFR of 2.9 children per woman during their lifetime. Even rural women have a higher TFR of 0.7 than women in urban areas<sup>6</sup>. The high TFR is caused by the high rate of unmet need for family planning in Sumatera Utara Province, 11% in 2017<sup>6</sup>. Besides being able to increase TFR, unmet need can result a decrease in contraceptive prevalence rate (CPR), which has risen only 3% from 2012-2017<sup>6</sup>. This analysis aims to understand the important determinants of unmet need for family planning in Sumatera Utara Province.

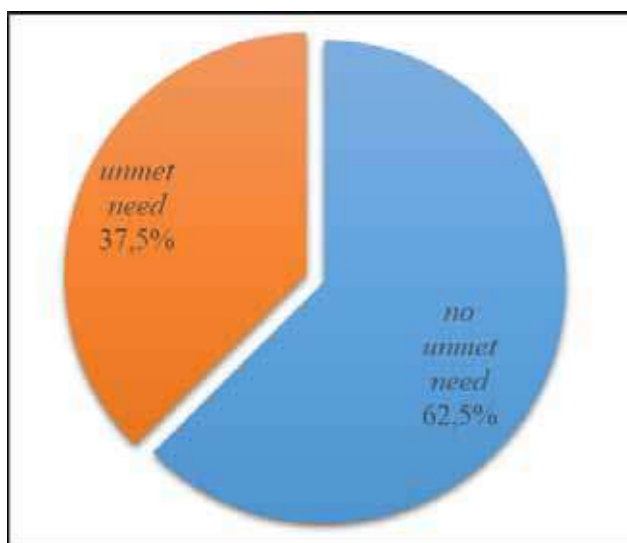
## Materials and Method

This survey uses a cross-sectional design. The population are married women who have given birth. The sample are women of childbearing age (WUS) 15-49 years old, married and designed to represent 33 districts/cities in Sumatera Utara Province. The sample size used is 795 married women of childbearing age (WUS) who do not use a contraceptive device in 78 clusters. The sample frame is a list of villages throughout Indonesia, equipped with urban/rural classification. The sampling design used is a two-stage sampling: Stage 1: A number of villages as clusters are selected by Proportional Probability to Size (PPS) sampling with the number of households. Stage 2: 35 households are selected by systematic random sampling. Data collection is carried out from April to June 2017.

Weight is calculated as a result of using the cluster sampling method at the time of the selection of research samples during data collection. Weight is normalized first so that the number of respondents analyzed do not experience swelling<sup>7</sup>.

## Result and Discussion

**Description of Unmet Need:** The analysis shows that of the 795 women of childbearing age (WUS) who do not use contraception as much as 37.5% experienced unmet need (Figure 1), 9.6% experienced unmet need for pregnancy spacing, 27.9% for pregnancy restriction. Thus, 1 out of 6 married women of childbearing age (WUS) experiences unmet need. Using a revised definition of unmet need, another analysis in Burundi in Central Africa also estimates unmet need at 32.4%<sup>8</sup>. This result is apparently greater than the national unmet need results of the 2017 IDHS results of around 11%<sup>6</sup>. The findings reveal that the number of unmet need for married women of childbearing aged 15-49 years in Sumatera Utara Province is lower than that of in Dang District of Nepal (49%), but higher than that of 26% in Klabang Sub-District Bondowoso Regency East Java and in the South Sulawesi Province at 14.3%<sup>9</sup>.



**Figure 1. Percentage of Unmet Need in Sumatera Utara Province in 2017**

**Cross tabulation of social demographic with unmet need:** As it is shown in Table 1, respondents aged 15-19 years have a risk of 2.78 times experienced unmet need greater than respondents who are > 35 years old. In Yogyakarta, respondents aged 16-34 years have a tendency of 1.626 times higher to experience unmet need compare to respondents aged 35-49 years. While in

Nusa Tenggara Timur (NTT), respondents aged 16-34 years have a tendency to 1,266 times higher to experience unmet need than respondents aged 35-49 years<sup>10</sup>.

Respondents who worked have a risk of 1.14 times greater to experience unmet. Consistent with the research conducted in West Padang<sup>11</sup>. Awareness of mothers who did not work for family planning is based on their low economy, so they think about regulating the number of births. The respondents with the fourth wealth quintile have a risk of 2.04 times greater to experience unmet need than the lowest respondents. Respondents have more than 2 children alive are 1.24 times more likely to experience unmet need. In Yogyakarta and NTT respondents with 3 children still alive or more, most experienced unmet need (respectively 1,848 times and 1,636 times)<sup>10</sup>. Same as the research conducted in Klabang District, women have 3-4 children are 5.4 times more at risk (95% CI: 0.99-29.60) to experience unmet need. The more children they have, the more likely a woman have exceeded her desired fertility preference, because she have unmet need<sup>9</sup>.

**Cross tabulation of knowledge about contraception with unmet need:** Respondents have poor knowledge are 1.69 times more likely to experience unmet need. A person's knowledge is the result of human sensation, or the result of knowing someone to a particular object through their senses (in this analysis in the form of a sense of hearing)<sup>10</sup>.

**Cross tabulation of contraceptive service providers with unmet need:** Respondents who are exposed to mass media have experienced 1.39 unmet need. Respondents visited by family planning officers are 3.03 times more likely to experience unmet need.

From Table 2 as a result of multivariate analysis, respondents aged 15-19 years have a tendency to experience unmet need 12.5 times higher than respondents aged 36-49 years after being controlled by number of children still alive, knowledge, media exposure and officer visits. Respondents aged 36-49 years will have the possibility of unmet need 0.08 times less than respondents aged 15-49 years. Consistent with the analysis in Burundi Central Africa showed the possibility of unmet need will decrease with increasing age<sup>8</sup>. The findings in Kenya also showed that respondents aged 35 years and over tend to experience unmet need 0.343 times less than respondents ages 15-19 years<sup>12</sup>. Respondents with the number of children 3 or more have a probability of 1.69 times unmet need. The analysis also

reveals that unmet need have a protective relationship with well-informed respondents [aOR = 0.47 (0.33 - 0.67)], respondents with poor knowledge have 2.13 times the possibility of unmet need.

Respondents who are exposed to the media have a 1.39 times unmet need. Respondents in Yogyakarta who are not exposed to mass media access and have poor knowledge tended to experience unmet need 3,640 times after being controlled by education, number of children still alive, female autonomy, media access, knowledge and age<sup>10</sup>.

The opportunity for unmet need for respondents who are not visited by Family Planning officers [aOR = 0.21 (0.13 - 0.35)] meant that respondents visited by officers have a 4.76 chance times unmet need. Relevant with findings in Ciawi Gebang, although the approach is different. Respondents received family planning counseling have 2.50 times unmet need after being controlled by the husband's knowledge and husband approval variables (95% CI 1.09 - 5.77)<sup>13</sup>.

Many factors associated with unmet need for family planning such as a lack of understanding of the risks of pregnancy, potential side effects and health concerns, lack of exposure to the risk of pregnancy, a prohibition on using contraception, did not want to be busy, also subjective experience that pregnancy would not occur without contraception<sup>14</sup>. Empirical evidence in Nusa Tenggara Barat showed that unmet need related to factors of age, parity, education, husband's education, economic status and family planning officers visit<sup>15</sup>.

Respondents who have 3 or more children tended to be 1.69 times higher to experience unmet need. The results indicated that the more children, the higher the unmet need. In Yogyakarta respondents who have 3 children or more tend to be 2.779 times higher to experience unmet need while in NTT tend to be 2.036 times<sup>15</sup>. The more the number of children alive, the more women tend to reach the desired family size and thus wish to limit further childbearing<sup>16,17</sup>.

Respondents with poor knowledge have greater unmet need events (2.13 times). In line with the results of the analysis of Putri (2013) and Hamid (2002) where respondents with poor knowledge are at greater risk of experiencing unmet need (respectively 1.59 times and 4.33 times)<sup>18,19</sup>. The research consistent with other studies from low-income countries such as West Bengal, India, Pakistan and Eritrea (a country located in northeastern Africa)<sup>20,21</sup>.

**Table 1: A bivariate analysis of determinants of unmet need for family planning in married women aged 15-49 years in Sumatera Utara Province**

Determinant	Unmet need		No unmet need		OR (95% CI)	P
	F	%	F	%		
Social demography						
Age (years)						
15 – 19	8	61,5	5	38,5	1	0,168
20 – 35	134	38,3	216	61,7	0,39 (0,13 – 1,21)	
> 35	156	36,1	276	63,9	0,36 (0,12 – 1,09)	
Education						
Higher	136	37,7	225	62,3	1	0,953
Primary	163	37,5	272	62,5	1,01 (0,76 – 1,35)	
Occupation's status						
Does not work	182	38,7	288	61,3	1	0,385
Work	116	35,7	209	64,3	1,14 (0,85 – 1,53)	
Wealth quintile						
Lowest	30	28,0	77	72,0	1	0,118
Second	57	35,0	106	65,0	1,41 (0,83 – 2,40)	
Middle	75	39,7	114	60,3	1,73 (1,03 – 2,89)	
Fourth	63	43,8	81	56,3	2,04 (1,19 – 3,49)	
Highest	74	38,3	119	61,7	1,62 (0,97 – 2,70)	
Number of children still alive						
<= 2 children	137	39,5	210	60,5	1	0,160
> 2 children	157	44,7	194	55,3	1,24 (0,92 -1,68)	
Residence						
Urban	149	60,5	228	39,5	1	0,279
Rural	150	38,8	269	64,2	0,85 (0,64 – 1,14)	
Knowledge						
Poor	96	30,3	221	69,7	1	0,001
Good	202	42,3	276	57,7	0,59 (0,44 – 0,80)	
Service provider						
Exposure to mass media						
No	92	32,6	190	67,4	1	0,036
Yes	206	40,2	307	59,8	10,72 (0,53 – 0,98)	
Officer visit						
Yes	24	18,9	103	81,1	1	< 0,001
No	275	41,2	393	58,8	0,33 (0,21 – 0,53)	

**Table 2. Final results of multivariate analysis of determinants of unmet need in Sumatera Utara Province**

Determinant	Coef B	S.E	P	OR (95% CI)
Age 15-19 years			0,008	1
Age 20-35 years	-2,268	0,837	0,007	0,10 (0,02 – 0,53)
Age 36-49 years	-2,506	0,842	0,003	0,08 (0,02 – 0,43)
Number of children still alive	0,527	0,177	0,003	1,69 (1,20 – 2,40)
Knowledge	-0,755	0,178	< 0,001	0,47 (0,33 – 0,67)
Exposure to mass media	-0,325	0,183	0,076	0,72 (0,50 – 1,04)
Officers visit	-1,563	0,254	< 0,001	0,21 (0,13 – 0,35)
Constant	2,427	0,840	0,004	

### Conclusion and Suggestion

**Conclusion:** The determinants of unmet need for married women who do not use contraception in Sumatera Utara Province are age, number of children still alive, knowledge and visits of officers. The most contribution determinant is age.

It suggested to improve Communication, Information and Education (IEC) efforts for married women by using mass media and family planning officers visit are expected to be very influential in increasing the knowledge of married women of childbearing age. Thus it is needed to increase the quality and quantity of Family Planning Field Officers (PLKB). Establishing cooperation with community leaders and local traditional leaders in the paradigm shift in the number of children is an important part in reducing unmet need in Sumatera Utara Province.

**Ethical Clearance:** Research has obtained approval from National Population and Family Planning.

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**Conflict of Interest:** Authors declare that there is no conflict of interest within this research and publication paper.

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# Relationship between Effective Leadership and Decision Making on Patient Safety Culture

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## Abstract

**Background:** Patient safety culture is the value, belief, behavior adopted by individuals in an organization regarding safety that prioritizes and supports the improvement of safety in patients in the treatment process. The application of optimal culture in order to become a habit requires discipline from the leader to fit the stated goals. Purpose - This research aims to determine the relationship of effective leadership and decision making on patient safety culture in the nursing ward.

**Research Method:** This research is a quantitative non-experimental descriptive research with the collection of total sampling data in the form of a questionnaire to all nurses in the nursing ward with total number of 85 respondents.

**Results:** The results of the analysis of respondents in the study obtained results  $p = 0.931$  for effective leadership analysis of the patient safety culture., While for the analysis of decision making on patient safety culture obtained results  $p = 0.026$  and the pearson moment value obtained results 0.212.

**Conclusion:** Firm and systematic decision making is needed in the application of patient safety culture so meet the goals of professional service planning.

**Keyword:** *Decision Making, Nurse, Patient Safety Culture.*

## Introduction

The effort to improve service quality and patient safety in hospitals is now a necessity and a movement that is universalized by various parties. Developed countries have begun to make a paradigm shift in services that previously focused on quality towards the quality-safety paradigm. This indicates an increase not only in the service quality sector but more focused on maintaining patient safety consistently in the era of globalization<sup>1,2</sup>.

The current era of globalization in the ASEAN Economic Community MEA (MEA) has created challenges for all types of industries to compete, including the industry in the health services sector, this is encouraging the rapid growth of new hospitals to meet customer needs. Such business environment conditions require hospitals to improve the quality and quality of services in order to remain successful, both at the operational, managerial and strategic levels<sup>3</sup>.

The quality and service quality of a hospital as an institution that produces health care technology products certainly depends also on the quality of medical services and nursing services provided to patients to improve the quality of health services (Nursalam, 2015). The optimal role of nurses in developing nursing service quality has developed and leads to demands for adequate competencies to support the patient safety movement (Yulia, 2010). This statement is in line with Kohn (2000)

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who establishes six dimensions in the quality of health services including those concerning patient safety<sup>4,5</sup>.

Safety culture is the values, beliefs, behaviors adopted by individuals in an organization regarding safety that prioritize and support improvement in safety. The patient safety culture is the values, attitudes, perceptions, competencies and patterns of individual and group behavior that determine organizational commitment and ways of patient safety<sup>6</sup>.

The patient safety culture consists of several elements. Elements in the patient safety culture include an open, fair (just), reporting, learning and informed. Being open and fair means sharing information openly and freely and fair treatment of staff when an incident occurs. Reporting culture is that nurses have confidence in the incident reporting system. Learning culture is committed to safety learning, communicating with others and always remembering them. Information culture means learning from past experience, being able to identify and reduce incidents in the future because of learning from events that have occurred<sup>7,8</sup>.

The patient safety culture is important. The patient safety culture will reduce adverse events (AE) so that hospital accountability in the eyes of patients and the community will increase.<sup>9</sup> The patient safety culture helps organizations develop clinical governance, organizations can be more aware of mistakes that have occurred, analyze and prevent harm or mistakes that will occur, reduce patient complications, recurring errors and resources needed to resolve complaints and demands<sup>7,9</sup>.

In the service room management system, it is needed a leader who has a leadership spirit and is able to deliver patient safety as a work culture in service and create a condition of patient safety culture or patient safety culture so that the quality of service and patient safety is maintained.

### Research Method

Research was conducted in the Ward Room of Ulin Banjarmasin Hospital with 85 respondents who worked in the treatment room. Sampling in this research using total sampling technique.

The type of research conducted by researchers is a non-experimental quantitative data approach, through quantitative descriptive analysis of variable components. Data collection is carried out with questionnaires as

primary data and analyzed by computer programs.

## Result

### Characteristics of Respondents:

**Table 1. Characteristic of respondent**

Characteristic	Respondent (n=85)	Percentage (%)
Gender	Male	24%
	Female	76%
Education	Vocation	90%
	Bachelor	10%
Training of Patient Safety	Ever been	97%
	Never	3%
Years of work in treatment room	>6 month	78%
	<6 month	22%

Based on the age analysis of respondents in the study ranged from 22-45 years and the average age of respondents was 29 years.

### Effective Leadership, Decision Making and Patient Safety Culture:

**Table 2. The results of the univariate analysis of effective leadership, decision making and patient safety culture in the study.**

Variable	Mean Median	SD	95% CI
Effective Leadership	82,46 80,00	8,302	80,67-84,25
Decision Making	14,12 15,00	1,601	13,77-14,47
Patient Safety Culture	100,89 102,00	7,706	99,23-102,56

### Bivariate Analysis of Effective Leadership and Decision Making on Patient Safety Culture:

**Table 3. Relationship between effective leadership and decision making towards patient safety culture.**

Variable	Application of Patient Safety Culture		
	N	Statistic test	Pearson Product
Effective Leadership	85	P = 0.931	-
Decision Making	85	P = 0.026	0.212*

## Discussion

**Patient Safety Leadership and Culture:** Effective leadership requires mastery of the leader in the existing

tasks and manpower, so the job satisfaction can be achieved. Based on the respondents' assessment of effective leadership in the high category, it can be said that effective leadership owned by the room supervisor from aspects of knowledge, self-awareness, communication, energy use, goal setting and action taking has been well implemented (Wardhani, 2013).

Effective leadership is the ability of leaders to influence subordinates in achieving an organizational goal. Effective leadership requires mastery of duties and professional staffing, so supervisors become role models and job satisfaction by implementing nurses can be achieved. A leader has a clear and appropriate target so that the achievement in the field of service in the treatment room can be conditioned properly and correctly.

However, based on the analysis conducted by researchers between effective leadership variables room supervisors with the application of patient safety culture there is no meaningful relationship. This happens because the management system of patient safety is not managed directly by the room supervisor, but is managed by a special commission in the Ulin Hospital Banjarmasin. So the discussion sessions and directives from the room supervisor to the implementing nurse are not optimal, become routine or become a habit. In line with the results obtained by researchers, Wardhani (2013) also revealed that there was no significant relationship between effective leadership and the application of patient safety culture ( $p = 0.406$ ). Although many references state that leadership is the first thing that must be considered in the development and application of patient safety culture, there are still many other variables which also have a strong influence and not become research variables<sup>10</sup>.

This is in accordance with the theory of Steven & John Jermier (1978) in Mulyadi (2005), that sometimes leadership is not something that is important in the success of a process. This is due to the factors of Leadership substitutes or neutralizer leadership, in the form of individual, occupational and organizational variables. According to Burke and Litwin, in addition to leadership factors, other factors that determine the success of implementing a patient safety culture include external environmental factors, structure and systems, individual knowledge and skills, work environment, needs and motivation<sup>11</sup>.

#### **Patient Safety Decision Making and Culture: An**

effective leader is leadership that is oriented towards determining rational and appropriate actions. The leader must be able to take action based on consideration of the effective leadership components described earlier. The action taken by a supervisor must pay attention to the ability-oriented leader before committing, no need to wait, take well-planned actions, cooperate with others in acting, act professionally, be able to make decisions, be able to give ideas, use leadership techniques in acting<sup>10</sup>.

The results of the analysis in the study of the effective leadership component of the room supervisor in the form of decision making with the application of patient safety culture there is a significant relationship with the value of  $p = 0.026$  ( $p < 0.05$ ). This is in accordance with Dwi Setiowati's (2010) study which states that there is a positive and weak strength relationship with the application of patient safety culture by implementing nurses. Marpaung (2005) also stated that there was a relationship between the action of the head of the room and the work culture of the nurse nurses ( $p$  value  $< 0.05$ ). However, Wardhani (2010) stated in his research the results of the test of the relationship between decision making and the application of a patient safety culture showed that there was no relationship between the actions taken by the head of the room with the application of a patient safety culture ( $p = 0.359$ ,  $p > 0.05$ ) in Unhas Hospital Makassar.

Decision making is part of the control function in nursing management (Dwi setiowati, 2010). Control in the patient safety culture is to provide feedback to staff, incident reporters, take actions for improvement and evaluation either post or before the event (Callahan & Ruchlin, 2003; Dwi setiowati, 2010). A leader needs to ensure that his subordinates' questions are answered with rational actions. The leader also needs to research and encourage critically and stay away from being skeptical of his staff.<sup>10,11</sup>

The above theory describes things that strengthen and can also be contrary to the results of research. Decision making by a supervisor must be appropriate and rational, so that every decision can be positively meaningful in implementing the application of patient safety culture in the form of reinforcement or rewarding staff in the service process.

#### **Conclusion**

The results of the final analysis revealed that effective leadership carried out by the head of the room

or supervisor in the room service was not related to patient safety culture, this indicates that there are other factors that might influence the application of patient safety culture in the room, one of them is individual factors from medical personnel who provide services there, the availability of facilities can also be a separate consideration.

Meanwhile, decision making is significantly related to the application of patient safety culture because firmness causes individuals to comply with existing regulations so that the goal of patient safety can be achieved by discipline and skill in work.

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**Ethical Clearance:** This study has obtained the ethical approval from the health research ethics committee of the Ulin General Hospital of Banjarmasin, Indonesia with the certificate number of No. 001/X-Riset/RSUDU/16.

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# Colombian Users' Experiences about Telemedicine in Health Services

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## Abstract

**Objective:** To examine the perception of telemedicine as a means to provide health services from the point of view of users of the health insurance system in the Municipality of Sonsón (Colombia).

**Materials and Method:** This qualitative study applied 16 interviews to key informants. The transcripts were later coded and analyzed adopting Strauss and Corbin's Grounded Theory, which resulted in an axial coding process.

**Results:** There is general rejection of telemedicine as a way to provide services because of its impersonal character and the limitation of the face-to-face contact with a health professional.

**Conclusions:** The implementation of telemedicine in the context of any health system should consider key social and cultural structural elements to ensure its acceptance by communities.

**Keywords:** Culture; health; health services; health systems; telemedicine; grounded theory.

## Introduction

The 1960's saw the beginning of the discussion about *connected societies* due to the emergence of Information and Communications Technologies (ICTs). Their impact on the social dynamics of human beings influenced economy, politics, culture and even public health<sup>1</sup>.

In the health sector, such technologies have improved the management efficiency of services

provided to the population with digital medical histories and novel diagnostic techniques that benefit the living conditions of people<sup>2,3</sup>.

Additionally, the relationship between technology and health sciences has led to consider different alternatives to overcome the barriers inherent to health service provision. For example, the geography of a territory may not enable to guarantee full access to specialized care. These situations caused the emergence of telemedicine<sup>4</sup>.

Besides, Internet is currently a key reference for health professionals; it has enabled to have more informed users and streamline many aspects of health care<sup>5</sup>.

Despite technological advances in this field, health care is still considered by many as a limited resource. According to estimates by the World Health Organization

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(WHO), between 2000 and 2009 there were 14 doctors for each 10,000 inhabitants worldwide, while in regions like Africa their number came down to just 2, which favors a wide gap in access depending on the context<sup>6</sup>.

In that sense, health systems should aim at preserving and maintaining the quality of life of all the population groups. In this regard, Colombia constitutes a point of reference in Latin America due to a series of health policy reforms that introduced an assurance model that seeks to guarantee coverage<sup>7,8</sup>.

However, little information on health care access in that country is available and it only refers to aspects such as the number of available hospital beds, physicians per people, or legal actions against insurance companies in case of failure to provide medical treatment. In spite of the efforts to improve access, the core problems of the system persist and the gap between urban and rural areas still is a latent barrier<sup>9</sup>.

For these reasons, a study was conducted to examine the perception of telemedicine of users in a relatively-remote municipality. Sonsón was selected because of its location: East of the Department of Antioquia and 3 hours by car from the capital (Medellín). Besides, in 2015 its population was mainly rural: 20,883 inhabitants compared to 15,221 in the urban area. Furthermore, this gap also translates into a territory still divided by socioeconomic factors<sup>10,11,12</sup>.

## Materials and Method

The goal of this year-long study was to understand the perceptions of telemedicine as a means to provide health services in 2016 from the perspective of users of the subsidized regime in the Colombian Health Insurance System living in Sonsón.

Therefore, qualitative research was conducted because, although it does not have a long history of applicability in health sciences (compared to epidemiological studies), its growing importance in recent years should be highlighted. This is due to the fact that it enables to obtain descriptive and interpretative data regarding behaviors observed in relation to the phenomenon under study from a holistic perspective. In this case, the adopted approach was historical-hermeneutical as it enables to acknowledge human beings as interpreters of their reality<sup>13,14,15</sup>.

Sixteen key informants participated in the process.

They met the inclusion criteria: they all were of legal age, enrolled in the Colombian Health Insurance System through the subsidized regime and living in Sonsón. An exclusion criterion was suffering from mental disorders that would prevent a voluntary and conscious participation in the study.

Regarding ethical considerations, elements from the Declaration of Helsinki were incorporated. Such instrument establishes the obligation to submit research projects to a committee that ensures the security of each participant. This was reflected in an informed consent based on the guidelines in Resolution 8430 of 1993 of the Colombian Ministry of Health<sup>16,17</sup>.

Therefore, the study was submitted to the Technical Committee of University Institution Escolme, who determined the study presented minimum risk as no physical, psychological, or social structures were modified in the informants.

Theoretical sampling was used to select the participants and ensure the widest possible diversity in variables such as age, gender, educational attainment and residence area (rural or urban), so that they were qualitatively representative of the population under study and connected by the health institutions in the municipality.

Semi-structured and in-depth interviews were used as the information collection instrument. They were later transcribed and coded based on Anselm Strauss and Juliet Corbin's Grounded Theory, understood as the process by which the collected data are fragmented, conceptualized and integrated to create a theory that explains the phenomenon under study<sup>18</sup>.

The first coding is referred to as *open* because it is a first approach by the researcher in terms of data, which results in descriptive categories. The second one is *axial* and it establishes associations between the first emergent categories to obtain more precise hypotheses that are validated by the informants in the study; thus, analytic categories emerge. During the third coding, called *selective*, a core category emerges and it enables to theorize the phenomenon under study by means of interpretative categories<sup>18</sup>.

Nevertheless, for time and budget reasons, this study reached as far as the *axial* stage of the coding process and produced the analytical categories found in Results.

The Grounded Theory was selected because of its scientific rigor in qualitative studies and since it enables health professionals in different fields to understand the subjective experiences of individuals regarding the problems under study<sup>19</sup>.

In addition, its symbolic interactionism enables to investigate aspects of human relationships with peers based on symbols and meanings that result from a social construct<sup>20</sup>.

**Findings:** Colombia is a country of contrasts not only because of its biodiversity, but also its traditions, culture and even the existing gaps caused by resource allocation. This situation has created a series of challenges in terms of development and public health plays a key role to overcome them.

Along with such differences in the social fabric, telemedicine emerges as an alternative that contributes to guarantee access to the health care system by population groups whose geographic location limits the type of health care they enjoy.

An exploration of the existing perceptions regarding telemedicine as an alternative to access health services in the Municipality of Sonsón revealed rejection among people. Although this alternative enables to access the system, in the users' opinion it does not provide the same satisfaction as direct care by health professionals. Such ideas are expressed by some of the informants in the study:

“This way of having a doctor see you personally and another physician through a device that helps the consultation doesn't seem trustworthy to me. It's not the same thing as being there with the specialist, because that way you can ask questions more easily; they check you and you feel satisfied. Maybe I don't believe in it because of my age.”

These arguments by the participants reveal a key element in health care: the trust built by the physician-patient relationship. This provides users with the confidence to clear up doubts regarding their treatment and other aspects related to their condition.

In the context of the Colombian health system, in addition to the factors related to people's perceptions and expectations regarding medical attention, there are administrative barriers for the dynamics of service provision.

These continuous limitations discourage users from accessing the services, moreover when they know they will be provided via telemedicine, which results in greater resistance. Thus, they decide on other alternatives, as some participants stated:

“They would tell you ‘come here’, ‘go there because the order is nowhere to be found’, ‘make copies of this’, ‘you're late’ and then you can't come from the farm because there's bad weather. An appointment via computer is useless; we'd better take our pill and we're under control.”

In this regard, the red tape imposed by the health system poses new challenges for stakeholders in society, especially those related to public health.

Different informants expressed disagreement with telemedicine because there is no direct contact with the health professional and, therefore, the trust that enables them to speak fluently and be satisfied is not built. Conversely, other interviewees maintained that they have no problem with this type of service:

“To me, it's a good mechanism in health services. Nowadays, technology is really advanced. Specialized attention is coming to remote areas where resources are limited or nonexistent and improves access and equality. Digital communication enables health information to be more comprehensive, up-to-date and accurate. Besides, the physician may have communication with the specialist at any time and that's an advantage.”

These testimonies provide an opportunity for the stakeholders that manage the Colombian health system to guarantee not only the efficiency of the operation but also greater acceptance of telemedicine and actually incorporate its benefits, thus improving the living conditions of the communities.

## **Discussion and Conclusions**

Telemedicine can be understood as the long-distance provision of health services associated with the rise of ICTs and globalization<sup>21</sup>. Its emergence has enabled efforts to overcome geographical barriers of access to health systems, particularly in communities in rural areas and developing countries<sup>22</sup>. Furthermore, it has become a key element to face the socioeconomic challenges that have been encountered since the 20th century<sup>23,24,25</sup>.

An example of the usefulness of telemedicine as a mechanism to reduce the barriers of access to health



services is the possibility of undocumented Mexican population in the United States to use resources in their country of origin, since they cannot access the benefits of the North American system because of their situation. Similarly, Salas, Salcedo and Aguilera (2013) list the advantages telemedicine offers in the context of Bogotá (Colombia) to guarantee the health care of patients with particular needs, even though the service is remotely provided<sup>26,27</sup>.

Nevertheless, in line with the results of this study, García and Rodas (2011) acknowledge some limitations associated with the implementation of telemedicine and highlight users' communication and information problems<sup>28</sup>. As indicated throughout this article, this situation does not only hinder its use but it also generates indifference and, therefore, poses new challenges in the field of public health<sup>29</sup>.

From this perspective, the study by Rubies et al. (2010) demonstrates the serious difficulties that underlie the implementation of telemedicine, not only because of the variables associated with the influence of people or organizations but also due to the obsolescence of technology<sup>30,31</sup>.

In light of this study, these difficulties gain traction largely because of the importance of the physician-patient relationship<sup>32</sup>. Furthermore, as stated in the study by Bermúdez (2016), the communication processes between these two parties are essential for users to adhere to the provided treatments<sup>33</sup>.

Notwithstanding, they are not the only elements to be considered when telemedicine is implemented because, as stated in this study, the red tape imposed by the Colombian health system constitutes a limitation in addition to users' social imaginaries and perceptions regarding this type of service provision, which leads to nonadherence to even necessary treatments<sup>34</sup>.

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# Analysis of Public Value in Governmental Institution Cardiac Center as an Example

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## Abstract

This article deals with analysis of work environment in the lens of Public Value. A brief account of our organization, Prince Sultan Cardiac Center Qassim (PSCCQ), will be outlined along with its mission, vision and values.

This will be accompanied by a review of what we mean by Public Value, including an overview of the PSCCQ work environment in the public value perspective, with a discussion on opportunities and obstacles to the advancement of PSCCQ values and missions.

Finally, this article is an effort to introduce the culture of public value in health services in developing countries.

**Keywords:** *Public value, Analysis, Governmental institution, Developing country.*

## Introduction

This article deals with analysis of work environment in the lens of Public Value. A brief account of our organization, Prince Sultan Cardiac Center Qassim (PSCCQ), will be outlined along with its mission, vision and values.

This will be accompanied by a review of what we mean by Public Value, including an overview of the PSCCQ work environment in the public value perspective, with a discussion on opportunities and obstacles to the advancement of PSCCQ values and missions.

Finally, this article is an effort to introduce the culture of public value in health services in developing countries.

### Prince Sultan Cardiac Center Qassim:

**Overview:** Prince Sultan Cardiac Center Qassim is the only tertiary cardiac center in Qassim, a province in Saudi Arabia that serves heart disease patients of all ages.

It is a government cardiac center with its own Human Resources and Financial Department, allowing the center the flexibility needed to carry out its duties.

**Mission:** Our mission is to deliver an integrated Cardiovascular Healthcare System to serve people of all ages in Qassim Region and the nearby areas by offering a continuum of high-quality Medical and Surgical Services committed to Patient Safety, Medical Education & Training, Research and Community Service.

**Vision:** Our vision is to advance Excellence in Cardiovascular Medicine and Surgery as well as Medical Education & Training and Research at a National level.

**Values:** Our values are commitment to Professionalism, Safety, Care, Compassion and Quality.

**Public Value:** It's been about 30 years since the idea of public value first emerged and twenty-four years since Mark Moore published *Creating Public Value: Strategic Management in Government*<sup>1</sup>.

Let us first define what do we mean by VALUE?

*Value is “that property of a thing because of which it is esteemed, desirable or useful; worth, merit or importance”<sup>2</sup>.*

In an interview, Mark Moore defines PUBLIC VALUE as equivalent to shareholder value in public management, with the public sector acting in the best interests of the “collective”. The equality of the allocation of public benefits and the implementation of public duties is as critical as the achievement of social outcomes or the satisfaction of individual clients<sup>3</sup>.

With this brief explanation of what public value entails, a closer look at the working environment of our organization will be illustrated.

**PSCCQ Working Enviroment in the Lens of Public Value:** According to Moore<sup>4</sup>, philosophic, economic, technological and managerial work is needed to build a performance management system that helps the company to reflect on the principles it is meant to create.

Here, the four (4) activities will be identified and the analysis of the application of the PSCCQ will be shown. The following section will therefore try to answer the following question:

To what extent do PSCCQ invest in managerial, technical, political and philosophical work?

#### **Philosophical Work:**

*Philosophical work is “associated with naming and justifying the important public values to be achieved by a public agency (or reflected in its operations)”<sup>4</sup>.*

Philosophical work includes examining whether the principles or values of PSCCQ (Professionalism, Safety, Care, Compassion and Quality) are in the minds and hearts of its employees? Is the patient the focus of attention, or is the patient-centered care is an essential aspiration in the PSCCQ?

Only a proper survey can answer these questions in a reliable manner, but close attention may be paid to PSCCQ employees, which has shown that there is no clear understanding of PSCCQ values and they are not yet in the hearts of many employees .Hence, it is the responsibility of leaders to build awareness and belief towards the value of PSCCQ and to bring mission and

vision to the minds and hearts of PSCCQ employees. Management plays a vital role in developing dynamic ways to influence each employee in achieving PSCCQ values.

#### **Political Work:**

*Political work is “associated with building a broad, stable agreement about the important dimensions of value that those who can call the organization to account will use to evaluate agency performance”<sup>4</sup>.*

The PSCCQ reports to the Qassim cluster. Therefore, if we examine which value is being measured from the cluster, it will be QUALITY because PSCCQ has a quality team that has certain criteria where they are being tested for compliance.

PSCCQ has a department responsible for monitoring and evaluating the safety of patients and a physician responsible for investigating any Occurrence Variance Report (OVR) and sentinel events.

The PSCCQ must report the monthly OVR report to the cluster and the team of the designated department in the cluster will evaluate its performance.

#### **Technical Work:**

*Technical work is “associated with finding or developing empirical measures that can reliably capture the degree to which the nominated values are being realized (or reflected) in agency operations”<sup>4</sup>.*

Most of the performance indicators obtained in the PSCCQ rely on results (OUTPUTS) that are not measures (OUTCOMES), such as the number of patients admitted or treated or seen in the hospital.

Recently, attention to outcomes and to count what counts<sup>5</sup>.

The Patient Experience Department was opened, Special training was given on how to gather and assess what matters to PSCCQ patients. An important issue when implementing measurements is to decide what should be measured? More outcome indicators instead of output are collected, such as how many patients with heart failure are readmitted due to the complexity of measuring values.

In this implementation, a lot of work needs to be done to determine what really counts.

**Managerial Work:**

*Managerial work is “associated with linking a performance measurement system to a performance management system that can drive public efforts toward improved performance”<sup>4</sup>.*

There are no structured initiatives in PSCCQ to compensate or inspire workers to show and maintain public value, such efforts are actually dispersed and not coordinated, for instance, by providing a certification to nurses who record most of the OVRs

To conclude, it is clear that the combination of these four activities is the key to good management<sup>4</sup>. Nevertheless, in PSCCQ, these four activities, although available but not properly organized and reinforced by leaders and managers, call for urgent discussion and proper knowledge among all PSCCQ employees.

**Opportunities and barriers to the promotion of PSCCQ values and mission and hence the public value:** SWOT analysis was used to assess the opportunities and barriers to the promotion of PSCCQ values<sup>6</sup>.

SWOT analysis was developed in the 1960s by Albert Humphrey, a management consultant at the Stanford Research Institute. It is a technique used to determine and define the Strengths, Weaknesses, Opportunities and Threats – **SWOT**.

SWOT Analysis of PSCCQ:

**Strengths:**

- Highly qualified nursing staff
- Strong Leadership Commitment
- Good reputation among local community
- Realistic mission
- Strong support from cluster director
- PSCCQ manages its own budget

**Weaknesses:**

- Limited bed capacity
- Lack of separate building
- Strong resistance from many consultants
- Limited recruitment ability
- Some of Ministry of Health regulations

**Opportunities:**

- Vision 2030
- New trends in Ministry of Health
- Educational and training grants
- Health transformation
- Additional administrative and financial support for module of care
- New cluster administration
- New visa rules in kingdom of Saudi Arabia
- Social media

**Threats:**

- New stock management roles
- Rapid staff turn over
- Social media

**Conclusion**

An analysis of public value in any given organization is vital, as Richard Barrett, Founder of the Barrett Values Center, said: “When we work in an organization whose culture aligns with our personal values, we feel liberated. We are able to bring our full selves to work”<sup>7</sup>.

The concept of public value in Saudi Arabia is relatively new and the PSCCQ is no exception and this has been shown in developing countries<sup>8</sup>.

This analysis also highlighted how important it is for the PSCCQ to have legitimacy and support from the cluster to turn inputs into outcomes<sup>9</sup>.

Finally, the PSCCQ administration must organize structured efforts to understand, create and demonstrate public value among staff toward achieving valuable outcomes<sup>10</sup>.

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# The Effect of Metal Nanoparticle on LH, FSH and Testosterone in Male Rats

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## Abstract

In our study, metal nanoparticles Ag, Cu, ZnO, CdO and Sn NPs were prepared by pulse laser ablation in liquid and characterized for investigation of reproductive toxicity in adult male rats. Thirty six healthy rats, two month age old and the rats weighing from 250-300 g, divided into six groups of six animals each (GAg, GCu, GZnO, GCdO and Sn) group which receive oral 0.3 ml dose of metal nanoparticles for 30 day. Blood samples were collected via cardiac puncture for serum collection. The formation Ag NPs, Cu NPs, ZnO NPs, CdO NPs, Sn NPs were shown through the x-ray diffraction pattern. AFM indicate to formation metal nanoparticles with diameter 61.36, 70.44, 66.82, 74.87 and 67.34 nm of Ag, Cu, ZnO, CdO and Sn NPs respectively. The results showed significant ( $P < 0.05$ ) elevation of luteinizing hormone (LH) for each metal nanoparticles except AgNPs non-significant. Each metal nanoparticle significant ( $P < 0.05$  and  $** p \leq 0.01$ ) of follicle-stimulating hormone (FSH), whereas in testosterone only Cu and Sn NPs significant ( $P < 0.05$ ).

**Keywords:** Metal nanoparticles, pulse laser ablation, testosterone, LH, FSH.

## Introduction

The application of nanomedicine is wide-ranging. One of nano-medicine's most significant problems is to comprehend its environmental efficacy and also to determine the possible toxicity of nano-scale materials. [1]The metallic nanoparticles (NPs) show distinct characteristics than they found at larger bulk size. These characteristics are accredited according to their smaller size and bigger area by volume ratio. [2] Nanoparticles of metal and metal oxide such as silver, zinc, gold, or titanium dioxide have been used as antimicrobial agents for over a century. The conduct of nanometals against pathogenic organisms at nanometric dimensions is currently being studied. [3]

The particle size is a significant nanomaterial characteristic that plays a main part in the characteristics of unique nanoparticles. The particle size may represent its physicochemical characteristics and enhance the ability to sorb and interact with biological tissues. [4,5] In reality, more research has been done on the size of nanoparticles than on other nano-scale properties. [6] Up

to now, results have shown that the use of nanomaterials increases biological activity as their size decreases. Today, multi-industry uses this science [7].

Nanoparticles and other cellular reactions toxicity relies on the nature of the material and doses were used. This showed that liver parenchyma cells play a significant part in eliminating nanoparticles from the blood. [8] Theoretically, nanoparticles may have some adverse effects on human health and the environment and their obvious effects on male reproductive function have not yet been clarified.

There are currently many techniques for generating suspended nanoparticles in aqueous solutions. Chemical techniques are the most frequently used because they are comparatively economical and the particle size can be easily controlled. Nevertheless, laser ablation in liquids has lately been shown to be a promising new method for obtaining metal colloids. [9-11] The aim of present study was to investigate the effects of metal nanoparticles toxicity on luteinizing hormone (LH), follicle-stimulating hormone (FSH) and testosterone.

## Experimental part:

**Preparation of metal nanoparticles:** Metal nanoparticles (Ag, Cu, Sn, ZnO and CdO) were produced by laser ablation of (Ag, Cu, Zn and Cd) targets (diameter = 1.5 mm, thickness = 0.6 mm, 99.99% immersed in a vessel filled with 3 mL of deionized water (DI) with power 500mJ and .The target irradiated vertically by a Q-switched Nd- YAG laser (DIAMOND-288 pattern EPLS), with wavelength ( $\lambda = 1064$  nm) duration time at 6 Hz. The laser beam was focused by a focal length 10cm), subsequently, we placed the pure metal solution and the pulsed Nd-YAG laser re-irradiates, the concentrated laser beam spot diameter was 4 mm.

**Experimental Model:** Suspensions of metal nanoparticles were administered to rats with 0.3 ml doses via oral gavage. Thirty six healthy rats and two months of age and rats weighing 250-300 g are all permitted to acclimatize in animal house conditions for one week ( $25 \pm 3^\circ\text{C}$ , 50-55 percent relative humidity and 12 hours light/dark cycle). The rats were divided into 6 groups in 6-rat capability cages made of plastic and sprinkled ground with sawdust, replaced every three days. The rats were fed a normal nutritionally balanced diet.

**Experimental Design:** Wistar male rats were divided into six groups of six individual animals.

- Control - Animals got (deionized water) only
- Ag- Animals got 0.3 ml/day of oral Ag NPs for 30 day.
- Cu- Animals got 0.3 ml/day of oral Cu NPs for 30 day.
- Sn- Animals got 0.3 ml/day of oral Sn NPs for 30 day.
- ZnO- Animals got 0.3 ml/day of oral ZnO NPs for 30 day.
- CdO- Animals got 0.3 ml/day of oral CdO NPs for 30 day.

**Blood Collection and Serum Separation:** At the end of the experimental period, blood collection 3ml per group was collected by heart puncture, Blood was gathered from each rat in the eppendorf tube. At  $30^\circ\text{C}$  and 3000 rpm for 15 min, eppendorf pipes were centrifuged. The blood sample was divided into two layers, the upper serum layer and the lower rejected layer and then Pasteur pipette pulled it. Till blood measurements, the serum layer from each rat was placed in freezing condition.

**Statistical Analysis:** Data is shown as the mean  $\pm$  SD. With Graphpad Prism 6.0 software, statistical analyzes were carried out using ANOVA one way. Means were used to compare untreated rats with distinct treated groups (\* $P \leq 0.05$ , \*\* $P \leq 0.01$ , \*\*\* $P \leq 0.001$ , \*\*\*\* $P \leq 0.0001$ ).

## Result and Discussion

**Structural and topography of nanoparticles:** Metal and oxide nanoparticle (Ag NPs, Cu NPs, ZnO NPs, CdO NPs) are formed by examining the x-ray, this is mentioned in my other paper.<sup>[12]</sup>

AFM imaging of metal nanoparticles was conducted on a smooth glass slide substrates by drop casting at heat 60. Film surface morphology was explored using AFM pictures, which at very elevated magnification generates topological surface pictures. AFM pictures as commonly recognized provide a helpful tool for unambiguously characterizing the order of magnitude and nanoparticle size distribution.

Figure (1) shows the morphology of dried colloids for Ag, Cu, Sn, ZnO and CdO NPs, 500 mJ/pulse and 500 pulses prepared by PLAL in DI. The images indicate that the MNPs have semi-sphere forms and we can see from graphic (2D) that the number and particle distribution of MNPs, note that the lowest size is Ag NPs and the bigger size is CdO NPs. Table (1) shows the average roughness value in DI at 500 laser energy and 500 pulses.



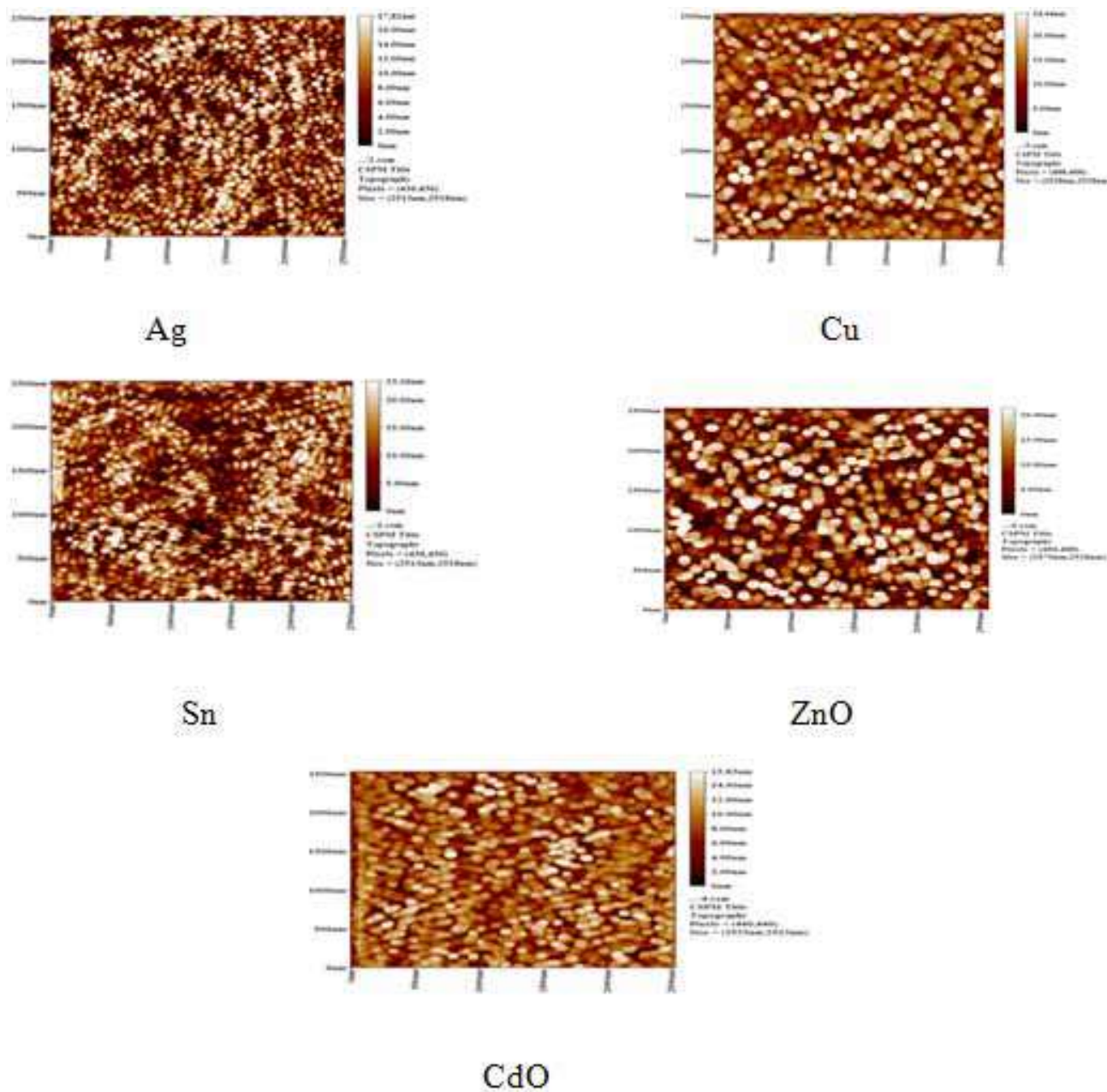


Figure (1): Typical 2DAFM image of Ag, Cu, Sn, ZnO and CdO nanoparticles prepared by PLAL by ablation of Sn target immersed in DI at 500 pulses constant, at 500mJ/pulse.

Table (1): Shows the values of roughness average and average diameter for MNPs in DI.

MNPs	Roughness Average (nm)	Average Diameter (nm)
Ag	4.23	61.36
Cu	4.44	70.44
ZnO	5.09	66.82
CdO	2.24	74.87
Sn	5.2	67.34

Atomic Absorption Spectrometer Analysis (AAS): The concentration of Ag, Cu, ZnO, CdO and Sn respectively, as in the table (2), prepared in PLAL has been determined by atomic absorption spectrometry.

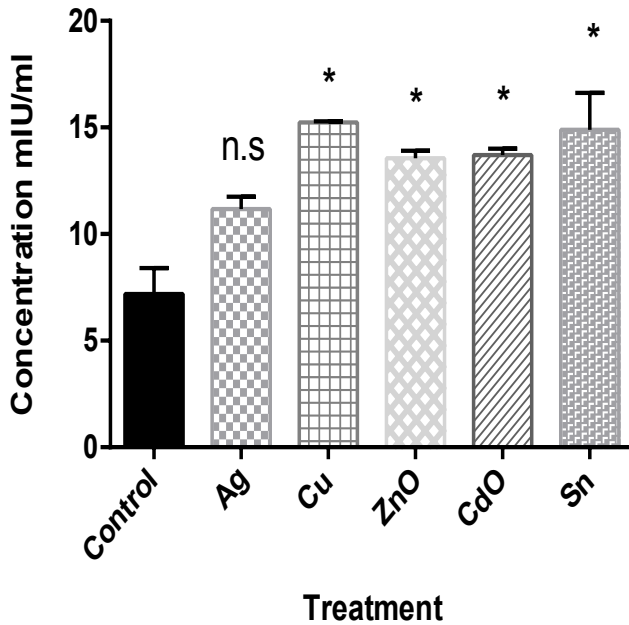
**Table (2): Shows the concentration of MNPs with 500 mJ and 500 pulses.**

Metal Nanoparticles	Concentration (ppm)
Ag	40.4081
Cu	10.3758
ZnO	24.0768
CdO	0.027
Sn	53.45

**Effect Metal Nanoparticles on Sexual Hormones:**

Figure (2) indicate that the level of serum leutinizing hormone (LH) in male rats dosed with MNPs showed a significant rise ( $p \leq 0.05$ ) over control. High LH shows an original testis failure and may happen as a result of chromosomal disorders. With the exception of group Ag NPs, the non-significant note ( $p > 0.05$ ) in the LH corresponds to<sup>[13]</sup>.

**LH**

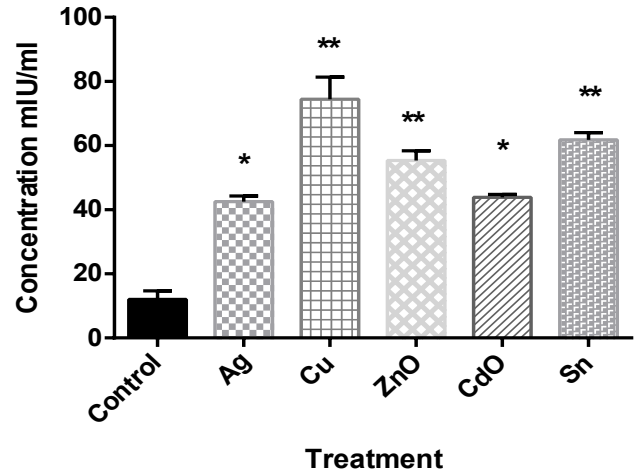


\* $p \leq 0.05$  and non-significant n.s

**Figure (2): The effect of MNPs on blood serum LH in male rats.**

Figure (3) indicate that the concentration of the Serum follicular stimulating hormone (FSH) showed a significant rise (\* $p \leq 0.05$  and \*\*  $p \leq 0.01$ ) in masculine rats dosed with MNPs compared to control, corresponding to.<sup>[14]</sup> This implies pituitary gland dysfunction, which can trigger reproduction of weaknesses.

**FSH**

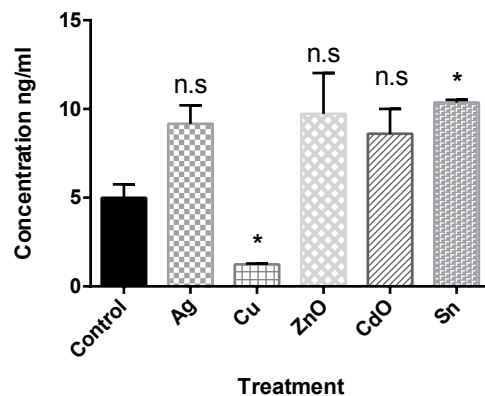


\* $p \leq 0.05$  and \*\*  $p \leq 0.01$

**Figure (3): The effect of MNPs on blood serum FSH in male rats.**

Figure (4) indicate that the level of serum testosterone hormone in male rats dosed with Ag, ZnO and CdO is non-significant ( $p > 0.05$ ) This outcome corresponds to.<sup>[14,15]</sup> for male rats dosed with Ag, ZnO and CdO as opposed to control at this dose. In Cu NPs this outcome corresponds to<sup>[16]</sup>, low testosterone concentration suggests a hypothalamic issue, adrenal disease, pituitary disease, or liver disease, indicating that copper nanoparticles can be regarded a reproductive toxicant. Sn NPs demonstrate a significant rise in the concentration of serum testosterone hormone ( $p \leq 0.05$ ) elevated testosterone concentrations may indicate enlarged testis or adrenal glands.

**TESTOSTERONE**



\* $p \leq 0.05$  and non-significant n.s

**Figure (4): The effect of MNPs on blood serum testosterone in male rats.**

## Conclusions

In summary, oral administration of Ag, Cu, ZnO, CdO and Sn NPs prepared by PLAL in 500 mJ and 500 pulses, Zn and Cd metals transformation to ZnO and CdO nanoparticles prepared by PLAL. Indicate some of this metal (especially Cu and Sn NPs) have reproductive toxicity on male rats.

**Conflict of Interest:** There are no conflict of interest.

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# Innovation of Jemawut Cookies (Foxtail Millet)-Tuna On Nutrition Status and Zinc Value for Children Aged 6-24 Months With Less Nutrition Status In Regency of Pacitan–Indonesia

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## Abstract

**Objective:** Indonesia provides support in preparing children as a nation's investment through the Scaling Up Nutrition (SUN) movement. The focus of the SUN movement is meeting the needs of 1000 FDL (First Day of Life) in order to reduce the number of malnutrition. Giving cookies Millet (foxtail millet) -tuna to children aged 6-24 months with under malnutrition status is one of the innovations in reducing malnutrition. The number of malnutrition children aged 6-24 months reaches 48% in region of Gemaharjo-Pacitan. This product contains 449.03 Kcal and 10.24 gr protein per 100 grams. It is hoped that the provision of these cookies combined with local food will improve nutritional status and zinc values in children aged 6-24 months with under malnutrition status.

**Method:** This study was experimental and conducted to 148 infants for 2 months and used a T-test. Results: Millet (foxtail millet)-tuna cookies increased nutritional status ( $p = 0,001$ ) and zinc value ( $p = 0.00$ ).

**Conclusion:** Cookies millet (foxtail millet) – tuna can improve nutritional status and zinc values in children aged 6-24 months of malnutrition in Pacitan - Indonesia.

**Keywords:** Millet-tuna cookies, nutritional status, zinc values, children aged 6-24 months.

## Introduction

According to the World Health Organization (WHO, 2014), 45% of under-five aged childrens' deaths are caused by malnutrition<sup>17</sup>. A Nutrition Status Assessment (NAS) conducted in Indonesia on 2017, shows that 11.3% of children aged 0-23 months are malnutrition (based on weight/age indicators)<sup>5</sup>. In Pacitan district alone there are 10.9% of children aged 0-23 months got malnutrition (Penilaian Status Gizi, 2018). The problem of malnutrition in children under two years is a problem

that needs to be addressed seriously<sup>4</sup>. The attention of developing countries is now shifting from breastfeeding to complementary food which side with breastmilk<sup>16</sup>. WHO recommends that supplementary feeding begin with 6 months with a gradual amount and form<sup>16</sup>.

The provision of Millet (foxtail millet) cookies for children aged 6-24, from local foodstuffs (barley and tuna) is expected to improve nutritional status (weight by age). Improvement of nutritional status according to age is also a priority in this intervention<sup>1</sup>. Body weight index according to age describes relative body weight compared to the age of children. This index is used to assess children who are underweight or severely under weight<sup>15</sup>. It is important to know that a child, whose weight is low according to age, may experience growth problems<sup>14</sup>. In addition to nutritional status, this intervention is expected to increase zinc value as one of the trace minerals or micro minerals that are important

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for life. In children if the amount of zinc absorbed is very small, they will experience improperly growth<sup>3</sup>.

## Method

This research was conducted in Regency of Pacitan - Indonesia. The first phase was carried out by testing the Millet (Foxtail millet) -tuna) cookie product, in accordance to SNI (Indonesian National Standard) 2973: 2011 and Indonesian Ministry of Health's standard followed by the acceptability test. The targets in this study were children aged 6-24 months with malnutrition status who were joined in twenty "Breastmilk Village" groups, which had agreed to informed consent. The purpose of using the "Kampung ASI" group is to facilitate the level of obedience in providing interventions. The second phase of this experimental design was an experiment with randomized control (Randomized Controlled Trial/RCT)<sup>13</sup>. For sample calculation using  $G * Power (V.3.1.9.2)$ , the T-test statistic test obtained a minimum sample size of 19 children per group. From the screening results in August 2019 it was found that

48 children aged 6-24 months who were malnutrition, which in this experiment, 148 children aged 6-24 months were targeted for the study (additional samples were needed to anticipate the possibility of selected subjects dropping out, loss to follow-up, or disobedient subject). So that each group consist of 24 children aged 6-24 months with under malnutrition status (group 1 = the control group was given a biscuit intervention from the Ministry of Health and group 2 = the intervention group was given Millet (foxtail millet) -tuna cookies). This research has obtained information on ethical conduct under number 349/UN27.06/KEPK/EC/2019. The study was conducted for 60 days (October-December 2019), with 8 times nutritional education. The nutritional status and zinc values check up conducted before and after the intervention. The final goal in this study is to find out how the two intervention groups compare to their nutritional status and zinc values. In addition, to find out whether the provision of local food can increase nutritional status and zinc values in children aged 6-24 months with under malnutrition status.

## Result

**Table 1. Characteristics of research subjects**

Variabel	K (n=24) Before intervention	K (n=24) Afterintervention	I (n=24) Before intervention	I (n=24) Afterintervention
Age	16,75±3,124		18,71±4,154	
Weight (kg)	7,875±0,5439	8,237±0,6240	8,058±0,7751	8,688±0,7456
<b>Education</b>				
<b>Father's Education :</b>				
High School	18 (75%)		14 (58,33%)	
Middle School	6 (25%)		10 (41,67%)	
<b>Mother's Education</b>				
High school	9 (37,50%)		7 (29,17%)	
Middle school	15 (62,50%)		17 (70,83%)	
<b>Father's occupation</b>				
Farm worker	3 (12,50%)		5 (20,83%)	
Farmer	19 (79,16%)		16 (66,66%)	
Tradesman	2 (8,34%)		3 (12,51%)	
Government employee Etc.				
<b>Occupation</b>				
Farm worker	3 (12,50%)		4 (16,67%)	
Farmer	17 (70,83%)		16 (66,66%)	
Tradesman	4 (16,67%)		3 (12,50%)	
Government employee Etc.			1 (4,17%)	
<b>Family Income</b>				
< Rp. 2.000.000	21 (87,5%)		23 (95,83%)	
≥ Rp. 2.000.000	3 (12,5%)		1 (4,17%)	

From table 1 it can be seen that there was an increased body weight before and after the intervention of the two groups given the biscuit intervention from the Ministry of Health and the intervention of giving cookies Millet (foxtail millet) -tuna).

**Table 2. Test Results of Nutrition Value for Jemawut (Foxtail Millet)-Tuna Cookies**

Parameter	Unit	Result	Method
Calorific value	kcal/100 g	449,03	By Calculation
Protein	gr/100 g	10,24	SNI 2973-2011; point A.4
Fat	gr/100 g	15,3	SNI 01-2891-1992; point 8.1
Carbohydrate	gr/100 g	69	By Different

Source: SUCOFINDO Laboratory (2019)

Based on SNI 2973: 11 test, it can be seen that the nutritional content of foxtail millet-tuna is safe to be consumed chemically and biologically. Also the nutritional content between barley (foxtail millet) -tuna cookies and PMT (Supplementary Feeding) from the Ministry of Health for toddlers are compared. SNI and nutrient content test was conducted by the SUCOFINDO laboratory in Surabaya. Ingredients tested were Foxtail Millet-tuna cookies with 100 gr of barley and 50 gr of tuna.

**Table 3. The Comparison of Nutritional Value of Barley (foxtail millet) –Tuna Cookies with PMT (Supplementary Feeding) from the Ministry of Health per 100gr**

Nutritional Value	Barley (foxtail millet)-Tuna Cookies	Toddlers’ PMT from Ministry of Health	Gap
Energy (Kkal)	449,03	450	-0,97
Protein (gr)	10,24	10	0,24
Fat (gr)	15,3	15	0,3
Carbohydrate (gr)	69	70	-1

Source: SUCOFINDO Laboratory (2019) and Ministry of Health (2018)

The nutritional value of foxtail millet-tuna per 100 grams compared to toddler PMT from the Ministry of Health has a gap that can still be tolerated, which is for energy there is a gap (-0.97 Kcal), protein (0.24 gr), fat (0.3gr) and carbohydrates (-1gr). With nutritional values adjusted to the Ministry of Health standards, it is expected that the foxtail millet cookies which made from local food ingredients, has the same nutritional values which are in accordance to Ministry of Health standards and SNI 2973: 11.

**Table 4. T-test results for nutritional status (Weight/Age) in two intervention groups**

Group	n	Mean	SD	p
<b>Before:</b>				
Control	24	-2,31	0,27	0,959
Experiment	24	-2,31	0,24	
<b>Sesudah:</b>				
Control	24	-2,24	0,20	0,000
Experiment	24	-1,95	0,19	

Source: Stata 13 data (2019)

From table 4 it can be seen that the nutritional status (weight/age) for the experimental and control groups before the intervention did not differ significantly ( $p = 0.959$ ), it means that the two groups had almost the same intake before the intervention. However, with the

intervention (giving of foxtail millet-tuna and biscuits from the Ministry of Health) and nutritional education (eight times) for 60 days, there was a significant difference in nutritional status (weight/age) intake between the experimental and control groups ( $p = 0,000$ ).

**Table 5. T-test results for zinc values in two intervention groups**

Group	n	Mean	SD	p
<b>Before:</b>				
Control	24	52,75	6,73	0,398
Experiment	24	54,58	8,08	
<b>After:</b>				
Control	24	71,95	5,97	0,000
Experiment	24	92,75	4,98	

**Source:** Stata 13 data (2019)

From table 5 it can be seen that the zinc values for the experimental and control groups before the intervention did not differ significantly ( $p = 0.398$ ) it means that the two groups had almost the same intake before the intervention. However, with the intervention (giving of foxtail millet-tuna and biscuits from the Ministry of Health) and nutritional education (eight times) for 60 days, there was a significant difference in zinc values between the experimental and control groups ( $p = 0,000$ ).

Zinc is one of the micro minerals needed for every cell in the body. Adequacy of this mineral is important in maintaining optimal health. Zinc functions as a cofactor for various enzymes, cell structure and integration, DNA synthesis, hormonal storage and expenditure, immune-transmission and has a role in the immune system. Zinc deficiency can cause decreased appetite, dermatitis, slow growth and immunodeficiency<sup>7</sup>.

Hardinsyah (2014) suggests that pregnant women, breastfeeding mothers, children in their infancy and also parents, those are included in the range of zinc deficiency group. Zinc deficiency experienced by almost all respondents in this study could be caused by the lack of consumption of foods with high zinc content.

Based on laboratory results before and after the intervention, there was an increase with a significant average from 53.66 mg to an average of 82.5 mg of zinc value. Through this study, the administration of foxtail

millet-tuna and nutritional education for eight times, was able to increase the zinc value on average to 92.15 mg. For the intervention of barley cookies (foxtail millet)-tuna had added higher value than the intervention of biscuits from the Ministry of Health, this is because the zinc content in tuna flour affects the increases in zinc value. The acceptability of barley cookies (foxtail millet)-tuna as additional food is higher than the acceptability of biscuits from the Ministry of Health.

## Conclusion

Biscuit interventions from the Ministry of Health and Millet (foxtail millet) -tuna cookies (from local food) both improve nutritional status and zinc values in children aged 6-24 months with underweight nutritional status in Pacitan Indonesia. But cookies Millet (foxtail millet) -tuna from local food ingredients, with proper processing will increase the nutritional status and zinc value greater in infants aged 6-24 months with under malnutrition status.

**Conflict of Interest:** There is no conflict of interest in this study.

**Source of Funding:** Funding in this study as a whole is accounted on the researcher independently. There are no other funding sources.

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# The Effectiveness of Local Dance Training of the Northeastern Thailand (Champa Sri) to Increase Glomerular Filtration Rate (GFR) in Elderly Women in Mahasarakham Province, Thailand

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## Abstract

Renal failure is the deceleration of renal functions and the loss of renal cortex and medulla. Therefore, the exercise by the local dance training of the northeastern Thailand (Champa Sri local dance) may help improve glomerular filtration rate (GFR). This research is a quasi-experimental design with a control group. The objectives were as follows: 1) to compare the differences of the eGFR before and after the dancing training and 2) to compare the differences in the amount of product wastes caused by muscles and were excreted through the kidneys (creatinine) and blood urea nitrogen (BUN) before and after the dance training. The sample group was 60-69 year-old women who were healthy. They were divided into two groups: 35 women in an experimental group and 35 women in a control group. The research tools consisted of 1) the dancing DVD for training, 2) the dancing guideline and 3) the collection record of blood test. The dance training program takes 50 minutes a day, 3 days a week and lasts 16 weeks. The statistics used in the study are paired-t test, Independent T-test, Wilcoxon signed rank test and Mann Whitney U test. The study indicated that the differences of the eGFR and creatinine before and after the dance training between the experimental group and the control group were statistically significant ( $p < 0.05$ ). However, the BUN values before and after experiment of the dance training between the experimental group and the control group were no statistically significant difference. In conclusion, the native dance training of the Champa Sri helped increase the efficiency of the eGFR.

**Keywords:** *The Effectiveness, Local Dance, Glomerular Filtration Rate (GFR), Elderly Women.*

## Introduction

Kidneys are the two organs shaped like beans. The functions of kidneys are to excrete product wastes from

the body's metabolism. The functions are measured by the eGFR. The test of creatinine and BUN. If renal failure or renal function deterioration and the loss of renal cortex and medulla continue to severe symptoms, it will result in renal failure and other related complications. During 2015 to 2018, the patients in Maha Sarakham province who have had chronic kidney disease were increased from 11,365 to 21,419 or 88.46%<sup>1</sup>. Thus, the exercise training in healthy people can be useful for the prevention and reduction of acute kidney injuries<sup>2</sup>. Therefore, the local dance training of the northeastern

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region of Thailand (Champa Sri local dance) may help increase the efficiency of the eGFR. The objectives of the study were as follows:

1. To compare the differences of the eGFR before and after the dancing training between groups.
2. To compare the differences in the amount of creatinine and BUN before and after the dance training between groups.

### Method

This research is a quasi-experimental design. The intervention of the research was “Champa Sri local dance” for 60-69 year-old women volunteers, who were healthy and were not recorded of nephrotic disease. The dance training program had started from week 1-16, 3 days per week for 50 minutes each, starting from 04.10 pm - 05.00 pm. The dance was performed on Wednesday, Thursday and Friday. Also, there was a control group in the study. Then, the calculation of the sample size was provided to compare the average scores between two groups of population<sup>3</sup>. The samples were divided into two groups including the experimental group and the control group. Each group consisted of 35 people, who voluntarily participated in the project. Then, the participants performed the simple randomization. The data of “Champa Sri local dance” in experimental group were collected from April – June 2018. It was divided into two periods including base line and 16 weeks. The data collection was taken at the same place as the dance practice, which was the meeting room of Nadun Sub-district Municipal. However, the data collection of the control group was taken at a meeting room, Khan Thararat Sub-district and Health Promotion Hospital, Kantharawichai district. The clinical examination was submitted to the clinical pathology laboratory at Mahasarakham Hospital. Additionally, the quality test of the tools including the clarification form, consent form and the record form were passed by three experts completely. Moreover, the compensation for female volunteers who participated in the dance training was received transportation fees for every trip of the dance training and every time of the collection of laboratory tests.

The test within the group used the pair t-test to analyze the differences for the data of normally distributed test. Then, Wilcoxon signed-rank tests were used for non-normally distributed tested data. The test between groups used the Independent T-test to analyze the differences when the data were normally distributed. Then, Mann Withney U test was used for the data of non-distributed test. The researcher evaluated volunteers with helping from the community leaders to clarify, persuade, volunteer and sign the consent form.

### RESULTS

1. There were 30 participants in the experimental group with the average age of 65.770 (SD = 2.12) and the control group were 30 participants with the average age of 64.87 (2.675). Five female volunteers participated in experimental group dropped out, control group as same as too.

#### The comparison of estimated eGFR:

- 1 The change of eGFR of the participants within the group before and after the dance training using pair t-test found that before and after the experiment in the experimental group were significantly different ( $p < 0.05$ ), control group as same as too. Also, the mean score of eGFR after the experiment was lower than the experimental group.
- 2 The change of eGFR between groups before and after the dance training using the Independent T-test showed that the percentage of eGFR in the experimental group's mean had a higher value (lower risk) and creatinine had a lower value (lower risk) than the control group. After the experiment of both groups, there was a significant difference in statistic ( $p < 0.05$ ), but the BUN values had no statistically significant differences ( $p > 0.05$ ) as showed in Table 1-2
- 3 The changes in physical activity and food dietary at home between groups before and after the experiment were not significantly different ( $p > 0.05$ ). Therefore, the study was indicated that the experimental and the control areas had similar living styles.

**Table 1. The comparison of the changes of eGFR, creatinine, BUN and complete blood count (CBC) before and after “Champa Sri local dance” between groups by using the Independent T-test.**

Dependent Variable	Before Training				After Training			
	Exper G. M(SD) n = 30	Control G.M(SD) n = 30	t	p-value	Exper G. M(SD) n = 30	Control G.M(SD) n = 30	t	p-value
eGFR	72.97 (15.55)	73.10 (14.92)	-0.03	0.975	81.67 (11.87)	73.38 (16.58)	2.22	0.030
creatinine	0.85 (0.15)	0.86 (0.16)	-0.32	0.750	0.75 (0.11)	0.88 (0.19)	-3.05	0.004
BUN	12.1 (2.31)	11.40 (2.19)	1.26	0.213	11.06 (2.25)	11.6 (2.35)	-0.89	0.375
White blood cell (WBC)	3.62 (1.10)	4.34 (1.63)	-1.99	0.051	5.00 (1.03)	4.28 (1.62)	2.06	0.044
red blood cell (RBC)	4.43 (0.28)	4.58 (0.30)	-1.97	0.053	4.63 (0.23)	4.46 (0.31)	2.43	0.018
Hemoglobin (HGB)	12.00 (0.74)	12.12 (0.59)	-0.65	0.515	12.92 (0.84)	11.77 (0.74)	5.61	<0.001
Hematocrit (Hct)	40.18 (2.31)	39.18 (1.92)	1.81	0.074	40.04 (2.40)	38.83 (2.34)	1.98	0.052
Platelet count	272,700.00 (58,069.01)	274,866.67 (55,032.11)	-0.148	0.883	275,883.33 (44,270.39)	281,833.33 (50,612.85)	-4.89	0.627

**Table 2. The comparison of the changes of weight before and after “Champa Sri local dance” between groups by using the Mann-Whitney U test.**

Dependent Variable	Before training				After training			
	Exper G. M(SD) n = 30	Control G.M(SD) n = 30	Z	p-value	Exper G. M(SD) n = 30	Control G.M(SD) n = 30	Z	p-value
Weight	56.486 (10.638)	55.570 (9.821)	-0.037	0.971	52.363 (3.589)	55.379 (8.312)	-2.004	0.045

## Discussion

This was the first study to support novel evidence about the effects of moderate intensity aerobic exercise by using “Champa Sri local dance” in renal function parameters in healthy elderly female. The study indicated that the differences of the eGFR and creatinine before and after the dance training between the experimental and control groups were statistically significant ( $p < 0.05$ ) and the percentage of eGFR and creatinine in the experimental group's mean had a higher value (lower risk) than the control group.

1. To compare the differences in the amount of eGFR, creatinine and BUN before and after the dance training between groups. The eGFR's result had a higher value (lower risk) than control group. It was

consistent with eGFR's result by using duration of exercise training in large Chinese population<sup>4,9</sup> and aerobic exercise training in non-dialysis chronic kidney disease<sup>5</sup>. It helps improving the vascular function and maintain the function of the arteries. It also helps reducing renal arterial flow by means of the increased renal sympathetic nerve activity<sup>6</sup>. The strength and balance<sup>7,12</sup> of exercise resulted in increasing the values of eGFR, creatinine, creatine kinase<sup>12</sup> as well as correlating with the proportion of creatinine and weight. In addition, the 4-month period was considered to be appropriate<sup>9,11,12</sup> for training which can result in significant differences between the groups. Also, if the training has been done for 12 months, it may change inversely with pulse wave velocity<sup>10</sup>. This was good for blood

circulation. For the decrease of BUN values in this experimental group was similar to the results of the cycling exercise and the effects of exercise on laboratory test results<sup>12</sup>. However, the BUN values between the groups did not have the statistical difference as same as the moderate exercise intensity within 6 months<sup>8,14</sup>. This may be due to the increase or decrease of the BUN values which was correlated with muscle mass, dehydration<sup>16,17</sup>, uric acid quantity<sup>18,19</sup>, drug use and illness<sup>27</sup>, etc.

2. To compare the differences in the amount of CBC before and after the dance training between groups. The result of WBC, RBC, HGB showed a higher value than control group. It was because the regular and continuous exercise with the moderate intensity which will result in increasing of WBC, RBC, HGB and Hct. The platelets were decrease and the immune levels were balanced<sup>13,20,21,22,28</sup>. It also increased the circulation of immunoglobulins, neutrophils and natural killer cells<sup>23,28</sup>. However, the results of strength exercise which were compared with the aerobic exercise found that the values of RBC, HGB, Hct and mean Corpuscular Volume (MCV) were decreased, but the number of platelets was increased<sup>24</sup>. Anyhow, this may be related to Malnutrition<sup>25</sup> and dehydration<sup>26,27</sup> conditions as well as the decreased values of Hct may be related to the anemia condition. However, the values of HGB and MCV values for age and gender must be compared additionally<sup>29,30</sup>.

### Conclusion

The native dance training of the northeastern region of Thailand (Champa Sri local dance) helped increase the efficiency of the eGFR.

### Recommendation in this Research:

1. The duration of the dance training, the frequency and the number of days should be increased in order to check the differences in the change of the other related physical changes.
2. There should be more records of the use of modern and traditional medicines, or even the treatment with other alternative medicines which are available in the area.
3. The risks of diabetes and high blood pressure should be checked as it is one of the factors affecting the rate of renal filtration and other related physical changes.

### Recommendation for Further Studies:

1. The training of Champa Sri local dance in the next time should have activities to monitor and control food dietary and medicine. Also, the physical activities at home should be clearly determined together with the assessment of happiness in the activity participation.
2. The training of Champa Sri local dance next time should increase the skills of remembering details in the daily routine, physical activity, good dietary. Thus, the target group will be self-recorder.

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# A 10-Year Follow-up of Rehabilitation of Severely Atrophied Edentulous Mandible with Implant Supported Over Denture: A Case Report

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## Abstract

**Background:** Retention and support for the conventional complete dentures primarily dependent upon the residual alveolar ridge and mucosa. Patients with poor mandibular ridge foundation usually suffer from inadequate denture retention and stability. In such cases, implant-supported overdenture treatment provides improved prosthesis retention and support and thus greatly increasing patient's acceptance toward prosthesis as when compared to conventional dentures.

**Case Report:** The present case report describes a successful rehabilitation of resorbed mandibular ridge with an overdenture supported by two implants and 10 years of follow-up was performed and discussed.

**Conclusion:** Implant-supported overdenture provides a strong return for the investment in treatment time and expense. The clinical outcome of this treatment is significantly better than that achieved with conventional mandibular dentures, especially when patients are experiencing technical problems because of compromised prosthesis retention and stability.

**Keywords:** *Atrophied mandible, ball attachment, implant overdenture, follow-up, Dental Implants.*

## Introduction

Dental implants are tooth-root analogue devices inserted into the jaw-bone and have been increasingly used to support different types of dental prostheses such as fixed partial dentures, fixed complete dentures and removable complete dentures.<sup>1</sup> Implant dentistry has improved the patient's satisfaction by improving

the retention, stability, function, aesthetics and the same time preserving the residual bone, especially in the mandible. Implant-supported overdentures have expanded rapidly as a successful treatment modality to rehabilitate completely edentulous patients.<sup>2</sup>

Several studies have indicated that the employment of implant supported overdentures within the mandibular bone is an effective and efficient treatment modality<sup>3,4</sup> particularly in patients with excessive loss of residual bone.<sup>5</sup> The survival rate of implants in the front region of the mandibular bone is excellent and the rate of surgical complications is very low. Moreover, implants demonstrate a reduced rate of residual ridge reduction within the anterior mandibular jaw area.<sup>6</sup> The treatment selection depends on the patient's individual needs and treatment modalities along-side their monetary standing. Two dental implants are usually considered the minimal

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number necessary for mandibular implant overdenture treatment.<sup>7</sup> In this case report, patient with resorbed edentulous mandible was successfully rehabilitated using two dental implants placed in the interforaminal region with ball abutments opposing conventional maxillary complete denture and 10 years of follow-up was performed and deliberated.

**Case Report:** A 54-year-old female patient reported with a chief complaint of loose acrylic complete dentures and difficulty in chewing in year 2010. Patient gave history of extraction 20 years back and since then she has been wearing the denture. The present denture, she is wearing; is her fifth denture. She was not happy with the retention of the denture as her complaint that the denture lifts up during eating and talking. Clinical and radiographic examination [Figure 1] revealed severe alveolar bone loss in the maxillary and mandibular residual ridges. There were no compromising systemic considerations. The blood reports of the patient were checked. The treatment plan was formulated, which comprised of mandibular implant-supported overdenture and conventional maxillary denture. The procedure was explained to the patient and informed consent was obtained. Two implants (A8, Ankylos C/X Implants, Dentsply, Sirona, US) of 3.5 mm diameter and 8 mm length was chosen according to the dimension of the bone. Under antibiotic prophylaxis and standard aseptic protocol, nerve block and infiltration anesthesia was administered. A full thickness crestal incision from first premolar to first premolar was given and muco-periosteal flap was reflected and osteotomy was performed in both the mandibular canine regions. [Figure 2] A paralleling tool was placed to check the implant parallelism and the implants were then threaded into position using a hand ratchet at 30 N cm countersinking the implant crest module at the crestal bone level and cover screw was placed and panoramic radiograph was taken [Figure 3]. On the 7th day of surgery, suture was removed and after 4 weeks the procedure of new complete denture began. Border molding, jaw relation record, try-in and denture delivery was completed [Figure 4, 5]. Twelve weeks postoperatively, osseointegration was evaluated clinically as well as radiographically using panoramic radiograph and both the implants were found to be rigidly fixed with an adequate zone of healthy, keratinized gingiva without any sign of crestal bone loss and the implants were ready to receive the prosthesis. The second-stage surgery was performed and the implants cover screws were removed and healing abutment were

screwed into the implant body [Figure 6]. The patient was recalled after two weeks, healing abutments were removed and a periodontal probe was used to measure the gingival cuff height at the right and left canine site implant position and ball abutments were tightened to the implants [Figure 7]. Self-cure acrylic was placed into the relieved space and denture was seated into patient's mouth and allowed to cure, when the patient was biting in centric relation [Figure 8]. After the acrylic is set, denture was removed and modified surface was finished and polished [Figure 9] and panoramic radiograph was taken post-operatively [Figure 10]. The patient was instructed for the use of soft brush and floss for maintenance of area around the implant ball abutments. The patient was recalled at one week, one month, three months and six months follow up appointments. The patient was delighted with the adequate retention, stability, comfort and function of the mandibular implant retained overdenture to her complete satisfaction. The occlusion was found stable; the denture and attachments were clean. The attachment system was devoid of any sign of wearing during the period.

In year 2020, the patient reported and mentioned that maxillary denture is fractured in the midline and mandibular denture was loose. She was not happy with the loose mandibular denture. On intra-oral examination, soft tissue covering (gingival cuff) around the implants was found to be healthy and attachment level was higher when compared with ten years ago photographs. There was slight plaque accumulation on ball abutments was noted. [Figure 11] On radiographic examination, there was minimal or no bone resorption noted around the implants when compared with ten years ago radiograph. The male attachments were evaluated and found to be loose and were not precisely fitting. The treatment planned was debridement of ball attachment, replace the male component and fabricate the metal based maxillary and mandibular dentures [Figure 12]. After the replacement with new dentures and attachments, patient was highly satisfied with the function and aesthetics.

## Discussion

Implant-supported overdenture provides many advantages over conventional denture therapy, like decreased bone resorption, reduced prosthesis movement, better esthetics, increased occlusal function and preservation of the occlusal vertical dimension etc. It is demonstrated that conventional mandibular complete denture produces significantly more patient problems



than maxillary complete dentures, primarily as a result of poor prosthesis retention.<sup>8</sup> Denture retention may be a major problem in patients with severely resorbed ridges, but placement of two or more implants allows optimal retention with patient satisfaction and performance. It has been reported that when implants are placed, the bone gets stimulated by the forces transmitted from implants; resulting minimal bone loss.<sup>9</sup> In the present case report, atrophied mandibular edentulous ridge was rehabilitated with overdenture supported with two implants and after ten years of follow up, minimal or no bone resorption was observed in comparison with the panoramic radiograph which was taken ten years ago. Although the support is shared by the tissues covered by the denture base, two implants usually provide sufficient stability in mandibular ridges.<sup>10</sup> Hygiene condition and residential maintenance procedures are improved with an overdenture.<sup>11</sup> For of these reasons, mandibular two implant overdenture has been described as a customary of take care for edentulous mandibles.<sup>12</sup> The two-implant overdenture therapy may be a consistent and reliable therapy for patients with an edentulous mandible. Many authors have hypothesized that it is appropriate to use two implants with an interconnector parallel to the hinge axis and a resilient overdenture on an ovoid or round bar.<sup>1,13</sup> Survival rates within the two implants supported overdenture groups compared with four-implant overdenture groups appear to be equivalent for patient satisfaction.<sup>14</sup> In the present case report author have placed two implants within the inter-foraminal region to provide retention and stability to the overdenture. The ball abutments were selected as they are cost effective and less technique sensitive, as compared to bar attachment which needs more inter-ridge space. Further, it has been reported that ball abutments are more advantageous with regard to optimizing stress and minimizing denture movement.<sup>15</sup> The anterior mandible has demonstrated a high predictability for implant-tissue integration and consequently, there's no use for planning the position of additional implants in anticipation of potential implant integration failure.<sup>16</sup>

### Conclusion

Implant-supported overdentures offer a strong return for the investment in treatment time and expense. The clinical outcome is significantly better than that achieved with conventional mandibular dentures, especially when patients are experiencing technical problems because of retention and stability of the compromised prosthesis. Patients with implant-supported overdentures are

highly satisfied with their dentures and show increased efficiency in mastication.

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# Vascular Complications of Type 1 Diabetes among Indian Patients

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## Abstract

Diabetes increases the risk of developing various irreversible complications. Demographics of Type 1 Diabetes (T1D) and its complications vary by country. Therefore, we need to examine data on Indian T1D patients and it is not enough to infer from international studies. This review aims to summarize the existing literature around micro and macro-vascular complications of T1D on Indian patients. We then discuss future directions and advocate more reports in this area on Indian T1D patients.

**Keywords:** Type 1 Diabetes, Indian Type 1 Diabetes patients, Diabetic Retinopathy, Diabetic Nephropathy, Diabetic Neuropathy.

## Introduction

Type 1 Diabetes (T1D) characterized by endogenous insulin deficiency, commonly occurs in children, although adults are also affected. According to International Diabetes Federation (IDF), globally newly diagnosed cases of T1D (0-14 years) have increased from 79,000 in 2013<sup>1</sup> to 96,100 in 2017<sup>2</sup>. Globally total number of children (0-14 years) with T1D were reported to be 5,86,000 in 2017<sup>2</sup> and from these 1,28,500 live in India, second highest in the world after the United States<sup>2</sup>. Estimates of the burden of T1D in India are few and have wide range, 3.8/1,00,000/year (1995-2008)<sup>3</sup> to 10.2/1,00,000/year (2008)<sup>4</sup>. In India T1D is one of the commonest endocrine and metabolic disease of childhood. However, in the absence of a nationwide registry, it is difficult to assess its true burden. Technological advancements in the management of T1D have improved the survival and lifespan of patients suffering this complex disease. Joslin Diabetes Center,

USA have reported thousands of people living with T1D for >50 years<sup>5</sup>. Early and long-term exposure to hyperglycemia in the presence of a significantly improved life span, increases the likelihood of these patients to develop complications which result in increased morbidity, treatment expenditure, hospital admissions and mortality. Thereby, lowering the quality of life, increasing burden of T1D and adversely affecting the economies of all countries, especially developing<sup>6</sup>.

Current understanding of the burden of these complications, come mainly from T1D cohorts of high-income countries (USA, Europe, Denmark, etc.) which highlight:

- a. Prevalence and incidence of complications of T1D vary hugely between countries<sup>7</sup>. Prevalence of DR among youth with T1D was 12% in Finland(2006-7)<sup>8</sup>, 17% in USA (2009-10)<sup>9</sup>, 0% in Philadelphia, USA (2009-13)<sup>10</sup>.
- b. There are ethnic disparities in diabetes-related outcomes among people with T1D. Higher numbers of diabetic ketoacidosis (DKA) and severe hypoglycemic events (SAE) have been reported in African Americans with T1D<sup>11</sup>.

A recent systematic review, highlighted that ethnic disparity in mortality is present in South Asians (SA)

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patients with T1D<sup>12</sup>. Also, it is well established that Asians are at high risk of obesity, Metabolic Syndrome, coronary heart disease, etc. Whether this places SA T1D patients at higher risk of developing macro-vascular complications, needs further study. In the South East Asian Region (SEAR), India is the largest country and its data is often used to represent SEAR at the global level. This advocates for more studies on this matter from India.

This review aims to present a comprehensive report of studies from India on this matter. Studies that reported prevalence or incidence data on complications are included in Table 1, examined in detail and presented as a narrative with textual description by each complication.

### Diabetic Retinopathy (DR):

**Epidemiology:** The prevalence ranged from 5% to 62.5%. This wide-range could be attributed to factors such as duration of T1D, age of participants and different time-periods of the studies (Table 1). DR has been reported to be common cause of blindness among adults in the western world<sup>2</sup> and is often quoted as most common complication of diabetes. Reports on Indian T1D patients are contradictory. Multicenter survey of Early onset Diabetes in India (MEDI) study, is the only multi-clinic study on T1D patients from India. This was conducted at 7 endocrinology clinics of tertiary-care teaching hospitals across India in 2008. It reported retinopathy as the least prevalent<sup>13</sup> whereas, another study<sup>14</sup> reported retinopathy as the commonest (5% v/s 35.2%). This difference in prevalence of DR, even with similar mean age of participants in both studies (17.6±7.8 v/s 16.5±9.9 years), could be attributed to differences in inclusion criteria of study [age at diagnosis ( $\leq 20$  years versus  $\leq 25$  years)], multi-center versus single-center and time-period of study 2008 versus 1992-2008.

Age-gender adjusted prevalence of DR was reported by a single-center study in Chennai as 62.5%. This study also highlighted that sight threatening diabetic retinopathy (STDR) was seen more among patients with longer duration of T1D (>15yrs) than shorter duration ( $\leq 10$ yrs), 44.1% vs 0% respectively<sup>15</sup>.

Incidence of DR among Indian T1D patients, was reported as 7- 8% per year (77.4/1000 person years)<sup>16</sup>. Only one article reported on progression of DR and in their study of 4 years they found progression in 40% of T1D patients with DR<sup>17</sup>. However, their results need to be taken conservatively. As this study had small sample

size (n=40), details regarding participant recruitment, clinical characteristics of excluded patients was not mentioned<sup>17</sup>. Studies included in Table 1, used 4-7 field stereoscopic fundus photograph to diagnose DR, and grading these retinal images by Early Treatment Diabetic Retinopathy System (ETDRS).

**Risk factors for DR:** Among the studies reviewed, only few presented the association of risk-factors with DR. Duration of diabetes was the strongest independent risk factor (OR:3.9/year<sup>18</sup>, OR:1.99/5year<sup>15</sup>). More than 50% of patients with long duration T1D (> 15years) had DR<sup>18</sup>. HbA1c was found to be independently associated with DR (OR: 1.19) in one study<sup>18</sup> and not in others<sup>15</sup>. Whereas gender and age at diagnosis of T1D were not found to be associated<sup>13,15,17-21</sup>. T1D patients with DR when compared with those without DR were described as significantly older, with longer duration of diabetes DR (OR: 3.9/year<sup>18</sup>, OR:1.99 per 5year<sup>15</sup>), had higher BMI, waist circumference (OR:1.3) and BP (OR:1.4)<sup>15</sup>.

**Diabetic Nephropathy (DN): Epidemiology:** Prevalence of DN ranged (Table 1) from as high as 28.2% in 2002<sup>22</sup> to as low as 3% in 2019<sup>21</sup>. This cannot be interpreted as decline in prevalence of DN among Indian T1D patients, as these are reports from different clinic-based studies. Nephropathy was repeatedly stated as the 2<sup>nd</sup> most common microvascular complication of diabetes among Indian T1D patients<sup>16,13</sup>, occurring at the rate of 6.2% per year<sup>16</sup>. One report stated nephropathy to be the least common complication (6.8% prevalence)<sup>14</sup>. Prevalence of DN was seen slightly higher among males than females (8% v/s 6%, statistically non-significant). Age of development of DN was reported as 25.0 ± 6.0 years<sup>18</sup>. A study on South Indian T1D patients stated that age-gender adjusted prevalence of nephropathy was higher among T1D patients with Metabolic Syndrome (MetS) than without (51.3% versus 15.1%)<sup>20</sup>. Studies included in Table 1, assessed DN using Urine albumin excretion rate (UAE)<sup>20</sup> and defined nephropathy if urine protein excretion was >500mg/24h on more than two consecutive occasions<sup>16,14,20,13,18,22</sup>, after ruling out systemic or urinary tract infection.

**Risk factors of DN:** Duration of diabetes was the strongest independent risk factor for DN. However, for the same duration of T1D, prevalence of DN varied considerably by the studies. Duration of T1D  $\leq 5$  years: 10.3%<sup>22</sup>, 2%<sup>18</sup>, 0%<sup>14,19</sup>; >15years: 12.1%<sup>14</sup> to 22.2%<sup>18</sup>. Among other risk factors associated with DN, hypertension and MetS (OR: 4.92)<sup>20</sup> were reported to

have independent association, where as glycemetic control and age at diagnosis of T1D did not<sup>18</sup>. Prevalence of hypertension was 22.7% among T1D patients with microalbuminuria and only 1% among those with normoalbuminuria<sup>22</sup>.

Youngest age of development of DN among T1D patients was reported as 19 years<sup>19</sup>, irrespective of age at diagnosis of T1D and gender.

**Diabetic Neuropathy:** Diabetic neuropathy is commonly classified into two groups, peripheral and autonomic neuropathy. All the articles listed in Table 1 assessed Peripheral Neuropathy (PN) and did not report Autonomic Neuropathy (AN). Asevaluation of AN is difficult and requires sophisticated instruments. PN was diagnosed by bilateral absence of ankle jerks and/or bilateral distal sensory loss or any other severe form of neurological deficit<sup>18</sup> in studies before the year 2000. Recent studies have used biothesiometer and defined Vibratory Perception Threshold (VPT)  $\geq 20$  as PN<sup>20</sup>.

**Epidemiology:** Prevalence of PN ranged from 3.0% to 29.8% (Table 1). The extremely low prevalence (3%) was reported among south Indian T1D patients<sup>18</sup>. Other studies on south Indian T1D patients also reported similar prevalence (range upto 10%)<sup>3,14,20</sup>. Study that reported high prevalence of PN (29.8%), included T1D patients from one city of North India (Lucknow). This stark difference in prevalence of DN could be attributed to different assessment techniques and, different definitions of PN. There may also exist difference in available treatment, patient support or regional difference, which needs to be studied further.

Most studies reported PN as least common micro vascular complication of T1D among Indian patients but two studies found it to be the most common<sup>19,13</sup>. Prevalence of PN among T1D patients with MetS was 58.8% and those without MetS was 15.6% (age-gender adjusted)<sup>20</sup>. We did not come across articles that exclusively studied PN among Indian T1D patients or reported age-gender adjusted prevalence of PN.

**Risk factors of PN:** Slightly higher prevalence of PN was reported among males than females (3.7 v/s 2.4%), but statistically insignificant<sup>18</sup>. PN was found even in patients with shorter duration of T1D (<5 years): 29%<sup>19</sup>. With every year increase in duration of diabetes, the odds of PN were 2.3(1.5-3.7) independent of confounders<sup>18</sup>. Glycemic control was not found to be independently associated with PN. On comparing T1D

patients with and without MetS, the odds of developing PN were higher among those with MetS(OR: 3.65) adjusted for confounders<sup>20</sup>.

**Macro-Vascular complications:** Diabetes complications due to damage to larger blood vessels are the macro-vascular complications and include Coronary Heart Disease (CHD) and Peripheral Vascular Disease (PVD). These are common cause of mortality among T1D patients.

Only two articles, studied macro-vascular complications. They reported prevalence of CHD and PVD as 0.5% each<sup>18</sup> and incidence of CHD and PVD as 1.2 and 2.7/1000 person years, respectively<sup>16</sup>.

## Discussion

In the above section, we have presented a comprehensive report about chronic complications of T1D among Indian patients, based on studies from across India. As these studies were clinic-based and not at population level there by, prevalence or incidence reported in them are based on the total number of patients attending that particular clinic. Most of these clinics were tertiary-care referral center and cater to the city and nearby districts. Direct comparison of these studies with each other and with studies from other countries is difficult, as inclusion – exclusion criteria varied between the studies, different time-periods of study, use of secondary versus primary data and inconsistent definition of T1D across studies (antibody testing is still uncommon in routine clinical practice in India). Also, some articles, studied T1D under the umbrella of youth-onset diabetes<sup>13,17</sup> and not all reported prevalence of complications by type of Diabetes<sup>19</sup>. These reasons also resulted in widely varied estimates of prevalence of complications in these studies. Age-gender adjusted prevalence and incidence of complications was reported by only one study. Duration of diabetes and HbA1c, were consistently reported to be risk factors for vascular complications. Also, MetS was reported to increase odds for microvascular complications. Across all studies, prevalence of macro-vascular complications was reported as <5%.

The Diabetes Control and Complications Trial (DCCT) brought a paradigm shift in the treatment of T1D patients. Its follow-up study EDIC and other international cohorts such as EURODIAB, FINNDANE and T1D Exchange Clinic, have brought much insight about T1D and the daily life struggles of patients. There

exists a lack of understanding pertaining to quality of life of Indian T1D patients and real-world scenario of Indian T1D clinics (challenges, routine procedures, patient education, care giver knowledge, screening facilities and recommendations followed). This exists, due to following challenges in India:

1. In India current research studies and government programs pertaining to Diabetes are focused on T2D. And T1D is still fighting its place under the sun.
2. In India, doctor hopping is a common practice specially among patients with chronic conditions. This, results in poor follow up rates at the clinic and undermines the formation of a cohort, which can be invited for research.
3. Single center studies are more common in India. National-level registry of diseases both communicable and non-communicable are uncommon. The multicenter “Young Diabetes Registry” (7-sites) of Indian Council of Medical Research was launched with the purpose to study

diabetes among the young, addressing the issue of diversity in culture and environment.

A ‘Registry: network of all clinics treating T1D patients’ across India, is a simple solution to the above listed problems. It’ll enable clinics and hospitals across India, to extract meaningful information from their patient’s data. This information will aid to enhance awareness about T1D, advocacy for allocation of resources towards welfare of T1D patients, reinforce knowledge-sharing between health care teams and thereby improve standards of care.

### Conclusion

Micro-macro vascular complications increase the burden of T1D. Reports on this matter from India are few. The absence of data results in invisibility of patients and worsening of their condition. To have true understanding on this matter in a vast and diverse country like India, it has become increasingly important that we need more studies from different parts of India. Because such data will contribute to improve the treatment and healthcare planning for Indian T1D patients.

**Table 1: Reports of Complications in T1D from India [CA: Current Age, ADT: Age at diagnosis of T1D, DT: Duration of T1D, NM: Not mentioned]**

Reference	Participant description	Prevalence/Incidence		
		Retinopathy	Nephropathy	Neuropathy
18	ADT: ≤20years CA*: 25(10-50) years DT*: 4.0(3 – 34) years *Median (Min-max)	83/617(13.4%)	44/617(7%)	19/617(3%)
22	NM	NA	22/78(28.2%)	NA
19	ADT: 10.6 ± 4.5years DT: >3years	11/67(16.4%)	9/67(13.4%)	20/67(29.8%)
14	ADT: 12.6 ± 6.3years DT: >5years CA: 15.9 ± 7.3years	79/224(35.2%)	17/249(6.8%)	17/195(8.7%)
3	ADT: NM DT: NM CA: 0-25years	14/166(8.4%)	20/230(8.6%)	12/230(5.2%)
13	ADT: 12.0 ± 5.4years DT: NM CA: 17.6 ± 7.8years	27/535(5%)	29/535(5.4%)	32/535(6%)
15	ADT: 10-25years DT: >2years	80/150(53.3%)	NA	NA
20	ADT: 15.6 ± 5.3years DT: 10.4 ± 1.1years	78/254(20.7%)	81/388(20.8%)	20/286(10.4%)

Reference	Participant description	Prevalence/Incidence		
		Retinopathy	Nephropathy	Neuropathy
21	ADT: $\leq 18$ years DT: NM CA: NM	16/164(9.75%)	5(3.0%)	Not Done
16	ADT: $17 \pm 4.3$ years DT: a. At baseline: $2.2 \pm 3.7$ years b. At follow-up: $10.1 \pm 6.7$ years	7-8% per year	5.8 – 6.2%/year	7.8%/year

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# Mental Health Among Orphan and Non-Orphan Adolescents in Delhi-NCR

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## Abstract

Mental health is defined as a state of happiness in which each person understands his or her own potential of handling challenges of life. A mentally healthy person can work effectively and joyfully and is able to make an influence on others. Stress coping mechanism largely depends on the upbringing pattern of the family. Orphan is a person who has lost both his parents and mostly learn to cope with the issues while experiencing life adversity. Aim: of the study is to study the mental health among orphan and non-orphan adolescents.

**Method:** 40 orphan adolescents were selected from the different orphanages of national capital region of India using purposive sampling method, similarly 40 non-orphan adolescents were selected from different schools. General health questionnaire- 28 was used to measure somatic, anxiety, social dysfunction and depression.

**Result:** Both the group were found significantly different on somatic ( $t= 10.30; p<.001$ ), anxiety ( $t= 10.30; p<.001$ ), social dysfunction ( $t= 10.30; p<.001$ ) and depression issues ( $t= 10.30; p<.001$ ).

**Conclusion:** Study shows that orphans mental health was poor than non-orphan adolescents.

**Keywords:** *Mental health, Orphan, non-orphan.*

## Introduction

Mental health comprises of our feelings, cognitive process and enlightenment. It effects our thinking, feeling, life processes and also effects our stress handling skills. Mental health is very important at every stage of life<sup>[1]</sup>. Many factors such as biological, brain chemistry genes, life experiences such as trauma or abuse and family history of mental health are causes of mental health problems. According to World Health Organization when children do not achieve social and behavioural potential then they lose their confidence and suffer from many mental health issues<sup>[2]</sup>.

Mental health play important role in Adolescent life and this is the significant period and crucial as the changing needs of the adolescents arise during this period. Adolescents are the future productive citizens of a country. Social problems like delinquency, crime, suicide, alcoholism, drug addiction, prejudice, under

achievement and dropping out of school are more sensitive problems in adolescent<sup>[3]</sup>. WHO says that worldwide 10-20% of adolescents experience mental health half of all mental illnesses begin in the age of 14 and two -quarters by mid20s. Therefore, Adolescents face major challenges like stigma, isolation and discrimination, as well as lack of access to health care and education facilities.

Recent studies have identified mental health problems - in particular depression, as the largest cause of the burden of disease among young people.

Poor mental health can have serious effects on the wider health and development of adolescents and association with several health and social outcomes such as higher alcohol, tobacco and illicit substances use, adolescent pregnancy, school dropout and delinquent behaviours. Parenting style refers to the way parents interact with each other and with children. Studied had

shown that parents -child interactions and relationships and parenting style affect mental health both in positive and negative ways<sup>[4]</sup>.

According to National Health Survey -3 which includes data from 2005 to 2006, 41 % of India's population is under 18 and It was also the largest child population in the world. According to the study, an additional 13 per cent of these children live in single-parent households, who are also socially and economically marginalized than that houses with the both parents. 85% children with single -parents are mostly living with their mothers and 4%of Indian population are orphans. However, challenges of mental health are different for orphans.

Orphan is defined as abandoned children, who has lost their parents. Studies reveals that India is home to 20 million orphans. states Uttar Pradesh, Madhya Pradesh, Chhattisgarh are home to billions of orphan children under age 18. This may rise up to 7.1 million and states in eastern region Bihar, Orisha, Jharkhand and west Bengal have up to 5.2 million till 2021. These states have double number of orphan children. Poverty has played a significant role to increase the number of abandoned and orphan children in these states. Military affected areas are also to be partially blamed. Importance is given to understand their physical states and mental health by several organizations all over the world. According to United Nations International Children's Emergency Fund (UNICEF), children those who have no parents or have a single parent, are malnourished and don't reach till their full potential of psychological and intellectual capabilities<sup>[5]</sup>. Another study in Tanzania, shows comparison of psychological health of orphans and non-orphans, originates wide evidence of reduced psychological wellbeing for orphans. This shows most orphans having psychological impairment, especially affected behaviour changes such as depression, anxiety and low self-esteem<sup>[6]</sup>. The world bank also says orphans have higher tendencies toward social disorganization than non-orphans<sup>[7]</sup>. To fulfil this gap present study was conducted with following objectives.

**Objectives:**

1. To study the somatic, social dysfunction, anxiety and depression issues among orphan and Non-orphan adolescents.
2. To study the difference in somatic, social dysfunction, anxiety and depression issues among orphan and Non-orphan adolescents.

**Hypothesis:**

1. There would be somatic, social dysfunction, anxiety and depression issues among orphan and Non-orphan adolescents.
2. There would be significant difference in somatic, social dysfunction, anxiety and depression issues among orphan and Non-orphan adolescents.

**Methodology**

**Design:** Descriptive correlational research design was used to conducted the study.

**Sampling:**

**Sampling technique:** Purposing sampling was used.

The samples were selected from 5 orphanage located in Delhi NCR. A total number of 40 orphan adolescent and 40 non-orphan adolescents were selected as per following inclusion and exclusion criteria's:

**Inclusion Criteria:**

- Age range 13 to 19 year only.
- English and Hindi speakers only.
- Minimum education Higher Secondary School.
- Orphans living in orphanage only.
- Non-orphans living with both the parents.

**Exclusion Criteria:**

- Subjects who were uninterested in study.
- Subjects who were suffering from any serious physical or mental issues.
- Physically handicapped subjects.
- Non-orphan living with single parent.

**Tools:**

**General health questionnaire 28:** The GHQ-28 was developed by Goldberg in 1978 and has since been translated into 38 languages. Developed as a screening tool to detect those likely to have or to be at risk of developing psychiatric disorders, the GHQ-28 is a 28-item measure of emotional distress in medical settings. Through factor analysis, the GHQ-28 has been divided into four subscales. These are: somatic symptoms (items

1–7); anxiety/insomnia (items 8–14); social dysfunction (items 15–21) and severe depression (items 22–28) It takes less than 5 minutes to complete<sup>[8]</sup>.

**Procedure:** To fulfil the objectives of the study, 31 orphanages located in Delhi-NCR were approached, among those 5 orphanages gave the permission to collect the data. 670 orphans living in orphanages were interviewed for their counselling needs. Duration was also used to identify the subject as per inclusion and exclusion criteria of the sample. 40 orphans were selected based on inclusion and exclusion criteria. Subject were

given detailed information about the study and consent was taken from the subject to use the data for research purpose. Data was collected by using GHQ.

## Results Analysis

In this study, the data obtained was analysed by using the Statistical Package for Social Sciences (SPSS) -21 version, paired sample t- test was calculated to see the difference between both the groups Obtained result is mention below.

**Table 1: Mean, S.D and t. test of General Health dimensions**

Variable	Orphan Mean	S.D.	Non-orphan mean	S.D.	t.
Somatic	6.47	4.02	2.15	1.79	6.2*
Social dysfunction	8.40	2.58	3.32	2.39	9.10*
Anxiety	7.27	3.92	2.07	2.54	7.0*
Depression	5.87	3.89	.55	.74	8.5*

**Note.** \* $p < .001$

The above result shows that in somatic complaints, there was significant difference among orphans and Non orphans ( $t = ; p < .001$ ). Similarly, anxiety in orphan adolescent was higher ( $M = 7.27$ ;  $SD = 3.92$ ) ( $M = 2.07$ ;  $SD = 2.54$ ) in Comparison with non-orphan adolescents. Social dysfunction was also higher in orphan adolescent ( $M = 8.40$ ;  $SD = 2.58$ ) ( $M = 3.32$ ;  $SD = 2.39$ ). compared to non-orphan adolescents. depression was higher in orphan adolescent ( $M = 5.87$ ;  $SD = 3.89$ ) ( $M = .55$ ;  $SD = .74$ ). compared to non-orphan adolescents. Result shows that there was significant difference in somatic, social dysfunction, anxiety and depression, demotion in orphan and non-orphan adolescents.

The result shows that orphan adolescent's mental health was very less rather than non-orphan. orphan children face many issues because of parenting lacking or others issues.

## Discussion

Mental health is a very important aspect for both groups. Mental health problem such as depression, anxiety, social dysfunction, stress somatic and other issues among adolescents and early adults are currently estimated to range from 5 to 80% in different populations worldwide<sup>[9]</sup>.

Orphan children suffer from many mental health problems because they don't have their parents or family, they have lack of confidence and their economic condition is very poor and their development is affected by various biological changes. They can't control their emotions any behaviour, therefore, they suffer from many mental health issues.

A similar study shows the psychosocial problems of orphans and non-orphans that prevalence of psychosocial problems (negative emotion, stigma, depression and behavioural problems) were higher among orphans than non-orphan adolescents<sup>[10]</sup>. Other study shows that the orphans are ill-treated by the society, which effects their mental health<sup>[11]</sup>. Because of the many tragedies such as loss of parent at in primary age has caused orphan adolescents loss of parental attachment in their lives. Living in orphanage, deprived orphan adolescents from their parent's attention and love. They face the different environment after the death of their parents<sup>[12]</sup>. These conditions influence orphan adolescents to experience such as depression anxiety, stress, social problem and somatic issues<sup>[13][14]</sup>.

We found in our study that orphan adolescent was highly suffered from mental health with caparison than

non-orphan's adolescents. Another study in Malaysia showed that orphan who are living in orphanage were more depressed and exposed to major depression disorder compared to that those are living with their family<sup>[15]</sup>.

In our study it was found that there was significant difference in somatic, anxiety, social dysfunction and depression among orphan and non-orphan adolescents at (p.001\*). Both hypotheses were accepted. Another finding describes ill-treatment and no counselling care are significantly associated with mental health among orphan and non-orphan's adolescents.

### Conclusion

According to our study there was significant difference in mental health of orphans rather than non-orphan adolescents. Due to lack of family and environment issues orphans suffers higher mental health issues in comparison with non-orphan adolescents.

**Conflict of Interest:** There was no conflict of interest in this study.

**Sources of Funding:** Study doesn't involve any funding since this was the part of SGT university project.

**Ethical Clearance:** Ethical clearance was obtained from SGT University Gurugram. We clearly explained aim of the study to the participants and information was collected after the consent form was filled from each participant. The rights were given to the study participants to discontinue participation at any time and participant name and other information were not used at the time of data collection and all personal information kept confidentially was assured at the study period.

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# A Study to Establish Correlation between Dermoscopic and Clinical Findings of Dermatophytosis

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## Abstract

**Background:** Dermatophytosis is a growing menace these days. Dermoscopy is a simple and non invasive diagnostic technique used in dermatology. But there are few studies on dermoscopy of dermatophytosis.

**Objective:** The present study aims to study the dermoscopic findings of dermatophytosis and to study its correlation with clinical and histopathological findings.

**Materials and Method:** It was a cross sectional study done over a period of 3 months. 100 patients with clinical diagnosis of any form of dermatophytosis, were included after taking an informed consent. Diagnosis of dermatophytosis was made clinically followed by KOH examination. Clinical examination, photographs and dermoscopy was done in all cases. Dermoscopy was taken by hand held dermoscope (Dermlite 4 gen DL4, California USA), with a magnification of 10x. Biopsy was done in selected patients.

**Results:** Out of 100 patients, male-to-female ratio was 1.5:1. Mean age was  $38 \pm 8.7$  years. Mean duration of disease was 3 months. Tinea corporis was the most common type, followed by tinea cruris and tinea facie. Dermoscopic findings of tinea corporis, cruris and facie were -peripherally distributed white scales, red to grey background, red to brownish black dots and globules at periphery, follicular micropustules and perifollicular scales. Tinea capitis showed black dots, broken hair and Morse code hair. Onychomycosis showed yellowish brown discoloration with subungual hyperkeratosis and jagging of free edge of nail plate.

**Conclusion:** In absence of adequate lab facilities, dermoscopy acts as a complementary tool to clinical diagnosis. Dermoscopy helps to initiate early treatment, thus helping to reduce tinea menace.

**Keywords:** Dermatophytosis, Dermoscopy, Tinea, Onychomycosis.

## Introduction

Dermoscopy is a simple, cost effective and non-invasive diagnostic technique used for many diseases

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in dermatology. Its use as a diagnostic tool is spreading beyond the diagnosis of pigmentary disorders. Its usefulness is established in diagnosis of tinea capitis. It is also being utilised increasingly in diagnosing onychomycosis. Dermatophytosis is prevalent as an epidemic in our country and its menace is growing day by day. The diagnosis of dermatophytosis is generally clinical and aided by direct microscopic examination with potassium hydroxide and fungal culture. These conventional tools are time consuming, complex and require training and laboratory settings. There are few studies on dermoscopy of dermatophytosis. The present study aims to establish the dermoscopic findings of various dermatophytosis and to study its correlation

with clinical and histopathological features, thus helping in early diagnosis and early management of dermatophytosis and obviating the need of cumbersome lab procedures.

### Materials and Method

This was a cross-sectional study done over a period of 3 months from September 2019 to November 2019 in the out patient department of dermatology of Krishna institute of medical sciences, karad . One-hundred patients with clinical diagnosis of any form of dermatophytosis, who were willing to be a part of the study, were included.■

After taking ethical clearance and consent, One-hundred patients were included in the study. A relevant history was taken regarding the onset, duration, progression, recurrence and treatment modalities. Diagnosis of dermatophytosis was made by clinical examination which was confirmed with direct microscopic examination with KOH. Clinical photographs and dermoscopic examination were done in all cases. Dermoscopy was taken by a handheld dermoscope (Dermlite 4 gen DL4, California USA) with a magnification of 10x. The contact plate of dermoscope was cleaned with sanitizer to prevent contamination. Biopsy was done in selected patients only.

#### Inclusion Criteria:

1. New clinically diagnosed cases of dermatophytosis.
2. Patients of both genders
3. Patients of all ages.

#### Exclusion Criteria:

1. Patients not willing to give consent for study
3. Those with history of any topical or systemic antifungal treatment in last 3 months
4. Patients with any ongoing treatment with topical or oral antifungals
5. Patients with other comorbidities and immunosuppression.
6. Patients with tinea incognito.

### Results

Total 100 patients of dermatophytosis were included in the study. Out of 100, 60 were male and 40 were females with a male-to-female ratio of 1.5:1. Age of

patients ranged from 15 to 70 years, with a mean age of  $38 \pm 8.7$  years. In our study, median duration of disease was 3 months; it ranged from 15 days to 4 months. 74 patients had acute disease (< 6 weeks) while 26 patients had chronic disease (> 6 weeks). KOH examination was positive in all cases.

Different types of dermatophytosis that were detected in our study are shown (table 1), with tinea corporis (47 %) being the most common type, followed by tinea cruris (32 %) and tinea facie (6%).

**Table 1: Distribution of various types of dermatophytosis**

Sr.No.	Type of Dermatophytosis	Number of Patients/ Percentage
1	Tinea corporis	47
2	Tinea cruris	32
3	Tinea facie	6
4	Tinea capitis	3
5	Tinea mannum	3
6	Tinea pedis	4
7	Onychomycosis	5
<b>Total</b>		100

Dermoscopic findings are enlisted (Table 2). Peripherally distributed white scales was the most common feature seen in 100 % of cases followed by background color varied from red (74%) to grey (26 %). Red dots and globules were seen in 35% cases while brownish black dots and globules were noted in 21% cases. Perifollicular scales were noted in 54 % of cases. Follicular micropustules were seen in 5 cases.

**Table 2: Dermoscopic findings of dermatophytosis and onychomycosis**

Dermoscopic Findings	Number of Patients/Percentage
<b>Background color</b>	
Red	74
Grey	26
<b>Peripherally distributed white scales</b>	100
Moth eaten appearance	65
Bietts collaret like scale	35
<b>Dots and globules</b>	
Red	35
Brownish black	21
Excoriation marks	27
Micropustules	5
Perifollicular scales	54

Dermoscopic Findings	Number of Patients/Percentage
<b>Hair changes –</b>	
Morse code hair	38
Black dots	3
Broken hair	9
<b>Nail changes</b>	
Yellowish brown discoloration	5
Subungual hyperkeratosis	4
Jagged edge of nail plate	3
Onycholysis	3
Nail dystrophy	1

Dermoscopic findings noted in cases of tinea corporis included background diffuse erythema in 30 patients and grey background in 17 patients; brown spots surrounded by a white-yellowish halo (15 patients), follicular micropustules (3 patients); and morse code hair (20 patients). Whitish superficial thin scales were

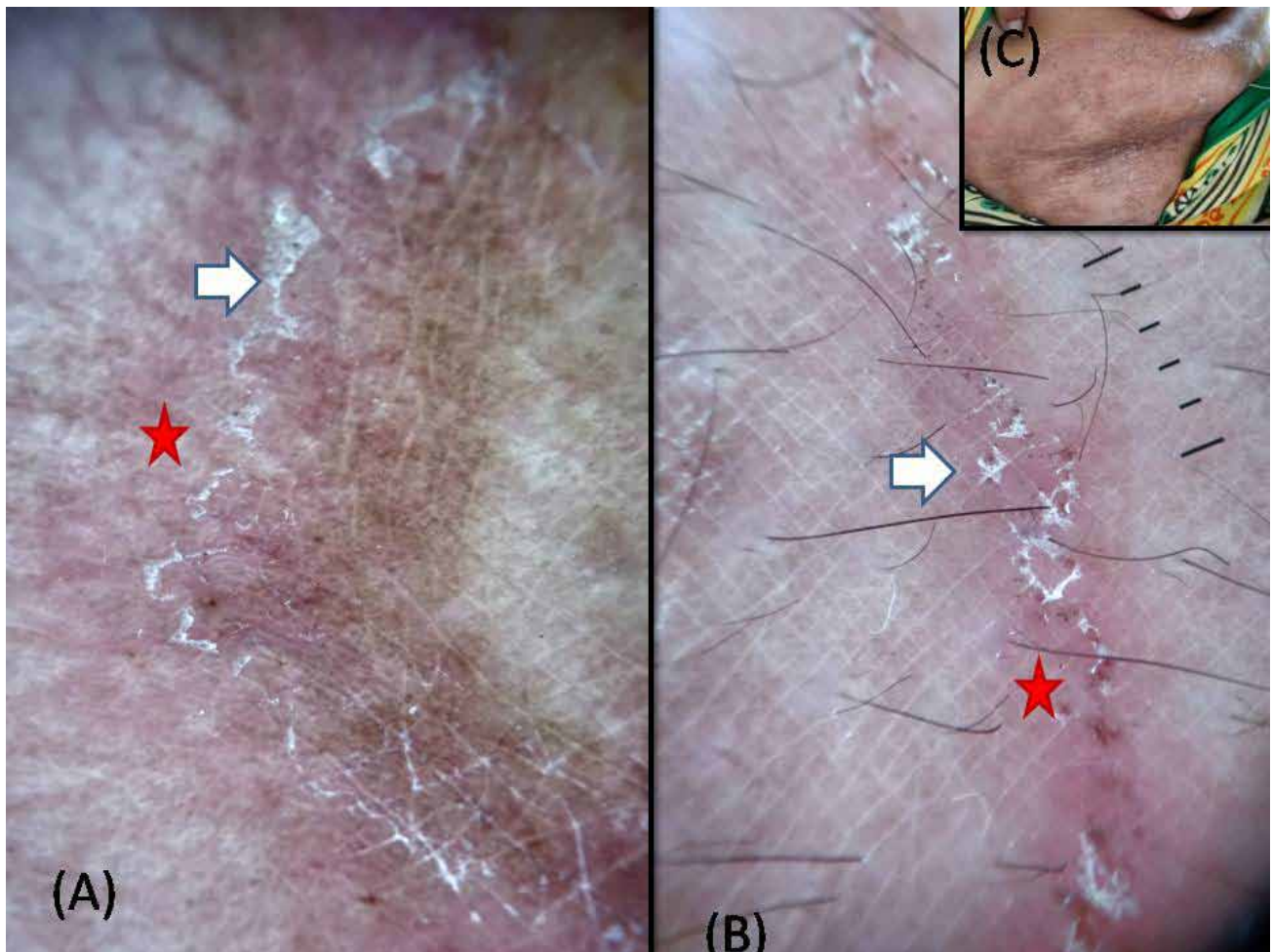
seen at the periphery of all the lesions. Scales were prominent along the skin creases. The vascular pattern is usually monomorphic, consisting of dotted vessels with mainly peripheral distribution. Hair changes included morse code hair (20 patients), broken hair (6 patients).

Dermoscopic findings of tinea cruris, tinea facie were similar to that of tinea corporis.

Dermoscopic findings of tinea manuum and pedis showed fine white scales within palmar and plantar creases with prominent surrounding erythema. Skin markings showed prominence.

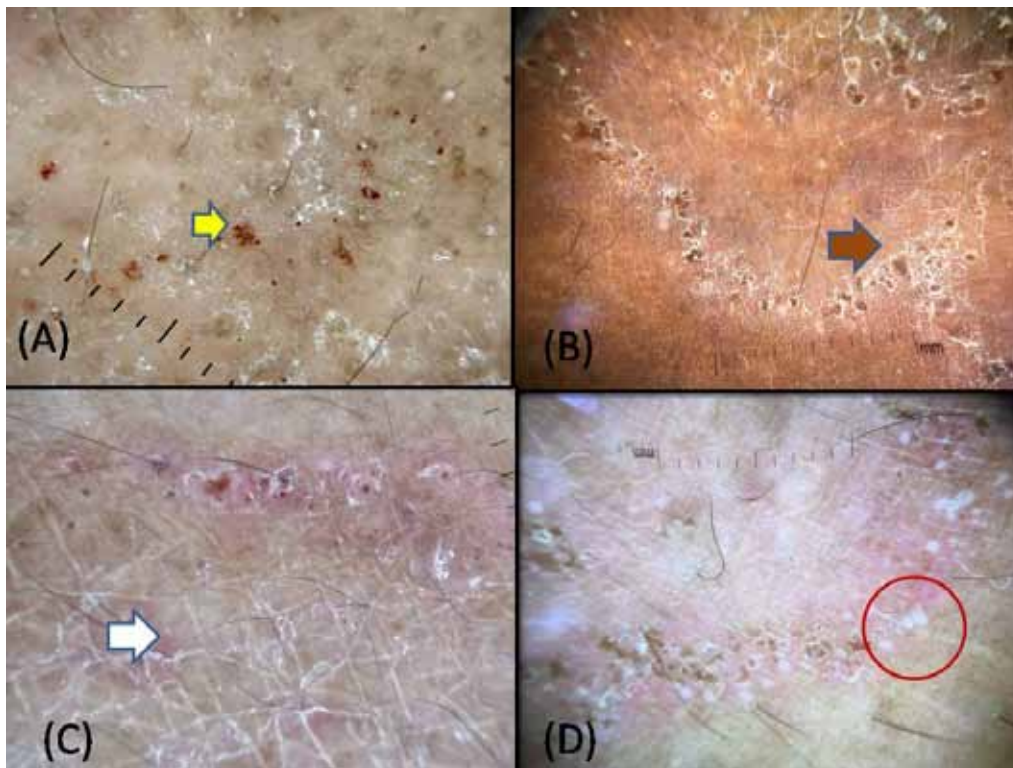
3 patients of tinea capitis showed broken hair, black dots and morse code hair.

5 patients of onychomycosis showed yellowish brown discoloration with subungual hyperkeratosis, jagged nail plate edges, onycholysis with nail dystrophy.

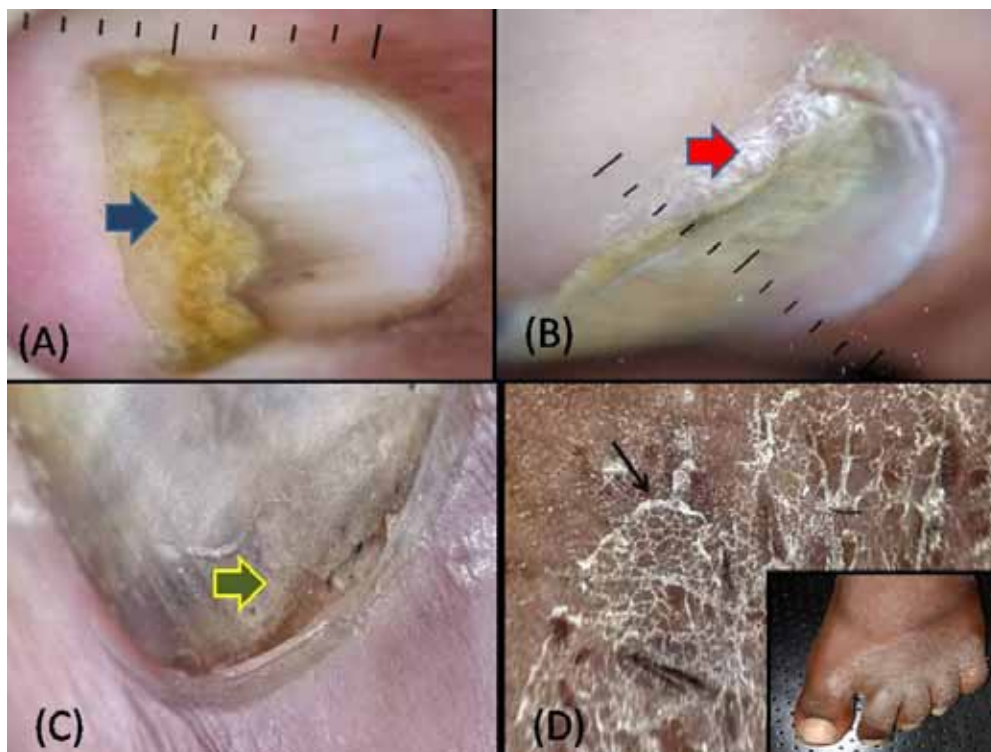


**Image 1: (White arrow) - Peripheral white scaling (A) shows continuous scales (B) Moth eaten appearance, (Red star)-background Erythema (C) clinical image of Tinea corporis**

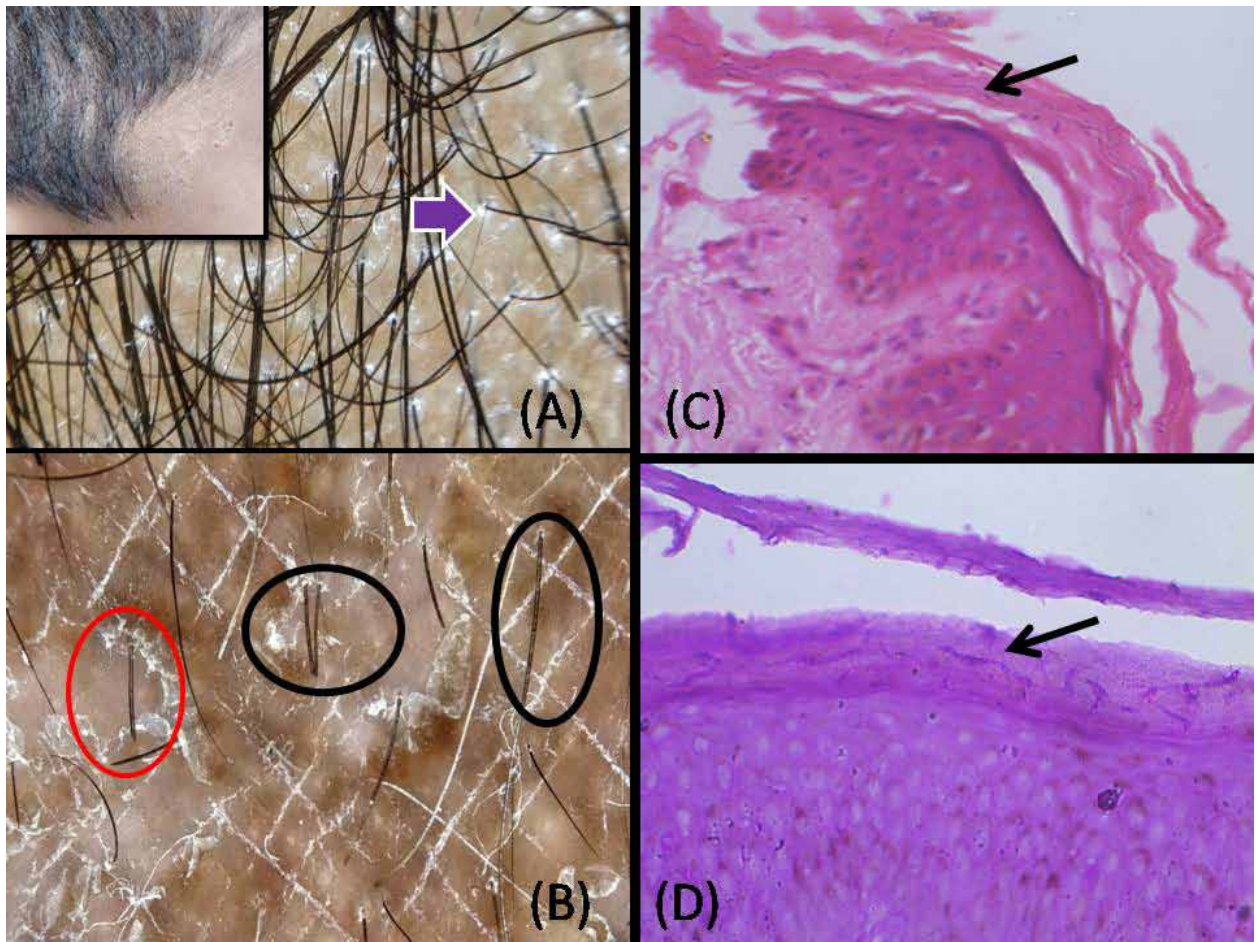




**Image 2: Dermoscopic features of Tinea corporis. (A) Yellow arrow showing red grouped dots and globules. (B) Brown arrow showing brown dots and globules. (C) White arrow showing white scales with accentuation of skin markings. (D) Red circle showing white structureless areas corresponding to micropustules.**



**Image 3: Dermoscopic features of Onychomycosis and tinea pedis (A) Blue arrow showing Onycholysis and yellow discoloration (B) Red arrow showing Subungual Hyperkeratosis (C) Green arrow showing jagged nail plate and grey discoloration. (D) Dermoscopic features of Tinea pedis – showing white scales with accentuation of skin markings. Inset showing clinical image**



**Image 4: A, B-Dermoscopic features of Tinea capitis. (A) Purple arrow showing perifollicular scales. Inset shows clinical image of tinea capitis with facie. (B) Red circle shows medullated hair, Black circle shows Morse code (bar code) hair. (C) Histopathological (H & E) features of dermatophytosis – showing fungal hyphae in stratum corneum, spongiosis and hyperkeratosis (D) Showing PAS stain – fungal hyphae**

### Discussion

Clinical manifestations of tinea are similar irrespective of site of involvement. Tinea infections are easy to diagnose but may pose a diagnostic challenge to treating physician during partial treatment, steroid abuse or fungus invasion on other dermatoses. Dermoscopy of tinea of skin is uncommonly studied but the role of trichoscopy in dermatophytosis is well established in literature. Only few reports are present regarding the dermoscopy of other dermatophytosis. Hence present study was done.

Background color of most lesions is red due to inflammation in the early lesions while late lesions show greyish background corresponding to post inflammatory hyperpigmentation.

Peripherally distributed whitish scales are the hallmark of tinea corporis which was seen in 100 % of cases in our study. This finding is consistent with a study done by Bhat et al.<sup>1</sup>

Two types of scale distribution were noted –the outer border of the scales is typically sharply demarcated and focally might acquire a “moth-eaten appearance”.<sup>2</sup>

Multiple circular peripheral scales often coalesce to form larger multicyclic lesions. The so-called Biett’s collaret-like scaling refers to a continuous peripheral rim of scales, surrounded by an erythematous halo. These scales correspond to hyperkeratosis on histopathology.<sup>2</sup>

Scales are also focally noticed in perifollicular areas. Reddish Brown dots and globules are noticed at the periphery of the lesions. The color of these dots and

globules changes to black with the duration of the lesion. Reddish brown color is imparted by serum, RBCs and hemosiderin in the skin tissue secondary to intense scratching. These globules appear black due to melanin deposition in the epidermis due to post inflammatory hyperpigmentation.

Knöpfel et al<sup>3</sup> and Bhat et al<sup>1</sup> also described presence of brown spots surrounded by white yellowish halo.

Hair changes include translucent hair (possibly due to massive fungal invasion), broken hair, black dots.<sup>4</sup> Morse code-like hair or bar code-like hair, is defined as multiple white alternate bands across the hair shaft. These were described in tinea capitis<sup>5,6</sup> and in tinea of the vellus body hair as well.<sup>4,7</sup>

Fungal involvement of vellus hair indicates need of systemic therapy for complete cure.<sup>7,8</sup>

Follicular micropustules were seen in 5 cases. Similar findings are noted by Bhat et al<sup>1</sup>. Micropustules indicate neutrophilic micro abscesses around hair follicle. Excoriation marks denote denuded epidermis on histopathological examination due to scratching.

The dermoscopic findings in cases of onychomycosis reported in our study included yellow brown discoloration, subungual hyperkeratosis, jagging of the free edge of the nail plate and nail dystrophy. These findings are consistent with the findings of studies conducted by Piraccini *et al.*<sup>9</sup> and De Crignis *et al.*<sup>10</sup>

### Conclusion

As the lab facilities for diagnosing dermatophytosis are cumbersome and time consuming, dermoscopy acts as complementary tool to the clinical diagnosis. Thereby it guides to initiate early treatment and helps in the reduction of tinea menace.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Taken

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# Normative Data of Trunk Muscle Endurance for Male Long-Distance Runners of Vadodara: An Observational Study

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## Abstract

**Introduction:** Over last two decades, Importance of trunk core muscle exercise has gain major interest in clinical as well as in profession athletes. Trunk muscle endurance and strength are routinely used measures in clinical evaluation, but lack of normative data is a limitation for measuring physical function of trunk in athletes.

**Aim:** Aim of the study is to find out normative data of trunk muscle endurance for male long-distance runners of Vadodara.

**Objectives:** To Establish normative data of Trunk flexors, extensors and side flexors endurance using McGill's Endurance Test.

**Methodology:** 80 male participants of 18-35 years were taken randomly from various sports ground of Vadodara. Study Design: Cross sectional Observation study. Outcome Measures: McGill's Endurance Test Procedure: Participants was selected based on Inclusion Criteria and McGill's Endurance test was used to examine trunk muscle endurance. These tests consist of four positions: 1) Trunk anterior flexor test, 2) Trunk posterior extensor test, 3) Latera side plank (Right) and 4) Lateral side plank (left). Statistical analysis: Descriptive statistics were used to summarise the data of all participants. Endurance levels between 25 and 50 consider low, between 50 and 75 consider medium and between 75 and 100 consider high.

**Result:** The mean value of trunk anterior flexor test was 148 sec, Trunk posterior extensor test was 108 sec, Lateral side plank (Right) was 83.2 sec and Lateral side plank (Left) was 81.5 sec.

**Conclusion:** This study was done to find out the normative data for endurance of trunk muscle in long distance runners of 18–35 age group. The reference value of trunk muscle endurance found in this study can be helpful for the quantitative evaluation, Rehabilitation programme and for the research purpose in the long-distance runners.

**Keywords:** *Trunk muscle endurance, Normative data, McGill's endurance test, Long distance runners.*

## Introduction

Good muscle Endurance is necessary to maintain postural control. Sustain postures require continuous, small adaptations in the stabilizing muscle to support the trunk against fluctuation forces. Large repetitive motions also require muscle to respond so as to control activity. In either case, as muscle fatigue, the mechanics of performance change and the load is shifted the inert tissue supporting the spine<sup>1</sup>. So, with poor muscular

support and sustained load on the inert supporting tissue, creep and distention occur, causing mechanical stress. In addition, injuries occur more frequently after a lot of repetitive activity or long periods of work and play when there is muscle fatigue. Core strengthening has play very important role in sports training as a method to condition athletes for the injury prevention to the spine and/or lower extremities. The main emphasis of core strengthening is focused on muscular stabilization of the

abdominal, Multifidus, paraspinal and gluteal muscles to provide better stability and control for activity of sports<sup>2</sup>. Past studies have shown the importance of pelvic stabilization in training the lumbar extensor muscles. Pollock et al. showed that resistance exercise training with pelvic stabilization improved development of lumbar extension strength<sup>3</sup>. Jeng et al. reported that the occurrence of LBP may be decreased by strengthening the back, legs and abdomen to improve muscular stabilization<sup>4</sup>.

Over last two decades, exercise and testing of trunk core muscle has gain major interest in the field of sports physiotherapy and professional athletes<sup>5,6</sup>. Injuries in the back muscle remains concern in professional athletes. The practice of measuring trunk muscle endurance has been widely used to identify athletes who may be at risk of muscle injuries, to evaluate rehabilitation outcomes and to enhance performance of athletes<sup>7</sup>. But still back literature contains limited normative data for trunk muscle endurance specially in the India. This lack of normative data is a limitation in the quantification of physical function of spine and is the impetus for this study.

When evaluating muscle performance in the trunk, an examiner can compare the normal and abnormal sides to quantify diminished muscle performance. This type of intrinsic control is not available for evaluation of the trunk muscle endurance. It is necessary to reference a normative data in order to find alternations of Trunk Musculature from Normal that is the main need of the study.

Core stability did not become popular in previous century, with the idea developing from the study of spinal stability by individuals, such as Punjabi<sup>8</sup>. Although lack of core stability associated with low back pain<sup>2</sup> and injuries<sup>9-10</sup>.

### Methodology

A total of 80 male participants of 18-35 years were taken from various sports ground of Vadodara. Verbal explanation of study was given to all participants and written consent was taken. Ethical clearance was taken from institutional ethical committee.

**Inclusion Criteria:** Healthy Male Timed Long-Distance Runners (10km, 21 km and 42.195 km), Age group 18 to 35 Years.

**Exclusion Criteria:** 1. Any Conditions affecting mobility or Balance 2. Any congenital and structural abnormalities 3. Any back, abdominal and lower limb surgical history, Hernia. 4. History of symptomatic low back pain within 6months of time.

**Procedure:** After taking informed consent participants' core endurance was examined using McGill's endurance test.<sup>11-13</sup>. Participants were advised to do trial and then ask to perform Actual test. Time was recorded in seconds per position where the participants could hold a static position of maximum seconds. Participant Begin and end the test with word start and stop and time was recorded with Stopwatch. 5 minutes of rest was given between each position to facilitate recovery. To maintain uniformity all participants were ask to perform test in same sequence. 1) Trunk anterior flexion test 2) trunk posterior Extension test 3) Lateral side plank (Right) and 4) Lateral side plank (Left).



**A. Trunk Anterior Flexor Test**



**B. Trunk Posterior Extensor Test**



**D. Lateral Side Plank (Left)**



**C. Lateral Side Plank (Right)**

**Statistical Analysis:** Descriptive statistics analysis was used to summarize the data of all participants using SPSS Software Version 22. Endurance levels were defined by using percentiles as low (between 25 and 50th), medium (between 50 and 75th), high (between 75 and 100th) respectively.

**Results**

Detail of all participants are given in table 1. Mean age is  $24.3 \pm 3.28$  Height is  $164 \pm 6.3$  cm, weight  $61 \pm 6.8$  kg and BMI are  $23 \pm 2.8$ kg/m<sup>2</sup>. The mean values for Trunk Flexors, extensors, Rt Lateral and Lt Lateral Plank are 148 Sec, 108 Sec, 81.5 Sec and 83.2 Sec respectively. Percentile data of four position of McGill’s Endurance Test for trunk Flexor and Extensor Test, right and left lateral Planks for all the participants are in table 3 respectively.

**Table 1: Detail of all participant**

S.No.	Variable	Mean	SD
1.	Age (Years)	24.3	3.28
2.	Height (cm)	164	6.3
3.	Weight (kg)	61	6.8
4.	BIM (kg/m <sup>2</sup> )	23	2.8

**Table 2: The mean data for all position of McGill’s endurance test**

S.No.	McGill’s Endurance Test	Mean	SD
1.	Trunk Anterior Flexor Test (sec)	148	14.3
2.	Left Lateral Plank (sec)	81.5	18.6
3.	Right Lateral Plank (sec)	83.2	21.8
4.	Trunk Posterior Extensor Test (sec)	108	26.3

**Table 3: Trunk muscle normative percentile data**

S.No.	McGill’s Endurance Test	25-50 %	50-75 %	75-100 %
1.	Trunk Anterior Flexor Test (sec)	78–128	128–151	151–212
2.	Trunk Posterior Extensor Test (sec)	75– 86	86– 118	118 – 149
3.	Left Lateral Plank (sec)	64.5– 72	72– 98	98 – 136
4.	Right Lateral Plank (sec)	65 - 76.5	76.5 – 113	113 -148

**Discussion**

Few studies have been done to find normative database for trunk flexor and extensor muscle endurance

in specific healthy individuals<sup>14-16</sup> and athletes.<sup>17,18</sup> A study done by Mbada et al (2010)<sup>19</sup> on normative values of static and dynamic abdominal muscles endurance in healthy Nigerians shows mean value 34.9 sec for static

endurance and 15.6 rep for dynamic endurance. McIntosh et al<sup>20</sup> had done study on trunk and lower extremity muscle endurance: They conclude that normative data for adults age group 19-29 years, who had endurance more than 75th percentile was 25% of male and female for dynamic chest raise, 18% male and 14% female for bilateral straight leg raise, 68% male and 62% female for static chest raise, 47% male and 46% female for prone bilateral straight leg raise.

The Values shown in table 3 suggest that 151-212 Sec., 118-149 Sec. consider as a good endurance, 128-151 Sec., 86-118 Sec. are fair and less than 128 Sec., 86 Sec. are considered as poor endurance for trunk flexors and extensors respectively. Th Value 98-136 Sec., 113-148 are good, 72-98 Sec., 76.5-113 Sec. are fair and less than 72 Sec., 76.5 Sec. are considered poor left lateral and right lateral plank endurance.

### Conclusion

This study was done to find out the normative data for endurance of trunk flexors, extensors and side flexors group of muscle in individuals of 18-35 years age group. Thus, the reference values in this study provide base for the rehabilitation program in runners and also as an outcome measure for quantitative improvement and can provide valuable insights for the other future researchers. Future Study can be performed with the larger sample size by including both male and female gender.

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**Source of Funding:** Self

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# Spatial Cluster Analysis as a Sampling Approach in Public Health Research

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## Abstract

**Introduction:** Sampling is the process of selecting unit from population of interest. Spatial cluster analysis is also a sampling strategy in large scale data on population/public health research; K Mean centroid is an exploratory tool to find the natural spatial clusters at focused level for both categorical and continues variables. Hence this study attempt.

**Objective:** The objective of the study was to develop a methodology for defining natural neighborhoods.

**Materials and Method:** The exploratory study was carried out during Nov 2016 to Dec 2017, using Primary Census Abstract of Kancheepuram district, Tamil Nadu issued from census 2011. Village data was extracted and the variables were made as domains by factor reduction and its scores were calculated by factor analysis. The villages were grouped with similar characteristics as clusters by K mean, Hierarchical and K Mean Centroid. The SPSS 16v, QGIS, GeoDa software were used.

**Results:** Out of 1020 villages 917 had selected after data mining and connectivity map was made. The census variables reduced as factors like Area, population, spatial distance, health facilities and recreation facilities by factor analysis. These factors scores were taken for the analysis after calculated weighted matrix. Villages were segregated as 5 clusters in every mapping, K Mean Centroid produced both clustering and significant map.

**Conclusion:** K Mean Centroid will give better understand about heterogeneity of large scale data. It helps us to select appropriate geographical locations to be sampled with existing data for further research.

**Keywords:** Factor scores, K mean, Hierarchical Cluster, K Mean Centroid, census.

## Introduction

Medical research aim to make general statement

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based on certain observations about a wider set of subjects or variables. Defining appropriate sample size and choosing appropriate sampling techniques are mandatory in order to find precise results. There were many sampling techniques were available such as simple random sampling, stratified sampling, systematic sampling, convenient sampling, purposive sampling etc. these were mainly used when unit of subjects as individual. When unit of measurement were group/set of people cluster sampling, two stage, Multi stage samplings were appropriate. The purpose of cluster analysis is to identify homogeneous subgroups with similar characteristics. Hence the community based studies were used the above techniques.

Spatial research studies mainly focus on Physical, Environmental and social attributes which may require carefully designed strategy for collection of data.<sup>1,2</sup> The main aim of spatial sampling approaches will be calculating mean of given attribute in an area; to test the effects of difference between ecological conditions; to establish spatial investigation or describe spatial distribution.<sup>3</sup>

In recent years the concept of spatial association and prediction of variables were analyzed.<sup>2</sup> Spatial analysis is use to identify the spatial patterns, identification of disease clusters, explanation or prediction of disease risk in geographical data. In other words spatial clustering will identify homogeneous groups of objects based on values of their attributes/geographic space.<sup>2,4</sup> Usually to study Infectious spread of disease; Occurrence of disease vectors, clustering of risk factors/combination; Existence of potential health hazards; Localized pollution sources these spatial cluster analysis will be appropriate.<sup>2,4</sup>

The purpose of this paper is to introduce spatial cluster analysis as neighbourhood sampling technique for existing large data set like census data. This sampling approach will detect neighborhoods with similar attributes which will help investigator/researcher to identify homogeneous groups in large population studies.

The objective of the study was to develop a methodology for defining natural neighborhoods and establish natural neighborhood sampling approach with social and physical resources using 2011 census tract data. Hence this study attempt.

## Methodology

An exploratory study design was conducted in School of Public Health, SRM University, Kattankulathur, Tamilnadu; approximately one year from November 2016 – December 2017.

**Data Collection:** The primary data of census 2011, Kancheepuram district, Tamil Nadu was extracted from www.Census.gov.in website.<sup>5</sup> “Rural table for Chengai Anna district” and “Table for Kancheepuram district” were selected for this study.<sup>5,6</sup> The two sets data were merged by village code with name after checking duplication and spell checks for further analysis in SPSS 16v.

**Variables in census data:** The census data had

approximately three hundred and eighty variables describing codes and names of district and villages, area, total population, worker/non worker population, schools, colleges, health facilities, communication facilities, recreation facilities, transports their availabilities and their km in distance to travel; water, electricity, sanitation, drainage, waste disposal were available or not in each villages; land areas such as forest, irrigated un irrigated lands, river, pond, lake etc in sqm.<sup>2,5,7</sup>

These variables were segregated as domains by Factor analysis.<sup>7</sup> The factor scores were calculated for continuous and as well as categorical variables.<sup>7</sup> The factor scores were considered as continuous variables and the variables which rotated individually were taken with original values for cluster analysis.<sup>7</sup>

**Geo Coding:** The longitude and latitude of each villages in Kancheepuram district were collected and merged with data set by village codes.<sup>7</sup> These codes and data set were finally merged with base map of Kancheepuram district after checking for duplicates and missing data.<sup>7</sup>

**Statistical Software:** SPSS 16v, Q GIS, Geo Da

## Results

After calculating factor score the data was translated to spatial data by merging these attributes with base map of Kancheepuram district by using village code as indicator variable.<sup>7</sup> K Mean Cluster Analysis, Hierarchical Cluster analysis and K mean centroid cluster analysis were used to find homogeneous spatial clustering of given data.<sup>8</sup> The ratio of sum of squares was compared in order to choose the natural neighborhood or spatial cluster by physical and social amenities of villages.<sup>8</sup>

K mean cluster analysis use to create n data points in to k homogeneous clusters. It assess by calculating the ratio of the total between group-sum of squares with the total variance.<sup>8</sup> The higher the value of ratio will yield better separation of the clusters.<sup>8</sup>

In this study, k mean cluster analysis yield the ratio of between-sum of squares was 0.18. The total villages were clusters as five and as follows 1. Very poor amenities villages 376, 2. Average amenities villages 250, 3. Very good amenities villages 211, 4. Poor amenities villages 48, 5. Good amenities villages 32.

Hierarchical cluster analysis is classical type of clustering method; The clusters were built in step by step

process, either in top – down fashion or bottom – up.<sup>8</sup> It compute the distance between two existing clusters in order to decide how to group the closest two together.<sup>8</sup> It has there patterns of linkages: single linkage, complete linkage and average linkage.<sup>8</sup> Dentogram will give the pictorial representation of cluster tree in this method.<sup>8</sup> The significance assessed by ward’s method.<sup>8</sup>

In this study, the hierarchical cluster analysis yield the ratio of between-sum of squares 0.16. In hierarchical clustering the five clusters are as follows: 1. Very Poor amenities villages were 500, 2. Average amenities villages 302, 3. Very Good amenities villages 37, 4. Poor amenities 31 and 5. Good amenities villages were 47.

The k mean centroid method include geometric centroids of the observations as part of the optimization process.<sup>8</sup> The x and y coordinates are simply added as additional variables in the collection of attributes.<sup>8</sup> This approach will yield better ratio and significance maps; The only criteria will be the centroids should be there as attributes in data.<sup>8</sup>

In this current study, k mean centroid cluster analysis was 0.17. This method yield similar like k mean cluster analysis with few deviations; the five clusters were: 1. Very Poor amenities villages 365, 2. Average amenities villages 250, 3. Very Good amenities villages 224, 4. Poor amenities villages 46 and 5. Good amenities villages were 32.

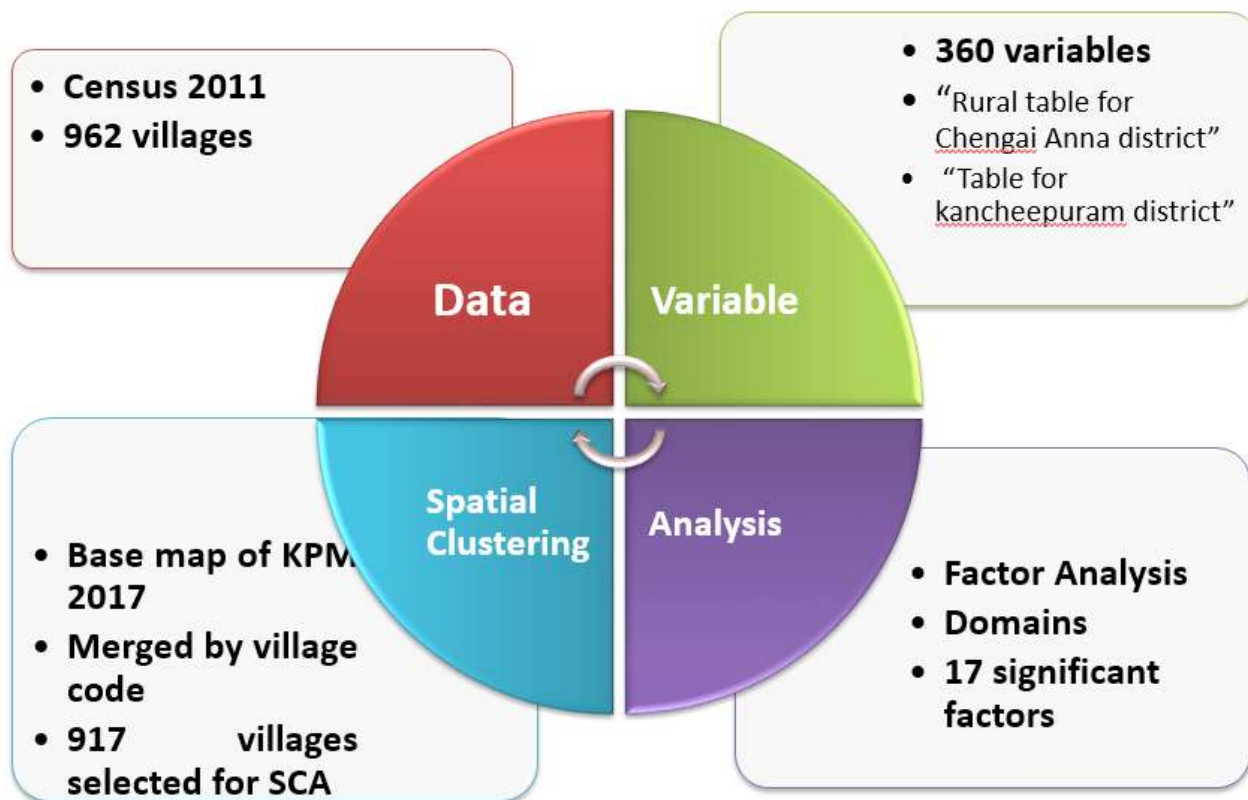


Figure 1: Conceptual Frame Work

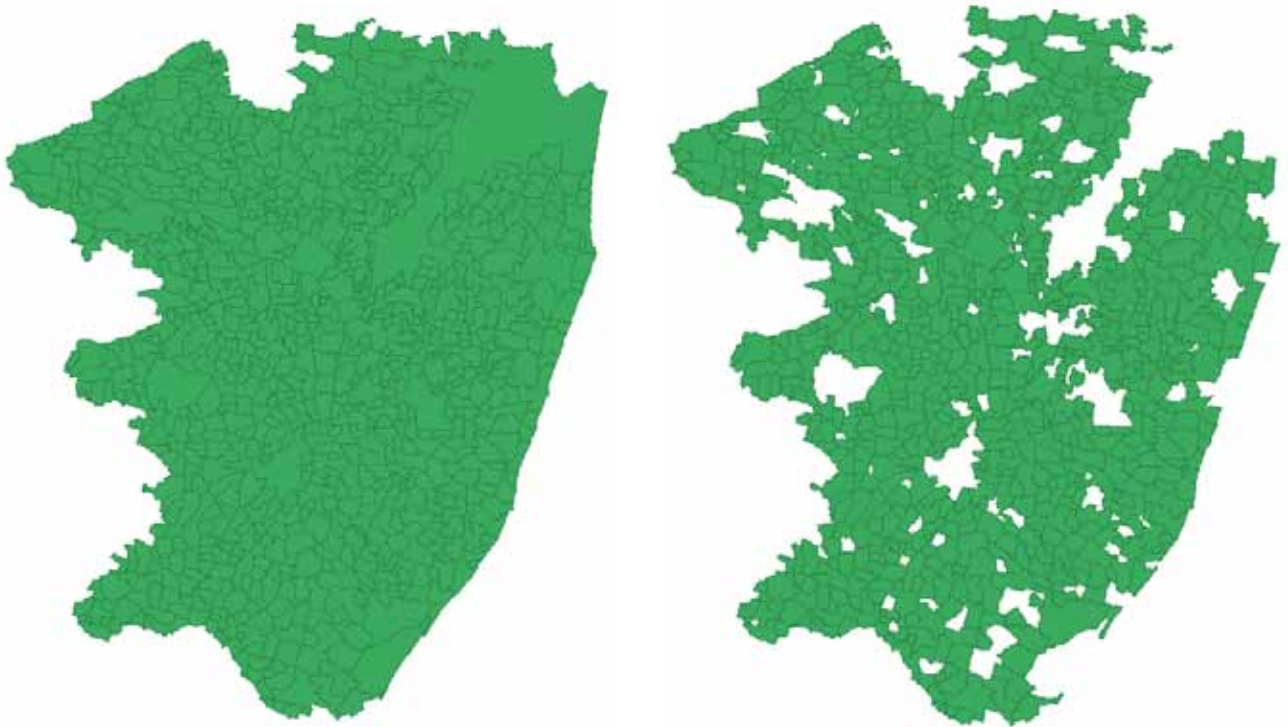


Figure 2: Base Map of Kancheepuram district with and without boundaries

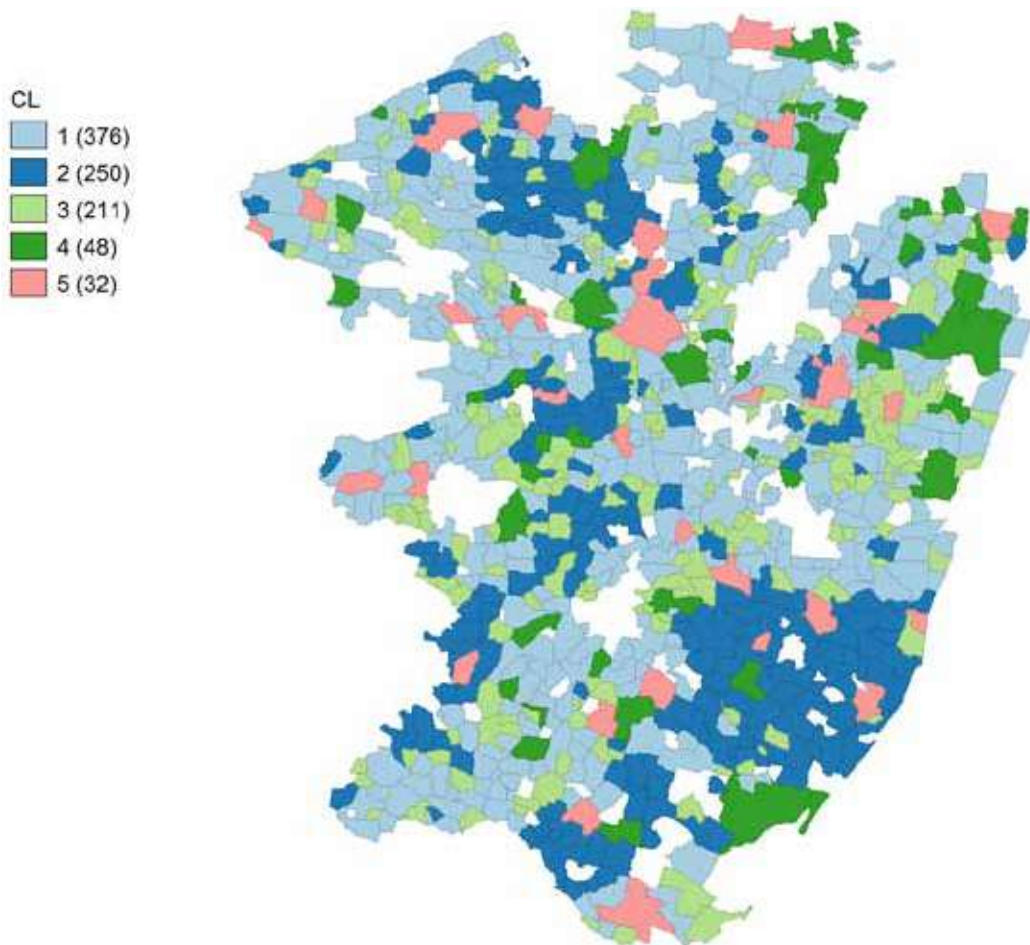


Figure 3: K Mean Cluster Analysis

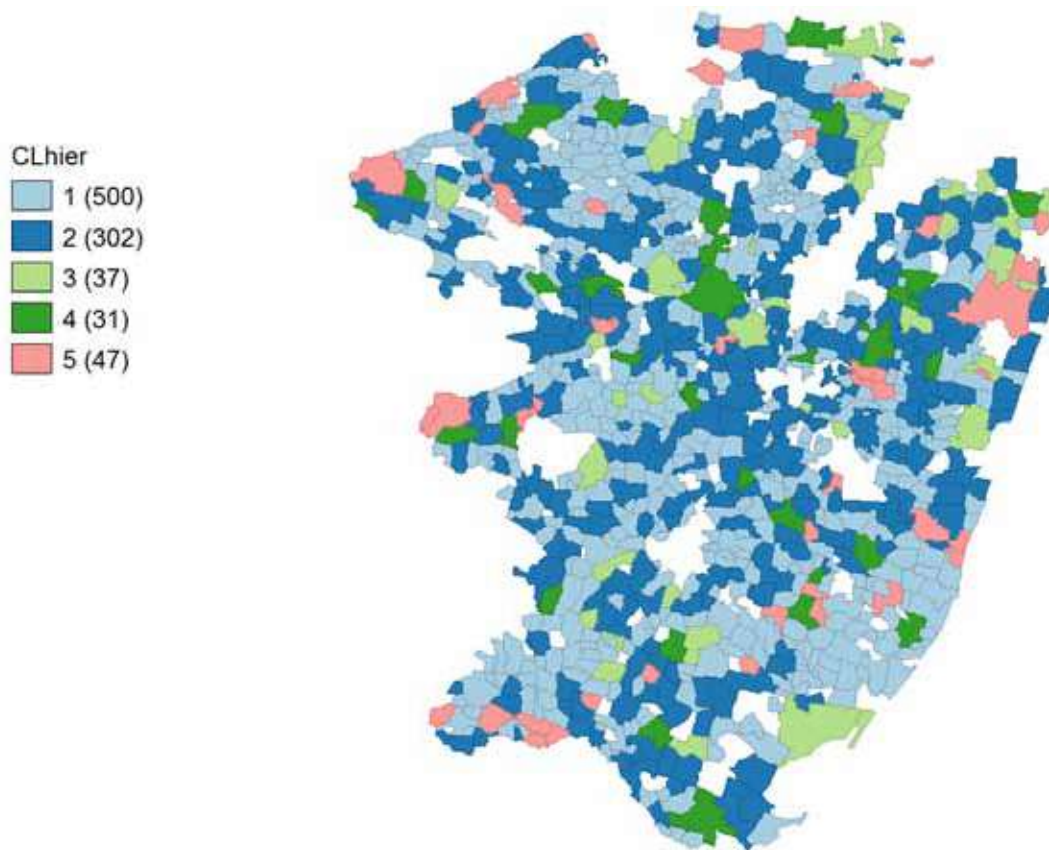


Figure 4: Hierarchical Cluster Analysis

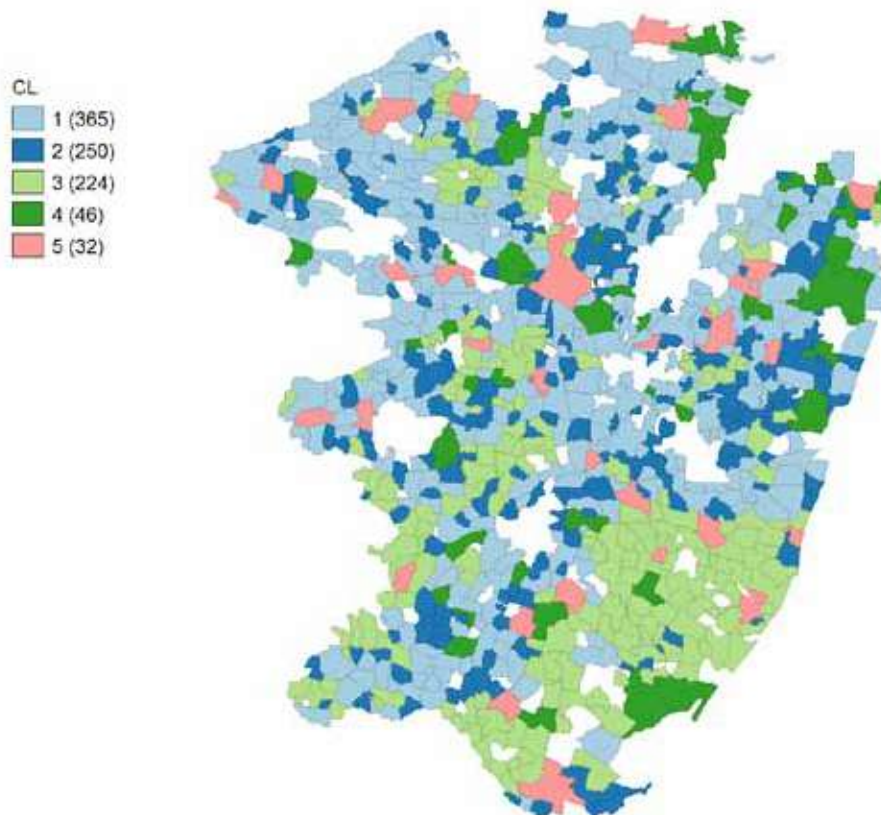


Figure 5: K Mean Centroid Cluster Analysis

## Discussion

There were various types of sampling procedures available for environmental studies.<sup>9,10</sup> The traditional sampling techniques were design based sampling which is based on either spatial autocorrelation or heterogeneity.<sup>9,10</sup> The other method was model based, adaptive sampling, spatially balanced sampling and kriging method.<sup>10</sup> These types of sampling procedures will be helpful to primary source of data collection process.

The present study explored a methodology that spatial cluster analysis as a sampling approach in biomedical or public health research. This spatial clustering would be very helpful sampling strategy for secondary source of data such as census tract data, sampling registration system etc. this study were assessed three different cluster analysis such as K mean, K mean Centroid and Hierarchical cluster analysis in order to define best fit of natural neighbourhood; and found K Mean centroid cluster analysis was appropriate method to detect the natural neighbourhood sampling strategy for any secondary source data such as census tract.

Adam et al conducted a study on socially based spatial boundaries in Canada by using census data and considered residential boundaries as natural neighbourhood.<sup>11</sup> They clustered one lakh population as homogeneous strata by using principle component analysis and Gi statistics for spatial dependence.<sup>11</sup> The residence, physical and land features such as roads, landscapes etc were used as indicators.

Similarly, Guo et al defined the concept of neighbourhood as residential location; they used hierarchical models in order to cluster the census data as homogeneous groups.<sup>12</sup> This study revealed that individual neighbourhood can be studied, he/she living on the boundary of a census area had more in common with residents of near area than with resident on the far.<sup>12</sup>

Study done by John RB, with the objective of whether neighborhood characteristics influences on symptoms of depression among elderly residents in New York city.<sup>13</sup> They used census cohort to assess the depression. The census variables were stratified as domains by factor analysis and then individual level survey had conducted.<sup>13</sup>

Luis DS et al studied intra-urban disparities in the quality of general population of Porto using census data.<sup>14</sup>

He assessed the spatial disparities of general population with two level such as territorial level and individual level survey.<sup>14</sup> Further the spatial dependence was determined with Moran I, Spatial Lag model and Spatial Error model.<sup>14</sup>

Basile et al conducted study to compare the spatial context with a multilevel perspective for neighbourhood research for mental health.<sup>15</sup> He used regional office survey data with 65830 study participants, Hierarchical spatial analysis was used to detect the disease clusters and he concluded that the neighborhood variations imply a significant impact between proximally closer neighborhoods.<sup>15</sup>

These literatures evident that, the spatial cluster analysis would be appropriate methodology to detect natural neighborhood or homogeneous spatial cluster groups, where to be sampled in environmental based research studies. The limitation of this study was, current study limited with the data set at district level, further studies will be required at higher level as well.

## Conclusion

The present study suggested that even though there were many types of sampling processes exists, spatial cluster analysis would be more appropriate method to detect the neighbourhood or homogeneous spatial clusters. However, the efficacy of spatial sampling may be increased if the investigator has prior knowledge about random field.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** The ethical clearance was obtained from institutional ethical committee of KIMSRC (EC No: 24/2016). Then data was extracted from Census 2011 and analyzed.

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# Prevalence of Good Menstrual Hygiene Practices among Adolescent Girls in a Rural Area Kancheepuram District

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## Abstract

Adolescence is a transitional phase of childhood to becoming adults and encompasses several challenges with respect to physical, emotional, social and mental changes.<sup>2</sup> Education regarding healthy adolescence is crucial and of them all, understanding and practice of good menstrual .Therefore, it is important to assess the status of the menstrual hygiene practices among the adolescent girls particularly in undeveloped areas to address the lacunae, which helps to emphasize safe hygienic practices during menstruation.<sup>2</sup> A cross sectional study was conducted in field practice area, RHTC CHRI Kancheepuram. School going menarche attained adolescent girls in the age group from 10 to 19 years had been included .A total of 436 adolescent girls had been included using the multistage random sampling method and analysis was done using IBM SPSS 21 version. The mean age of the study population was 14.48 with standard deviation of 1.77. It has been evident that awareness of menstruation before menarche was only 14.7% and the first source of information about menstruation was found to be by their mothers followed by teachers. 77% of adolescent girls were using sanitary napkin and 23% of them were using cloth. In this study only 15% had good menstrual hygiene practice; there should be a need to educate the girls about menstruation, its importance and hygiene maintenance, to enable them to lead a healthy reproductive life in future.

**Keywords:** Adolescence, Good menstrual hygiene practice and Absorbent.

## Introduction

Adolescence is believed to be a vital phase of one's life, especially girls.<sup>1</sup> Adolescence is a transitional phase of childhood to becoming adults and encompasses several challenges with respect to physical, emotional,

social and mental changes.<sup>2</sup> Globally there were 1.2 billion adolescent girls in the year 2009 which forms 18% of the world's population.<sup>3</sup> According to census 2011 India has an adolescent population (both sexes) consisting of 19.6 percent and in Tamil Nadu, the total adolescent population (both sexes) constitute 17.2 percent.<sup>4</sup> Education regarding healthy adolescence is crucial and of them all, understanding and practice of good menstrual hygiene is of prime importance in our nation, especially when the rural population is concerned.<sup>5</sup>

Menstruation, the term signifies a physiological process from menarche (the first menstruation) to menopause (the last menstrual period) in a cyclical way; which requires appropriate knowledge and understanding

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the practice of good menstrual hygiene will aid in the prevention of several undesirable consequences/complications in the future.<sup>6</sup> For example, there are evidences from studies suggesting that poor menstrual hygiene practices have been linked to possibilities of developing Reproductive Tract Infections (RTI),<sup>7</sup> Urinary Tract Infections (UTI),<sup>8</sup> and some long-term consequences such a cervical cancer and infertility, etc. India accounts for 27% of the world's cervical cancer deaths, according to World Health Organization data.<sup>9</sup> The incidence rate is almost twice the global average and doctors studying the disease say poor menstrual hygiene is partly to blame.<sup>9</sup> This explains the importance of good menstrual hygiene practice.

There are several aspects of good menstrual hygiene practice to be understood and several factors influencing the same should be addressed.<sup>6</sup> With regard to Good menstrual hygiene practices, there are studies discussing the effective types of absorbent sanitary materials used during menstruation, there are several aspects, which have been discussed in limited studies.<sup>6</sup> Disposable pads have been proven to have better outcomes and choice with evidence in several studies.<sup>6,10</sup> regarding good menstrual hygiene, whereas the reusable clothes which have not been cleaned properly have shown undesirable outcomes. Reusable clothes are proven to be not harmful, when it is washed properly and dried under sun, due to cultural taboos.<sup>10</sup> There are other measures of good menstrual hygiene practice, which include washing of genital regions appropriately, taking regular baths, using appropriate sanitary method and the knowledge about the disposal of the same, etc which have not been addressed.<sup>10,11</sup>

Nearly 72% of the adolescents have been residing in rural area,<sup>1</sup> which explains the challenges faced by the adolescent girls in seeking advice regarding menstrual hygiene practice or reproductive health unfortunately. The socioeconomic status influences in many ways such as access to disposable sanitary pads, in built toilets in households, proper sanitation facilities, all of which are seemingly unavailable or inappropriately maintained, in rural areas.<sup>11</sup> This again emphasizes the importance of educating the adolescent girls in knowing the practice of good menstrual hygiene.

In rural areas of India, menstruation has still been observed as a cultural taboo to be discussed about.<sup>12</sup> There are many issues being faced predominantly in women and adolescent girls residing in underdeveloped

areas during menstruation. Lack of awareness; lack of access to disposable absorbent material leading to use of alternatives such as old fabric cloths, rags, sand, ash, newspapers, dried leaves, hay and plastic; lack of proper toilet facilities at home and school level – altogether comprise the crux of menstrual hygiene related problems.<sup>5,13</sup> Social prohibitions, isolation and restrictions during the menstrual period from routine activities and the negative attitude of the parents for the open discussion on the related issues have blocked the way of the adolescent girls to right kind of information, especially in rural and tribal communities.<sup>14</sup> These issues lead to reproductive tract infections in 70% females using unhygienic material.<sup>13</sup> A woman throws away 125-150 kilograms of non-biodegradable absorbents used during menstruation in her lifetime lead to poor environment sustainability.

Majority of the schools do not support the adolescent girls or female teachers in managing menstrual hygiene with dignity.<sup>15,16</sup> Poor water and sanitation facilities will make them manage menstruation in a poor way and inappropriate sanitary protection materials can lead to blood-stained clothes causing them stress and embarrassment.<sup>15,16</sup> Therefore, failure to deliver appropriate menstrual hygiene facilities at home or at school reduces the level of having good menstrual hygiene practice among female students<sup>17</sup>. UNICEF states that 1 in 10 adolescent school age girls do not attend school during menstruation, which is similar to the world bank statistics, where the students have been absent from school 4 days every four weeks because of the menstruation.<sup>17</sup>

**Justification of the Study:** Good menstrual hygiene practices from the childhood may escalate safe practices which help in mitigating potentially possible infections in the future and also it promotes confident mental and physical health in young women, who would form the backbone of every society. Therefore, it is important to assess the status of the good menstrual hygiene practices among the adolescent girls particularly in rural areas to address the lacunae in practices. Studies related to menstrual hygiene are scarce that too in rural population.

**Objectives:** To estimate the prevalence of good menstrual hygiene practices among adolescent girls in field practice area of RHTC, CHRI.

## Material and Method

A Cross sectional study was conducted in Field

practice area of Rural Health & Training Centre, Chettinad Hospital and Research Institute from December 2016 to August 2017. The Study population was menarche attained School going adolescent girls in the age group of 10 to 19 years in the study area. Based on the study **article 45 %**<sup>19,20</sup> Assuming 95% confidence interval with a 5% allowable error. The sample size calculated with the formula,  $n=4 PQ/L^2$ , with 10% attrition rate the sample size was 436. The Multistage random sampling was adopted for choosing sample for the population.

**First stage:** The Rural Health and Training Center, Poonjeri, Chettinad Hospital and Research Institute, covers 12 villages. 6 villages have been chosen for the study by lottery method. **Second stage:** among them only 7 schools had adolescent age group (high school and higher secondary school). The list of schools was obtained from the respective authorities in the chosen geographical area. For feasibility with regards to time period among 7 schools by lottery method 3 schools were chosen randomly. **Third stage:** From the randomly chosen 3 schools, 839 adolescent girls who have attained menarche were enrolled. Among them 436 adolescent girls were selected through simple random sampling by lottery method.

**Study Tool:** Pretested Semi structured questionnaire and good menstrual hygiene (UNICEF guidance booklet).<sup>21</sup> was used.

**Ethical Committee:** Approval was obtained from Institutional Human Ethics Committee, CHRI Kelambakkam. Informed written consent was obtained from the parents or guardian of all participants after explaining the objective, risks and benefits involved in the study.

**Statistical Method:** Data of adolescents collected was coded and entered into Excel sheet. Statistical

analysis was done using statistical software IBM SPSS version 20. Descriptive analysis was carried by mean and standard deviation for continuous variables and chi square test for categorical variables, P value <0.05 was taken as significant.

## Results

The mean age of the study population was 14.48 ±1.77 years with the range from 11 to 18 years. Among the study population nearly 373 (85.6%) participants were from nuclear family. Most of the study participants' mothers were Illiterate 357 (81.9%). According to Modified BG Prasad's classification (2018) most of them 178 (41%) were from class III socioeconomic class followed by class IV 122 (28%) participants, then 80 (18%) participants from class II, 30 (7%) participants from class V and 26 (6%) participants. In the study population, 29.4% attained menarche at 11 years, 30.7% attained menarche at 12 years, 34.9% attained menarche at 13 years, 4.4% at 14 years and 0.7% at 15 years. Among the study participants only 15% had awareness regarding the menstruation before menarche. Among the study population majority 184 (42.2%) felt discomfort followed by some adolescent girls were scared 116 (26.6%) and a few of them were disgusted 98 (22.5%) towards menarche and only 38 participants (8.7%) were feeling normal during menarche. Among the study 303 (69%) reported that their routine work had been disturbed during menstruation while 133 (31%) revealed they didn't have any routine work disturbance during menstruation. Adolescent girls mother's education, Occupation and their socioeconomic status have highly been associated with good menstrual hygiene  $p < 0.001$ . This shows that we have to give more attention to the adolescent girls who belong to poor, illiterate and unemployed mothers.

**Table 1: Distribution of study participants by restriction during menstruation**

S.No.	Variable	Frequency	Percentage
1.	<b>Restriction to have certain food during the menstruation</b>		
	Yes	141	32.3
	No	295	67.7
2.	<b>Restriction to go to religious occasions</b>		
	Yes	287	65.8
	No	149	34.2
3.	<b>Restrictions not to attend school</b>		
	Yes	184	42.2
	No	252	57.8

S.No.	Variable	Frequency	Percentage
4	<b>Restriction not to do household</b>		
	Yes	110	25.2
	No	326	74.8
5	<b>Restriction to play</b>		
	Yes	86	19.7
	No	350	80.3

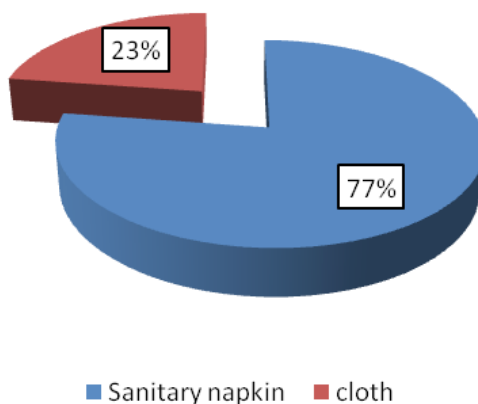
**Table 2: Factors affecting good menstrual hygiene**

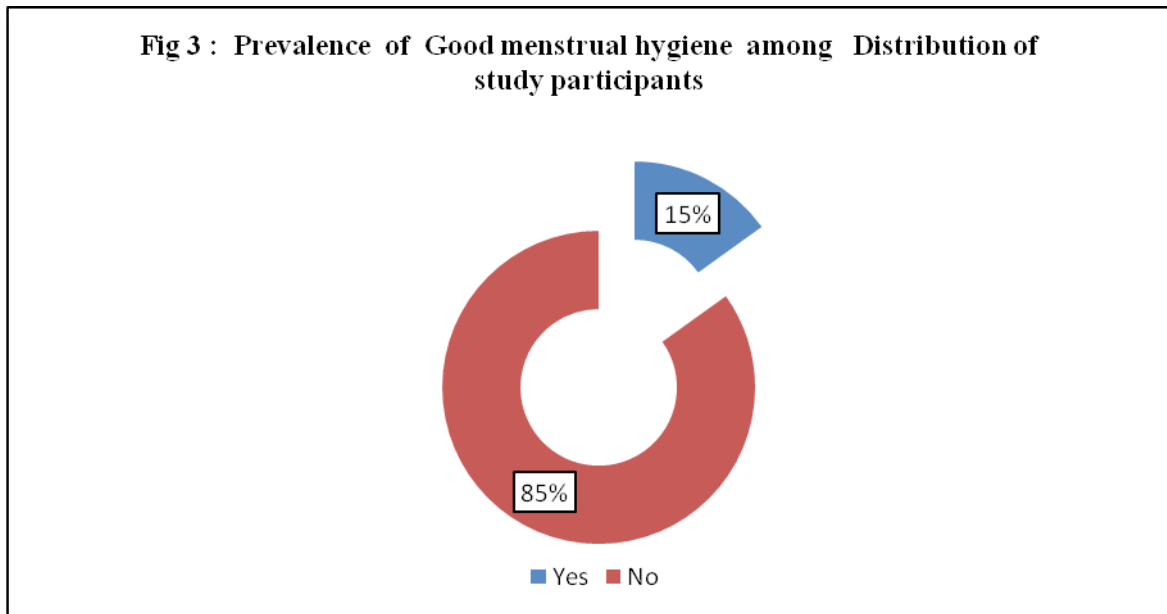
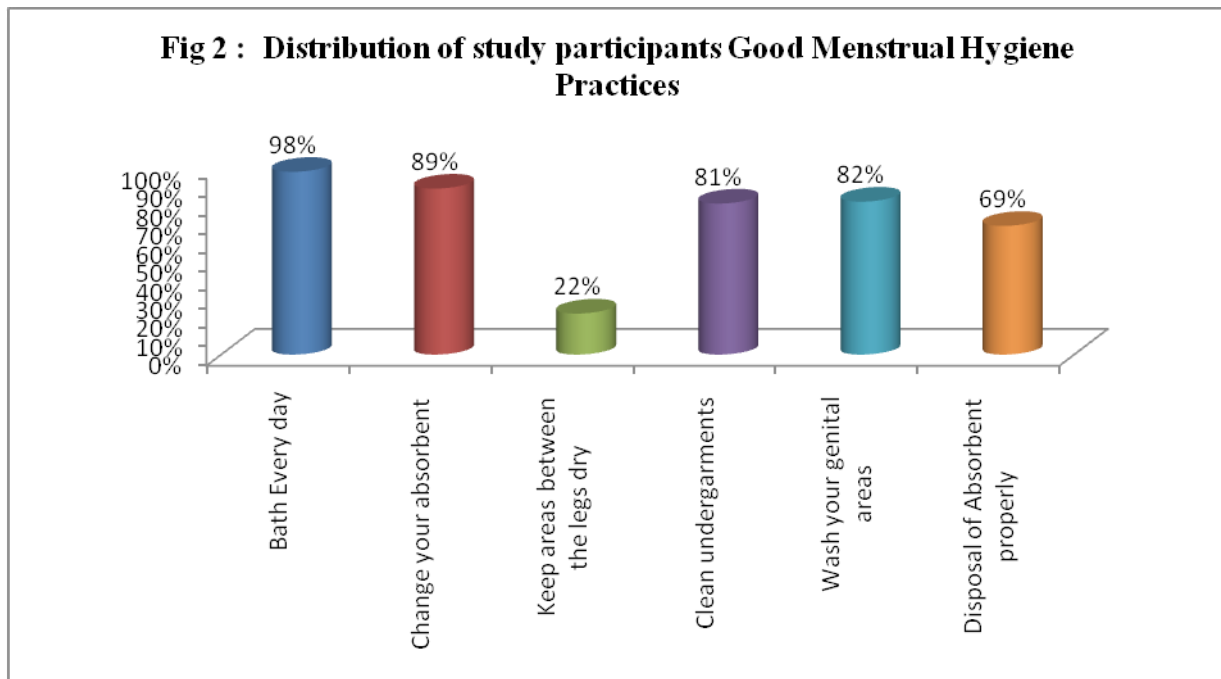
Variables in the Equation									
		B	S.E.	Wald	df	P Value	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	Religion	1.905	.456	17.498	1	P<0.001v*	6.723	2.753	16.416
	Motherseducation	4.479	.483	85.957	1	P<0.001*	88.114	34.187	227.107
	Socioeconomicstatus	1.033	.236	19.068	1	P<0.001*	2.808	1.767	4.464
	Constant	-11.150	1.490	55.995	1	P<0.001*			

a. Variable(s) entered on step 1: Religion, Motherseducation, socioeconomicstatus.

After the univariate analysis of the demographic variable, multivariate analysis logistic regression was used to know whether good menstrual hygiene has been dependent on the demographic variables .The above table shows that mothers education, religion of the girl and socio economic status was significant. p<0.001

**Fig 1 : Distribution of study participants Absorbent used**





**Discussion**

The present study concludes that the first source of information regarding the menstrual hygiene was mother followed by the teacher. It is observed that, more than half of the respondents felt discomfort while experiencing menstruation. Furthermore, majority of the respondents claimed that they had negligent or very little information about menstruation before attaining menarche. Due to cultural expectations and restrictions many girls have not properly and adequately been informed about the realities of menstruation. As

a result, they feel subnormal, diseased, or traumatized. Unprepared girls have been frightened, confused and felt embarrassed by menarche and likely to develop negative attitudes towards menstruation.

In this study, it is observed that only a few participants have been practicing good menstrual hygiene. Major Lacunae was inner thigh area dry and properly disposal of absorbent. Regarding personal hygiene majority of them did not carry out hand wash after changing their napkins and/or did not shave their pubic hairs regularly. To overcome this problem school-level health policies

should be made by school management committee to promote and educate students regarding health and safety, to ensure adequate water and sanitation facilities and to protect girl students from bullying and sexual harassment.

In this study, it has been observed that only a few participants were practicing good menstrual hygiene. Certain ritual beliefs associated with menstruation like restriction to certain foods, isolation from religious occasions, restraint from school attendance, not allowing for play, have still been followed. In this study Good menstrual hygiene of the adolescent girls was depended on religion mothers education and socio economic status. Although most of the respondents used sanitary napkins during their menstrual periods, but not able to complete the good menstrual hygiene criteria. We should educate the girlst hose who using reusable cloth that it would be a misconception that washing and drying to be done secretly or in a hidden corner so that it cannot be seen by others. It has also been believed that menstrual fluids may be misused for black magic, so women should wash the wrapper/cloth during menses only at night when others were asleep. We should educate about menstrual health management and its link to their health. They should also make girl students aware of how to dispose of used menstrual products at home and in schools and about the consequences of throwing them in open or flushing them in toilets. Menstrual flow was seen as dirty, polluting and shameful, so women hide menstrual cloths for fear of being cursed.

### **Conclusion**

It is evident from the study that few of the participants used cloths as absorbent. In spite of cloth having its own advantage such as cheap, easy availability it could not be categorized as good menstrual practice because of difficulty in proper maintenance during menstruation. Although most of the respondents used sanitary napkins during their menstrual periods, most of them lacked in at least one or more hygienic practices like, keeping the inner thigh area dry, changing napkin regularly using mild soap and water for genital wash and proper disposal of sanitary pads/clothes during menstruation. The mothers' education, 'occupation and socioeconomic status of the respondents had a direct association with good menstrual hygiene. Certain ritual beliefs associated with menstruation like restriction to certain foods, isolation from religious occasions etcare still followed .In addition to that challenges concerned with respect to

sanitation issues in the schools like improper sanitary latrine facilities and continuous water supply, made it difficult to practice good menstrual hygiene. Teachers can make the school environment girl-friendly to manage menstruation with dignity. Sex education in schools helps adolescents to discover their sexual identity, to know physiological changes occurring in the body and how to take care of personal hygiene

**Conflict of Interest:** Nil

**Acknowledgment**

**Source of Funding:** Self

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# Influence of Age and Gender on Mindfulness-Cognitive Science

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## Abstract

**Introduction:** Mindfulness is the basic human ability to be fully aware of where we are and what we're doing. It is a special form of attention, a cognitive phenomenon that can increase awareness of internal pain or stress and help to cultivate habits of practicing self-care. Mindfulness is an attribute of consciousness long believed to promote well-being. This study was carried out to analyse the age and gender differences in assessment of mindfulness.

**Materials and Method:** This was a cross sectional study conducted in the Department of Physiology, VMCM, Karaikal over a period of three months. Mindfulness is assessed using Mindful Attention Awareness Scale (MAAS) It is a 15 item, Likert type 6 point scale with each having score ranging from low (1) to a high score (6) proportional to the degree of mindfulness. The structured questionnaire sent to subjects through the mail, WhatsApp in the form of google doc link. Individual responses received and the data analyzed.

**RESULT:** A total of 330 study participants were included in the study. Majority of study participants scored between 3-5 (70%) followed by >5 (17.8%). The mean score among females was higher compared to males. Using Independent t test the t value is -1.807 and the p value is 0.072. Interesting observation was made in the present study, as age advances there is a trend of increase in mindfulness score.

**Conclusion:** Our study conclude that there is trend that as age advances mindfulness increases and females show greater degree of mindfulness compared to males though statistically not significant.

**Keywords:** Mindfulness, Gender variation, Mindfulness attention awareness scale (MAAS).

## Introduction

Mindfulness can be defined as the degree of awareness that is achieved by purposefully paying attention to the present moment, without judging it.<sup>1</sup> Two components

are emphasized in defining mindfulness: self-regulation of attention and nurturing a non-judgmental orientation based on acceptance.<sup>2</sup>

Since the launch of the first empirical research conducted on this topic numerous studies have shown the positive effects of increased mindfulness - on life-satisfaction, vitality, self-esteem, empathy, optimism, integrity, or positive affect – and its contribution to reducing the difficulties with emotional dysregulation, depression, neuroticism, rumination, social anxiety and wandering thoughts. Mindfulness as a general concept and mindfulness meditation as a therapeutic method have become increasingly popular in the last decades

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and the number of research papers on the subject has grown exponentially.<sup>3</sup>

Further, interest has developed regarding the human capacity for enhanced attention to and awareness of life’s experiences, which has been termed trait mindfulness. Trait mindfulness, also referred to in some literature as day-to-day mindfulness or dispositional mindfulness, is defined by Brown and Ryan as an inherent state of consciousness varying between and within humans that is characterized by the presence or absence of attention to or awareness of what is occurring in present experience.<sup>4</sup>

On reviewing the Indian literature with respect to the studies on assessment of mindfulness, surprisingly data is scanty. Hence the present study aimed at assessing the mindfulness and to analyse impact of age and gender on mindfulness.

**Materials and Method**

This was a cross sectional questionnaire based observational study conducted at the department of physiology, Vinayaka mission medical college after obtaining institutional ethical committee clearance. Consent was obtained from the participants. A total of 330 participants were included in the study. Convenience sampling technique was used. Mindfulness is assessed using Mindful Attention Awareness Scale (MAAS). It is a 15 item, Likert type 6 point scale with each having score ranging from low (1) to a high score (6) proportional to the degree of mindfulness. The structured questionnaire sent to subjects through the email, WhatsApp in the form of google doc link. Individual responses received and the data analyzed.

**The Mindful Attention Awareness Scale (MAAS):** The trait MAAS is a 15-item scale designed

to assess a core characteristic of mindfulness, namely, a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place. Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.<sup>4</sup>

In collection of data we had assistance of medical undergraduate students who asked persons they know from general population (their friends, neighbours and family members) to complete MAAS.

**Inclusion criteria:** Both sexes in the age group of 18 yrs to 60 yrs were included.

**Exclusion Criteria:** Those who had severe neurological disorders.

**STATISTICAL ANALYSIS:** Descriptive analysis done with the interpretation of data. Age mean and score mean calculated with SD. Age Mean ± SD: 23.72 ± 7.76. Score Mean ± SD: 4.15 ± 0.92. For analytical purpose, age is subdivided into five class intervals: Less than 20, 20-29, 30-39, 40-49 and more than 50

**Results**

A total of 330 participants were included in the study. Majority of participants were belonged to age group less than 20 years which accounted for 55.6% followed by 20-29 years which accounted for 25.9%. Least number of participants were from the age group of >50 years which accounted for 0.9%. (Table. 1).

**Table 1: Age wise and mean score distribution of study participants.**

Age (Years)	No. of Counts	Percentage	Score Mean ± SD
<20	178	55.6%	4.05 ± 0.85
20 – 29	83	25.9%	4.25 ± 1.04
30 – 39	44	13.8%	4.12 ± 0.96
40 – 49	12	3.8%	4.61 ± 0.62
≥50	3	0.9%	5.31 ± 0.35
<b>Total</b>	<b>320</b>	<b>100%</b>	

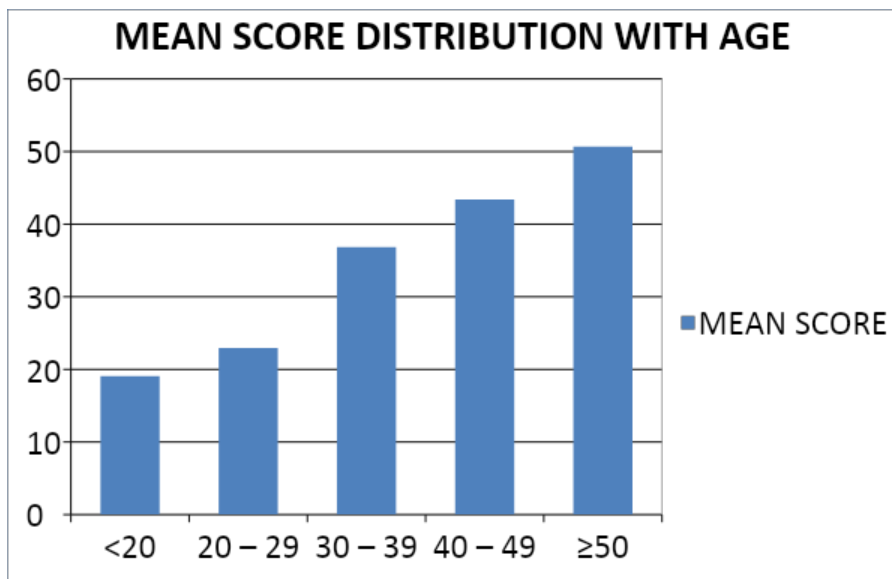


In our study, majority of study participants scored between 3-5 (70%) followed by >5 (17.8%). the mean score in females is higher compared to males. Using Independent t test the t value is -1.807 and the p value is 0.072.

**Table 2: Gender wise distribution of score**

Score Distribution	Male	Female	No. of Counts	Percentage
<3	25	14	39	12.2%
3 – 5	114	110	224	70%
>5	27	30	57	17.8%

Interesting observation was made in the present study, as age advances there is a trend of increase in mindfulness score.



**Fig. Mean score distribution with age**

**Discussion**

In the present study, age and gender were considered and assessed for mindfulness. In our study it was noticed that average mean score was high among females compared to males. Further, it was observed that, as age advances there is a trend of increase in mindfulness score. Majority of study participants were students. The mean score of mindfulness among students was found to be less compared to other higher age group participants. This low score could be due to weakness in organizational mindfulness and the role of the university as a new environment with its requirements and conditions. Undergraduate students in the first semester, who are new and unfamiliar members of this atmosphere, may be at high risk as a group for the disturbance of their mindfulness in parallel with other mental difficulties.<sup>5</sup> This is also in agreement with the studies conducted by Mogilner et al<sup>6</sup> and Sturgess .<sup>7</sup>

Among students, To bring mental processes under greater voluntary control, fostering general mental well-being and developing specific capacities such as calmness, concentration and training of attention and awareness skills are one of the solutions.<sup>8</sup> As per Charles et al, regarding the age contrasts is maturational change/ formative understanding which sets that as people age, they grow progressively adjust method for dealing with their feelings and in this way are less deciding about themselves as well as other people. It implies that more seasoned grown-ups can be progressively present “at this very moment”, since they are not hindered by force of their feelings. This is additionally upheld by the consequences of a longitudinal investigation of 2.704 members in four ages of families where they found that negative influence diminished with age and that more established individuals tended to control their feelings all the more viably.<sup>9</sup>

Drawing on the theoretical framework of potential mechanisms of mindfulness, as proposed by Hölzel et al.<sup>10</sup> research among experienced meditators Tran et al.<sup>11</sup> has shown that meditation experience and mindfulness are positively associated with indicators of all proposed mechanisms, i.e., attention regulation, body awareness, emotion regulation, and a change in perspective on the self. However, only improvements in emotion regulation and body awareness, but not in attention regulation and a less static perspective about the self explained the effects of trait mindfulness on mental health. Body awareness appeared to be a specific pathway for the effects of trait mindfulness on symptoms of anxiety, whereas non attachment (i.e., the relative absence of a fixation on ideas, images, or sensory objects, and of internal pressure to get, hold, avoid, or change circumstances or experiences; Sahdra et al.<sup>12</sup> for symptoms of depression.

The present study further aimed at determining the gender difference. There is almost no empirical work addressing gender differences on mindfulness in India to our knowledge. Mean scores among females were found to be high. But the difference was not statistically significant. In fact, most task-switching studies do not explore individual differences and accordingly are carried out with small samples. This is in agreement with the study conducted by Sabina Alispahic and Eneđina Hasanbegovic Anic.<sup>13</sup> As per their study, statistically significant gender difference for the subscales Observing, where females scored higher than men and Acting with awareness, where males had higher scores than their counterparts. Our observation with respect to gender is similar to the study conducted by Sturgess.<sup>7</sup>

Gender differences could be explained with different cognitive functioning of females and males. According to the previous research, women in general are much better in observing details than men and also in multitasking doing several things at the same time, while men in general having a tendency to focus on one task at the time and be more aware while doing it. Stoet et al.<sup>14</sup>

But there are a majority of research evidences from the past which contradict with the present findings and confirm gender differences on mindfulness and academic self-confidence.<sup>15,16</sup>

The present study has limitations. This study is limited in that it lacked multiple method to assess the MAAS, which did not allow for a formal multitrait-

multi method analysis of convergent/discriminant validity. Despite these limitations, it can be said that the MAAS has acceptable psychometric properties in the study population and is confident to measure mindfulness. This scale can also be used to evaluate the effectiveness of the mindfulness-based interventions. Further the limitation of the study was, reported results are based on self-reports throughout and thus potentially are prone to common-method variance effects and Study group is taken from a homogenous population.

## Conclusion

Our study was the empirical research about age and gender differences in mindfulness in this region. Our study conclude that there is trend that as age advances mindfulness increases (p value 0.133) and females show greater degree of mindfulness compared to males (p value 0.07) though statistically not significant. Further interventional studies can be carried out among youngsters to improve mindfulness.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** Institutional ethical clearance was obtained.

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# Association of Internet Addiction with Social Support, Loneliness And Stress: A Cross Sectional Study among Female College Students

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## Abstract

**Background:** Internet Addiction is a significant emerging mental health condition among Indian college students and cascading into a major public health concern. Internet addiction has witnessed an upsurge as a clinical phenomenon among young adults precipitated by new challenges specific to this developmental age and owing to its complexity resulting from multiple psychosocial factors which warrants the need for effective multi modal intervention due to high relapse rates and resistance to treatment.

**Aim:** The present investigation was aimed to evaluate the association of Internet Addiction with social support, loneliness and stress among female college students in Chandigarh.

**Methodology:** It was a cross sectional study among 200 undergraduate female students within the age range of 18-21 years, drawn from various colleges pertaining to Chandigarh region. Internet Addiction Test (Young, 1998) was employed as a screening instrument to identify internet dependence and other assessment tools administered include Perceived Stress Scale, Multidimensional Perceived Social Support scale and UCLA Loneliness Scale.

**Results:** Comparative Analysis revealed that there were significant differences between Internet Addiction and Non Internet Addiction groups of female college students in the areas of Stress, Loneliness and Family Support. Bivariate correlation analysis showed a positive relationship of Internet Addiction with Stress and Loneliness. However there emerged a negative correlation between Internet Addiction and Family Support.

**Conclusion:** Our study holds heuristic value for elucidating the potential impact of low family support and heightened stress due to plethora of reasons may increase vulnerability to Internet Addiction among female college students. We can conclude that young adults with insufficient or conflictual family interaction triggers emotional loneliness resulting in either social withdrawal or search for needed relationships in the Internet environment. Hence, family support is an important factor in treating and preventing Internet addiction.

**Keywords:** *Internet Addiction, Stress, Loneliness, Social Support, College Students.*

## Introduction

Internet Addiction (IA) refers to excessive or poorly controlled preoccupations, urges, or behaviors regarding Internet use, which eventually could lead to distress and functional impairment<sup>[1]</sup>. In the fifth edition of the DSM, Internet addiction is equated with the addiction to Internet games, although some research shows that

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they should be viewed as separate entities<sup>[2]</sup>. Internet addiction has been shown to be related to depression, anxiety, aggression, sleep disturbance, Attention Deficit Hyperactivity Disorder (ADHD) and alcohol dependence<sup>[3]</sup>. Compulsive Internet users show different activity patterns in regions of the brain that have been implicated in reward and emotion processing with decreased grey matter volume in several regions<sup>[4]</sup>.

Research on excessive internet use and associated behavioral problems has grown dramatically in the last few decades. A recent review of more than 103 studies found that over 12% of male students and 5% female students in China showed signs of Internet addiction<sup>[5]</sup>. In a study among 810 undergraduate Indian college students aged of 19 -21 years, reported the prevalence rate of IA as 8.8% (10.33% males and 6.87% females)<sup>[6]</sup>. Studies in different countries have generated widely different estimates owing to different study designs, varied diagnostic criteria, diverse assessment measures, cultural backgrounds and study samples.

Internet addiction is significantly associated with factors such as availability of own personal gadgets, use of smartphones, exposure to internet at a very young age, internet usage for the purpose of exploring new things and building new relationships online<sup>[7]</sup>. Adolescents have been identified as an at-risk population as they tend to be more prone to risky behavior and can indulge in addictive practices in order to cope with anxiety, frustration and failure or need for excitement, unrealistic optimism in relation to the feeling of invulnerability, or even the need to achieve their goals as a part of their transition into adult age<sup>[8]</sup>. Since most studies from India have reported higher prevalence of IA in males<sup>[9, 10]</sup>, so there are lacunae of studies examining this phenomenon exclusively in female students. It is pertinent to examine the association of Internet addiction and differential psychosocial correlates in this vulnerable developmental phase of young adulthood for the purpose of detecting early warning signs of underlying psychopathology and to formulate effective interventions.

### Objectives:

1. To identify possible differences between Internet Addiction and Non Internet Addiction groups on psychological variables of Social Support, Loneliness and Stress.
2. To study the relationship between Internet Addiction and the psychological variables of Social Support, Loneliness and Stress.

## Methodology

**Sample:** It was a cross sectional study and purposive sampling technique was used to select 200 undergraduate female students within the age range of 18-21 years drawn from colleges pertaining to Chandigarh region. The subjects belonging to nuclear families and middle income group in order to control the effect of socioeconomic variables.

**Procedure:** The testing schedule was started with participants filling details about their socio-demographic and Internet User characteristics after explaining the nature and purpose of the study. Written informed consent was taken from them and were conveyed that their participation was voluntary. The data gathered would be confidential to be used only for research purpose. Internet Addiction Test (IAT) was used as a screening measure to identify internet dependence. Data was collected from those college students using internet for at least since last 6 months. The selected sample comprised out of 100 dependent users and 100 non - dependent users of internet (as per Young's criteria of IA).

### Assessment Tools:

1. **Socio-Demographic Profile:** included questions on socio-demographic and Internet User characteristics of the participants such as age, marital status, educational qualifications, family type, family socioeconomic status, purpose of internet usage, age of internet usage initiation, time spent online per day and frequency of Internet use per week in days.
2. **Internet Addiction Test (IAT)**<sup>[11]</sup>: The IAT is a self-reported measure comprising 20 items rated on a 5-point scale determining the degree to which their Internet use affects their daily routine, social life, productivity, sleeping pattern and feelings. The IAT total score ranges from 20 to 100, with higher scores representing higher severity of Internet compulsivity and addiction. The participants were allocated into either the IA group (IAT score  $\geq 40$ ) or the Non IA group (IAT score  $< 40$ )<sup>[12]</sup>. Internal consistency (0.88), test-retest reliability (0.82) and bisection (0.72) are satisfactory.
3. **Perceived Stress Scale (PSS- 10)**<sup>[13]</sup>: The PSS consists of 10 items rated on a 5-point scale designed to measure the perception of stress and degree to which situations in one's life are appraised as stressful during the last month.

- 4. UCLA (University of California, Los Angeles) Loneliness Scale<sup>[14]</sup>:** The UCLA includes 20 statements rated on a 4-point Likert scale which reflects how lonely people define their lives. Cronbach’s alpha coefficient was found 0.90 in this study.
- 5. Multidimensional Perceived Social Support<sup>[15]</sup>:** The MSPSS is a 12-item scale that measures perceived support from three domains: Family (FA), Friends (FR) and a significant Other (SO) rated on a 7-point Likert-type scale. Cronbach’s alpha coefficients for FA, FR and SO were .82, .86 and .86, respectively.

**Statistical Analysis:** Considering the objectives of the study, descriptive analysis, Independent sample t-test and Pearson Product Moment Correlation was computed using SPSS Statistics Version 21.

**Results**

A descriptive analysis of the sociodemographic and Internet user’s characteristics revealed that the mean age of these students was 19.58 years(± 1.20) and all of them were unmarried. Majority of them primarily used the Internet for pleasure activities including social networking sites, entertainment, online shopping and online gaming. Pertinent findings in this study were earlier than expected age of internet usage initiation

was 13 years, time spent online per day was 4-6 hours, frequency of Internet use per week was everyday and 26-30 hours per week.

A perusal of Table 1 revealed a statistically significant difference between IA Group (N =100) and Non IA Group (N =100) in the areas of Stress (t = 2.82; p = 0.01) and Loneliness (t = 4.54; p = 0.01) with higher scores in IA Group and in the sub domain of Social Support, i.e., Family Support (t = 3.20; p = 0.01) with higher scores in Non IA Group. A perusal of Table 2 shows correlation analysis between Internet Addiction and the psychological variables. Correlation analysis showed a positive significant association between IA with Stress (r =0.417; p = 0.01) and IA with Loneliness (r =0.290; p = 0.01). However there emerged a negative significant correlation between IA and sub domains of Social Support, i.e., Family Support (r =-0.368; p=0.01). Results also showed a positive significant correlation between Stress and Loneliness (r = 0.215; p = 0.05) but a negative significant correlation between Stress and sub domains of Social Support, i.e., Family Support (r = -0.262; p = 0.01). As expected, there emerged a negative significant correlation between Loneliness and sub domains of Social Support, i.e., Significant Other (r = -0.339, p =0.01), Family Support (r = -0.289; p = 0.01), Friends (r = -0.432; p = 0.01) and total score of social support (r = -0.414; p = 0.01).

**Table 1: Shows descriptive analysis and comparative analysis of Internet Addiction and Non Internet Addiction groups on psychological variables of Social Support, Loneliness and Stress**

Variables	Internet Addiction Group (N = 100)	Non Internet Addiction Group (N = 100)	t-ratio
	Mean ± SD	Mean ± SD	
Total Social Support	5.13 ±1.40	5.48 ±1.167	1.12
Significant Other Support	5.34 ±1.86	5.11 ±1.66	0.63
Family Support	4.77 ±1.68	5.87 ±1.17	3.20**
Friends Support	5.23 ±1.44	5.50 ±1.24	0.82
Stress	23.17 ±7.19	18.15 ±7.01	2.82**
Loneliness	51.08 ±12.07	44.13 ±9.41	4.54**

\* Significant at 0.05 level  
 \*\* Significant at 0.01 level

**Table 2: Shows Correlation Analysis between Internet Addiction and psychological variables of Social Support, Loneliness and Stress**

Variables	Stress	Internet Addiction	Loneliness
Stress	1		
Internet Addiction	0.417**	1	
Loneliness	0.215*	0.290**	1
Significant OtherSupport	0.035	0.097	-0.339**
FamilySupport	-0.262**	-0.368**	-0.289**
Friends Support	-0.171	-0.035	-0.432**
Total Social Support	-0.139	-0.101	-0.414**

\* Significant at 0.05 level

\*\* Significant at 0.01 level

## Discussion

The present study aims to enhance our understanding of Internet Addiction (IA) among female college students and its relationship with psychosocial correlates of social support, stress and loneliness. Results revealed that Non IA group reported higher scores in the area of Family Support and a negative correlation exists between IA and Family Support. This crucial finding cannot be overlooked in this particular age group and gender specific research, that only lack of family support exacerbated Internet addiction among female college students which could be attributed to plethora of reasons such as inadequate emotional support, high discipline, intense conflicts, low expressiveness, maladaptive parental rearing styles, low family functionality<sup>[16]</sup>, low perceptions of social support from family, divorced families, low-income families, severely dysfunctional families<sup>[17]</sup>. Paradoxically with pre-existing problematic familial relations in these young adults would make treatment difficult. Another pertinent rationale for low family support provided to female young adults can be attributed to gender discrimination and rampant sexism in Punjab.

The present study also found that IA group reported higher scores in the area of Loneliness and a positive correlation exists between IA and Loneliness indicating that female young adults who are predisposed to or are engaged in addictive use of internet primarily to gain social approval, enhancement of self-esteem, overcoming feelings of loneliness, boredom, helplessness, anxiety and depression which can be achieved compensatively within online social environment. In a meta-analysis

examining 94 studies conducted in 22 countries also proved a correlation between depression, loneliness and Internet addiction<sup>[18]</sup>.

Our study revealed that IA group reported higher scores in the area of Stress and a positive correlation exists between IA and Stress. Besides numerous benefits of this ubiquitous technological tool, problematic Internet use is strongly associated with low impulse control and resulting in increased feelings of tension or arousal if there is lack of easy accessibility of computers or internet availability. Excessive Internet use is associated with a gamut of negative life consequences for college students undergoing major life changes and stressful life circumstances including low self esteem, relationship problems, lack of effective communication within family environment, academic stress<sup>[19]</sup> and social anxiety<sup>[20]</sup> and peer pressure, etc.

The present study reported a negative association of Loneliness with Social Support (Significant Other, Family Support, Friends); negative correlation between Stress and Family Support; and positive correlation between Stress and Loneliness. Loneliness is linked with Internet use due to the tendency for withdrawal from real life experiences since the individual might think that his current relationships do not meet his expectations<sup>[21]</sup>. Research evinces that people who were lonely with deficient social skills can develop compulsive Internet usage behaviors which prevents them from developing healthy social relationships in their daily life<sup>[22]</sup>. At this developmental stage, peer group becomes an important source of social support as they seek to individuate from family. But low social support from family decreases

a student's ability to proactively and reactively cope with the academic or other significant life stressors and can negatively impact their quality of life. Research suggests that compulsive Internet usage increased levels of depression, stress and loneliness<sup>[23]</sup>.

**Limitations:** The limitations include cross-sectional design which precludes making a causal link, purposive sampling technique, self report measures and gender specific sample (restricted to females) may limit generalization of findings. Longitudinal design based research can be conducted in future to formulate comprehensive preventive strategies.

### Conclusion

The present study holds significant heuristic value for future research by providing a comprehensive empirical research finding to understand the psychosocial underpinnings of Internet Addiction among female college students. A multidisciplinary team including social and mental health agencies must collaborate to provide a holistic management of IA and formulation of preventive measures remain critical to illuminate parents and educational institutions in curbing Internet-related problems early and effectively in college students.

**Conflicts of Interest:** Nil

**Financial Support and Sponsorship:** Nil

**Ethical Clearance:** There is no Institutional Ethics Committee. Written informed consent was taken from all students who participated in the study

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# Effects of Dance and Movement Therapy (DMT) Versus Progressive Muscle Relaxation (PMR) on Quality of Life among Elderly Residing in Selected Old Age Homes of Haryana: A Quasi Experimental Study

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## Abstract

Elderly age group is a controversial issue as it is a natural process which presents a unique challenge for every individual in society. Thus it is being considered that quality of life among elderly is poor due to ignorance that is the vulnerable population. The objective of the study was to evaluate the quality of life among elderly before and after administration of dance and movement therapy and progressive muscle relaxation. Methodology: Quantitative research approach, quasi experimental non equivalent control group pretest post test design, with Purposive sampling technique. Data was collected by using Modified WHO-QOL Bref questionnaire for assessing quality of life. Thus findings of the study showed effectiveness of dance and movement therapy and progressive muscle relaxation on quality of life as the calculated Repeated Measure Anova F value (DMT  $F=1027.03$ ,  $p=0.00$  and PMRF= $496.31$ ,  $p=0.00$ ). Result also shows in PMR group quality of life among elderly was found to be statistically significant with source of income and history of chronic illness i.e ( $F=3.534$ ,  $p=0.02$ ) and ( $t=2.922$ ,  $p=0.00$ ) and in DMT group quality of life among elderly was found to be statistically significant with nature of previous occupation and history of chronic illness i.e ( $F=2.935$ ,  $p=0.05$ ) and ( $t=2.408$ ,  $p=0.02$ ). Conclusion: DMT and PMR was effective intervention given for 30 minutes at once daily for improving quality of life among elderly.

**Keywords:** *Quality of life, Dance and movement therapy (DMT), Progressive Muscle Relaxation (PMR), Elderly residing at old age homes.*

## Introduction

Elderly is unavoidable consequence of life. Every

individual who is born must grow older and eventually die.<sup>1</sup> Elderly is conventionally considered to be identical process that is shaping the physical and mental health. Ageing has considered itself an important public health challenge. Elderly has a distinct set of medical and social problems, which will become increasingly apparent in elderly.<sup>2</sup>

The world population is ageing and by 2025, the world's population is expected to include more than 830 million people at an age of 65 by 2030, the number of people in the world aged 60 years or over is projected to

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grow by 56 percent, from 434 million to 1.4 billion and by 2050 the global population of elderly is projected to reaching nearly 2.1 billion about 901 million.<sup>3,4</sup> Thus successfully ageing is dazzling the ability of elderly people to adapt to physical, social and emotional losses and to achieve satisfaction, security, safety and gratification.

A person with a depressed mood feels distressing, anxious, empty, desperate and powerless, worthless, blameworthy, short-tempered, or ashamed.<sup>5</sup> According to World Health Organization (WHO), the QOL is individual's insight of their situation in life in the perspective of customs and significance in which they survive and in relation to the objectives, opportunity, interactions and desires.<sup>6</sup>

Dance therapy effects changes in feelings, cognition, physical functioning and behavior.<sup>7</sup> Dance as psychotherapy has been used to recover from psychological and substantial well-being of a person.<sup>8</sup> Poco-Poco is the type of dance therapy which is used as the psychotherapy along with the music to relieve the mental illness.<sup>9</sup>

Progressive muscle relaxation is a psychotherapy that is used for relaxing mind and body by gradually tensing and soothing muscle of body.<sup>10</sup> Person will feels less pressure and have a good physical and emotional health. When the muscle is relaxed, the feelings of warmness and enormity are felt as a result.<sup>11</sup>

Elderly at the peak age feels impassiveness, worthlessness and insecurity, especially when living with these feelings in old age homes. It is very important to understand the factor which affects the quality of life of the elderly persons.<sup>12,13</sup> The quality of life also depends upon emotional interpretation that a person feels about life. Thus the quality of life is progressively more attributed as an estimation that is reliant on the person's prejudice.<sup>14</sup>

## Methodology

The study was conducted during the period from October 2017- November 2018 in the state of Haryana, India. A sample of 60 elderly participated in this quasi experimental study with the prior permission from concerned authority of old age homes. Quantitative research approach was considered to be the most appreciated approach to assess the effectiveness of dance and movement therapy and progressive muscle

relaxation on QOL among elderly with non equivalent control group pre-test post-test design.

**Inclusion Criteria:** Elderly aged 60 years and above, residing in old age homes, willing to participate in the study, alert, oriented and comprehend to respond, able to understand and speak Hindi and able to move without walking aids or any physical assistance.

**Procedure:** Screening was done on day 1 with selected variables and by Modified WHO-QOL Bref questionnaire for quality of life assessment with interview technique. Dance and movement therapy and progressive muscle relaxation was administered to elderly from 2<sup>nd</sup> day to 8<sup>th</sup> day as per intervention protocol. DMT contain 3 sessions i.e warm up session of 5 min duration followed by active session that involves all elderly to sit and do the chair step dance together for 20 min, further third session is for cooling or relaxing session for 5 min. Similarly Progressive muscle relaxation also include 3 sessions i.e warm up session that is done for 5 minutes followed by active sessions done for 20 minutes in this muscle are tensed for 5 seconds and relaxed for 20-30 seconds along with deep breathing and cooling session that is done for 5 minutes. Immediately after completion of 7 days intervention post test I was taken (day 8) and then after 1 week of post test I post test II was taken (day 16) for both DMT and PMR group.

## Data Analysis:

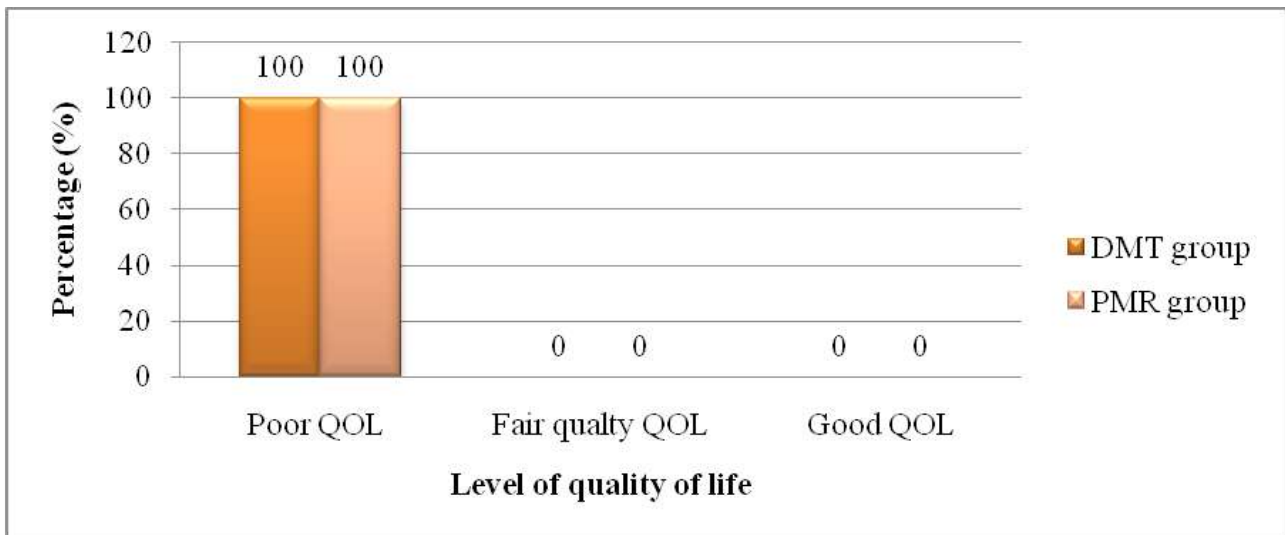
**Descriptive statistics:** Frequency, percentage distribution was used to describe selected variables, Chi-square was used to assess the homogeneity between two groups.

**Inferential Statistics:** Independent 't' test, Repeated measure ANOVA Spearman correlation, ANOVA and 't' test

## Results

Homogeneity was checked by  $\chi^2$  test was applied to compare the DMT and PMR group with respect to every selected variables. Hence both the group was homogenous except for gender ( $p=0.04$ ).

Percentage distribution of DMT and PMR in terms of quality of life among elderly before administration of intervention are shown in Figure 1. All the elderly in both DMT and PMR group (100%) were having poor quality of life.



**Figure 1: Quality of life before Administration of Dance and**

**Movement therapy and Progressive**

**Muscle Relaxation:** In terms of QOL, there was significant difference between DMT and PMR group found before administration of intervention as the calculated ‘t’ value was 7.60, p=0.001 with mean difference of 1.17 Mean score after administration

of intervention in DMT group was 99.33 and in PMR group was 98.57 with mean difference of 0.767. The calculated ‘t’ value was found to be 0.58, p= 0.56 in post-test I. In post-test II mean score after administration of intervention in DMT group was 96.57 and in PMR group was 96.97 with mean difference of 0.400. The calculated ‘t’ value was found to be 0.20, p=0.83.

**Table 1: Mean, mean difference, standard deviation of difference, Standard Error of Mean Difference and ‘t’ value of quality of life among elderly before and after DMT and PMR in DMT and PMR group N=60**

Observation	Group	Mean±S.D	M <sub>D</sub>	SE <sub>MD</sub>	‘t’ value	df	p value
Pretest	DMT group (n=30)	50.17±4.87	1.17	8.93	7.60	58	0.001*
	PMR group (n=30)	59.10±4.19					
Post Test I	DMT group (n=30)	99.33±4.49	0.767	1.31	0.58	58	0.56 <sup>NS</sup>
	PMR group (n=30)	98.57±5.62					
Post Test II	DMT group (n=30)	96.57±6.75	0.400	0.93	0.20	58	0.83 <sup>NS</sup>
	PMR group (n=30)	96.97±8.18					

NS -Not significant (p>0.05) t=58(2.00) \*- significant (p ≤ 0.05)

In DMT group the mean score of quality of life in pre test, post test I and post test II was 50.17, 99.33 and 96.57 respectively. Where the F value is 1027.03 with calculated p=0.00. Whereas in PMR group the mean

score of quality of life in pre test, post test I and post test II scores was 59.10, 98.57 and 96.97 respectively. Where F value is 496.31 with calculated p= 0.00.

**Table 2: Repeated measure ANOVA showing the significant difference within groups in terms of Quality of life in DMT group and PMR group N=60**

Groups	Test	Mean	F value	p value
DMT group (n=30)	Pre test	50.17	1027.03	0.00*
	Post test I	99.33		
	Post test II	96.57		
PMR group (n=30)	Pre test	59.10	496.31	0.00*
	Post test I	98.57		
	Post test II	96.97		

\*- significant (p ≤ 0.05)

In DMT group there was the predictability of nature of previous occupation in multiple correlation coefficient, the direction of predictability for the variable is as if chance of private service increases by 1 point, the quality of life get decreases by 8 points (-7.880). Similarly in second model if private service increases by 1 point then quality of life decreases by 12 points (-11.695) and if presence of history of chronic illness increase by 1 point then quality of life get decreases by 10 points (-9.538). In model three if private service increases by 1 point then quality of life decreases by 14 points (-13.873), if presence of history of chronic illness increase by 1 point then quality of life get decreases by

11 points (-11.051) and if no source of income increase by 1 point then quality of life get decreases by 8 points (-7.863). In final model if private service increases by 1 point then quality of life decreases by 14 points (-13.873), if presence of history of chronic illness increase by 1 point then quality of life get decreases by 11 points (-10.702), if no source of income increase by 1 point then quality of life get decreases by 7 points (-6.679) and if chance of Sikh religion increase by 1 point then quality of life get decreases by 3 points (-3.133). This infers that nature of previous occupation i.e private service among elderly had continuous prediction in negative direction throughout the models.

**Table 3: Step Wise Multiple Regression Showing Predictability of Individual Independent Variables on Quality of Life among Elderly in DMT Group (Regression Coefficient) in Post test II N=30**

Model	Unstandardized Coefficient		Standardized Coefficients Beta	t value	p value
	B Std.	Error			
(Constant)	97.880	1.232	-	79.442	0.00*
Nature of previous occupation (private)	-7.880	3.018	-0.442	-2.611	0.01*
(Constant)	95.972	1.020	-	94.048	0.00*
Nature of previous occupation (private)	-11.695	2.431	-0.657	-4.810	0.00*
History of chronic illness	-9.538	2.049	0.636	4.655	0.00*
(Constant)	97.242	0.862	-	112.818	0.00*
Nature of previous occupation (private)	-13.873	1.991	-0.779	-6.969	0.00*
History of chronic illness	-11.051	1.659	0.736	6.662	0.00*
Source of income (no source)	-7.863	1.891	-0.442	-4.157	0.00*
(Constant)	98.078	0.894	-	109.655	0.00*
Nature of previous occupation (private)	-13.873	1.863	-0.779	-7.446	0.00*
History of chronic illness	-10.702	1.561	0.713	6.857	0.00*
Source of income (no source)	-6.679	1.853	-0.375	-3.605	0.00*
Religion (Sikh)	-3.133	1.448	-0.216	-2.163	0.04*

\*- significant (p ≤ 0.05)

Presence of History of chronic illness having prediction with variability of R square = 15% (0.157) as calculated F value 5.210 which was significant at 0.05 level of significance which infers that the chance of fluctuation or change in R value is less than 0.03. Further when combined with Educational status – primary education (reference group- graduation and above) the

prediction with variability of R square= 28% (0.289) as calculated F value 5.492 which was significant at 0.05 level of significance which infers that the chance of fluctuation or change in R value is less than 0.01. This further infers that presence of history of chronic illness alone had higher predictability than the second model.

**Table 4: Step Wise Multiple Regression Showing Predictability of Multiple Independent Variables on Quality of Life among Elderly in PMR Group (Multiple Correlational Coefficient) in Post test II N=30**

Model	R Value	R square	Adjusted R square	Std. error of estimate	df	F value	p value
History of chronic illness	0.396	0.157	0.127	7.645	1/28	5.210	0.03*
History of chronic illness & Educational status (Primary)	0.528	0.289	0.237	7.148	2/27	5.492	0.01*

\*- significant (p ≤ 0.05)

### Discussion

In the present study, less than half of the elderly in DMT and PMR group were in the age group of 70-79 years of age i.e 13(43.3%) and 14(46.7%) respectively. More than half of elderly in DMT group were females 17 (56.7%) whereas in PMR group most of the elderly 22 (73.3 %) were males. More than half of elderly in DMT group were living in urban area 16(53.3%) whereas in PMR group two third of the elderly were living in urban area 18(60%). These findings are partially consistent and contradictory to a cross sectional study conducted by P. Gowthami B, Jayabharathi et al. (2016) on prevalence of depression and QOL among elderly where they found that less than half of the elderly 42 (32.3 %) belongs to the age group of 60-64 years and least no. of elderly 17 (13.1%) were in the age group of 70-74 and above 80 years. More than half of the elderly 73 (56.2 %) were males and less than half 57 (43.8%) were females and majority of elderly 130 (100.0%) were living in rural area.<sup>15</sup>

In the present study, it showed that all the elderly in both the groups (100%) were having poor quality of life in both DMT and PMR group before administration of intervention. These findings were contradictory to the various studies conducted by Abhay Mudey (2011), where it is found that 90% elderly were having fair quality of life and 85% were having good quality of life<sup>16</sup>.

### Conclusion

Dance and movement therapy and Progressive muscle relaxation was effective in improving quality of life among elderly.

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**Conflict of Interest:** Nil

**Source of Funding:** Nil

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# Effects of Integrative Neuromuscular Training Combined with Yoga and Stretching Exercises on Abdominal Strength Endurance of Primary School Children

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## Abstract

**Background:** Abdominal strength endurance is used to stabilizing the core muscles. Poor core muscle strength leads to the poor posture. It affects to the motor skills in children. The integrative neuromuscular training can enhance the abdominal muscle strength and used to avoid bad posture in children. This is a training to improve the physical fitness in children and lead them to live healthy life style.

**Purpose:** To know the sixteen weeks of training effects of integrative neuromuscular training combined with yoga and stretching exercises on abdominal strength endurance of primary school children.

**Method:** Sixty primary school children with the age of seven to ten years were selected as subjects from Alagappa Fitness Foundation, Karaikudi, Tamilnadu, India. They were randomly allocated to integrative neuromuscular training (n=15, INT), integrative neuromuscular training combined with yoga (n=15, INT-Y), integrative neuromuscular training combined with stretching exercises (n=15, INT-S) and control participants (n=15, CP). The subjects performed their scheduled training for the period of 16 weeks, three alternative days in a week. The three selected trainings were chosen as independent variables and abdominal strength endurance was chosen as a dependent variable. It was tested by sit up test, performance recorded in numbers.

**Results:** After the sixteen weeks training, the experimental groups showed that significant differences ( $p < 0.05$ ) on abdominal strength endurance. The control participants did not show any significant difference ( $p > 0.01$ ) on abdominal strength endurance.

**Conclusion:** The integrative neuromuscular training combined with yoga group produced greater improvement on abdominal strength endurance than the other trainings.

**Keywords:** *Neuromuscular, Training, Yoga, Stretching, Abdominal Strengthen durance.*

## Introduction

Physical activity is a behavior, whereas physical fitness is an attribute.<sup>1-3</sup> Physical activities that is planned, structured and repetitive bodily movement done to improve or maintain one or more components of physical fitness. Physical fitness is a groups of individual character attained from usual physical activity. These characteristics include cardio respiratory endurance, muscular endurance, muscular strength, body composition and flexibility.<sup>4-6</sup>

The growth prototype of a child is the consequence of

a constant interaction among the child's environment and genes. This comprises the socioeconomic surroundings of the family and school as well as the environmental of the district and country. Changes in the growth pattern, therefore, reflect changes in one or more of this factors.<sup>7</sup>

During infancy and preschool age, movement is an integral part of children's life. In the first six years of life, children discover themselves and the world through movement and captivate their surroundings, through their body and their sensations.<sup>8</sup> Thus, especially in that period of human life, the study of a child's motor performance can significantly contribute to the full



understanding of his/her entire personality.<sup>9</sup>

Physical activity in different forms is important to health and development during childhood.<sup>10</sup> Children need regular physical activity for normal growth and development, maintenance of good health and fitness and development of physical activity skills and behaviors that carry into adulthood.<sup>11</sup> Organs grow at different rates and these rates can differ from the growth rate of the human body as a whole.<sup>12-15</sup>

The integrative neuromuscular training (INT) is a conception to apply a versatile type activity which integrates specific (exercise targeted to motor control) and general (fundamental movement), strength and conditioning activities namely core focused strength, resistance dynamic stability, agility and plyometric. These are planned to improve a skill and health related fitness.<sup>16</sup> More recently, integrative neuromuscular training (INT) which includes general and specific physical activities that are intentionally designed to enhance both health (e.g., muscular strength and cardio respiratory endurance) and skill-related (e.g., agility and balance) components of physical fitness has been recognized as an innovative approach for school-age youth.<sup>17</sup>

Children and young people are now recommended to take part in at least 60 minutes of moderate to vigorous physical activity daily to promote and protect healthy heart function, increase bone and muscle strength, improve mood and lower the risk of depression and reduce the risks of obesity, osteoporosis and diabetes.<sup>18</sup> The abdominal muscles are made up of four layers of powerful elastic bands. These muscle fibers crisscross to form an anatomical girdle. They lie across each other at various angles. The abdominals work together as a unit to produce movement.<sup>19</sup> The abdominal muscle strength

provides core muscles stability to carry out daily work with minimum effort and avoid the strain in the body.

### Method

**Samples:** Sixty primary school children (N=60) with the age of 7-10 years were selected from Alagappa Fitness Foundation, Karaikudi, Tamilnadu, India. Features about the study were informed to the children’s parents and required to sign an informed consent form. The study protocol was approved by Departmental Research Committee of the Department of Physical Education and Health Sciences, Alagappa University.

**Training Approaches:** The chosen children were divided into four equal groups, i.e., three experimental and one control group. The experimental group-I practiced integrative neuromuscular training (INT), the experimental group-II practiced integrative neuromuscular training combined with yoga (INT-Y), the experimental group-III practiced integrative neuromuscular training combined with stretching exercises (INT-S) and group-4 acted as control participants, they did not practiced any particular training. The chosen subjects were participated in this study for the period of sixteen weeks i.e., three alternative days per week.

**Data Collection:** The abdominal strength endurance was tested before and after the 16 weeks of training program. It was tested by sit ups test and scored were recorded in numbers.

**Statistical Application:** To observe the pre and post test differences between the groups, the paired sample t test was applied. To find the adjusted post test mean differences among the group, the analysis of co variance was applied. The Scheffe’s Post Hoc Test was applied to find the pair wise comparisons between the groups.

### Results

#### Abdominal Strength Endurance:

**Table 1: Demonstrates the paired sample ‘t’ test on abdominal strength endurance (Measures in numbers)**

Group	Pre test (M±SD)	Post test (M±SD)	‘t’-Test	P Value
INT (n=15)	10.46±0.63	12.6±0.5	9.02*	0.00
INT-Y (n =15)	10.53±0.99	14.4±0.5	15.12*	0.00
INT-S (n =15)	10.4±0.73	13.46±0.63	10.8*	0.00
CP(n =15)	10.4±0.82	10.26±0.79	1.46	0.97

INT-Integrative neuromuscular training, INT-Y- Integrative neuromuscular training combined with yoga, INT-S- Integrative neuromuscular training with stretching, CP-Control participants, M-Mean, SD-Standard Deviation, \*- significant, Significant at p<0.01, Insignificant at p>0.05

Table-I shows the results of mean + standard deviation of abdominal strength endurance of integrative neuromuscular training (INT), integrative neuromuscular training with yoga (INT-Y), integrative neuromuscular training with stretching exercises (INT-S) and control participants. There was a significant increase ( $p < 0.01$ ) in abdominal strength endurance in INT, INT-Y and INT-S.

There was no significant increase ( $p > 0.05$ ) in abdominal strength endurance in control participants (CP). These results indicate that the sixteen weeks of training intervention produced improvement on abdominal strength endurance in experimental groups. In control participants, there were no significant improvement was found.

**Table 2: Demonstrates the analysis of covariance on abdominal strength endurance (Measures in numbers)**

	INT	INT-Y	INT-S	CP	F	p value
Adjusted post test Mean	12.59	14.38	13.47	10.28	125.05*	0.00

INT-Integrative neuromuscular training, INT-Y- Integrative neuromuscular training combined with yoga, INT-S- Integrative neuromuscular training with stretching, CP-Control participants, M-Mean, SD-Standard Deviation, \*- significant, Significant at  $p < 0.01$ , Insignificant at  $p > 0.05$

Table-2 shows the results of analysis of covariance on abdominal strength endurance of integrative neuromuscular training (INT), integrative neuromuscular training with yoga (INT-Y), integrative neuromuscular training with stretching exercises (INT-S) and control participants. There was a significant difference ( $p < 0.01$ ) in abdominal strength endurance among INT, INT-Y INT-S and control participants (CP).

of integrative neuromuscular training combined with yoga and stretching exercises have enhance the capacity of abdominal strength endurance. The integrative neuromuscular training combined with yoga (INT-Y) produced greater improvement on abdominal strength endurance than the other training groups. The control group did not show any significant improvement on criterion variable.

The superiority effects among the selected groups were found by the application of Scheffe’s Post Hoc Test. It is illustrated.

From the statistical end results we can confirm that, 16 weeks of integrative neuromuscular training combined with yoga and stretching exercises significantly enhanced the capacity of abdominal strength endurance in primary school children. The percentage of improvement on abdominal strength endurance of integrative neuromuscular training (INT), integrative neuromuscular training combined with yoga (INT-Y) and integrative neuromuscular training with stretching exercises (INT-S) were 20.45%, 36.75% and 29.42 %respectively. These results indicate that the INT-Y produced greater improvement on abdominal strength endurance than the other trainings. Hence, the integrative neuromuscular training with yoga is suitable for the development of abdominal strength endurance.

**Table 3: Pair wise comparisons on abdominal strength endurance**

Groups	Mean Differences	Scheffe’s (p value)
INT and INT-Y	1.78*	0.00
INT and INT-S	0.88*	0.00
INT and CP	2.32*	0.00
INT-Y and INT-S	0.9*	0.01
INT-Y and CP	4.1*	0.00
INT-S and CP	3.2*	0.00

The table-3 shows the pair wise comparisons on abdominal strength endurance of selected groups.

The present study findings were in line with certain results of earlier research, while slightly contrasting with other results of relevant studies. The integrative neuromuscular training is a time efficient and cost effective training. It improves the skill and health related fitness in children.<sup>20</sup>Integrative neuromuscular training is an effective and time-efficient addition to PE for enhancing motor skills and promoting physical activity

From the above table significant differences was found between the pairs were INT and INT-Y, INT and INT-S, INT and CP, INT-Y and INT-S, INT-Y and CP, INT-S and CP.

**Discussion on Findings**

After the completion of the sixteen weeks effects

in children.<sup>21</sup> The implication of plyometric training can improve strength among football players.<sup>22</sup> Plyometric training with resistance training is more beneficial than the resistance training with static stretching for improving upper and lower body strength in boys.<sup>23</sup> There was a significant improvement in health related physical fitness in students with intellectual impairment owing to the jump rope training.<sup>24</sup> The inclusion of rope-jump programs in physical education and sports lesson prospectus and in sports training intervention may give to the growth of children's motor skills and speed up the growth of the children.<sup>25</sup> There was a significant improvement in muscular strength due to the calisthenics, using different progressive variations.<sup>26</sup> Study findings from effects of strength training on speed leg explosive power and muscular endurance of college men students showed that speed, leg explosive power and muscular endurance were significantly improved due to the influence of strength training.<sup>27</sup> Twelve weeks of low intensity of land and aquatic plyometric training enhanced muscular endurance. Between the trainings the effect was similar on abdominal muscular endurance.<sup>28</sup>

### Conclusion

In conclusion, we compared the effects of integrative neuromuscular training combined with yoga and stretching exercises on abdominal strength endurance in primary school children. These training regimens appeared sufficient to enhance the abdominal strength endurance. The greatest improvement was found in integrative neuromuscular training with yoga than the other training groups.

The study protocol is most advantageous for primary school going children in the way to improving the health fitness. At this age, a children well adopted in healthy aspects it lead them to live healthy lifestyle and suitable for sporting performances in future.

### Conflict of Interest: Nil

**Ethical Clearance:** The study protocol was approved by Departmental Research Committee of the Department of Physical Education and Health Sciences, Alagappa University

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# A Combination of Clinical Examination with Specific Biomarkers and Judicious Use of Imaging Modality can Reduce the Rates of Negative Appendicectomy

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## Abstract

**Background:** Acute appendicitis is one of the most common surgical emergencies. Accurate diagnosis of acute appendicitis is based on careful history, physical examination and laboratory and imaging findings.

**Objective:** The primary aim is the correlation between clinical, biochemical and radiological assessment in patients of appendicitis and also to reduce the rates of negative appendicectomy.

**Method:** The study was carried out in Department of General Surgery, Sir Sunderlal Hospital, IMS and BHU from September 2015 to July 2017. Total 61 patients of age group 16-65 years and either sex were evaluated on the basis of predetermined proforma, which included a detailed history, clinical examination, laboratory investigations and high resolution sonography or CT and histopathology. Sensitivities, specificities, positive and negative predictive values of TLC, neutrophil percentage, Modified Alvarado Score, CRP, D-dimer, USG and CT scan were calculated in respect to histopathology finding as a gold standard.

**Results:** Modified Alvarado scoring (MAS 7-9: Appendicitis definitive) was present in 24 (39.3%) patients. Raised leucocyte count was present in 49 (80.32%) patients, while neutrophil count above 75% was present in 47 (77%) patients. Raised CRP was present in 55 (90.16%) patients with cut-off of >3 mg/l (normal range 1-3 mg/l) while D-dimer was elevated in 44 (72.13%) patients with cut-off of >5 mg/l. On ultrasonography, (77%) patients were diagnosed as acute appendicitis whereas (83.3%) had diagnosis of acute appendicitis in CECT abdomen. Histopathological examination was positive in 60 (98.4%) patients.

**Conclusion:** We concluded that combination of thorough clinical evaluation along with certain routine biochemical & specific markers and ultrasonography as the primary imaging modality is sufficient in establishing a diagnosis of acute appendicitis in more than 90% cases.

**Keywords:** Acute appendicitis, Histopathological examination, Rovsing's sign.

## Introduction

Abdominal pain is one of the most common reasons

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for visits to the emergency room, comprising 7% of all visits<sup>1</sup>. In most of the patients, symptoms are benign and self-limited; a subset will be diagnosed with an "acute abdomen" as a result of serious intra-abdominal pathology necessitating emergency intervention. The incidence of acute appendicitis declines with age<sup>2-4</sup>. The incidence is highest among children aged 10-14 years. A declining incidence has been reported over the last decade<sup>5</sup>. Males are more commonly affected with male to female ratio of 1.4:1<sup>6,7</sup>. A three-fold risk

of appendicitis has been shown in patients with a family history of appendicitis, which also suggests the presence of genetic factors<sup>8</sup>. While the clinical diagnosis may be straightforward in patients who present with classic signs and symptoms, atypical presentations may result in diagnostic confusion and delay in treatment.

In many cases, the diagnosis of appendicitis is straightforward, however, the diagnosis can be challenging and despite advanced diagnostic imaging, rate of removal of healthy appendices in suspected cases of appendicitis remains high. During the past two decades, imaging techniques like ultrasonography and particularly computed tomography (CT) have allowed preoperative diagnosis of appendicitis to be more reliable<sup>9</sup>, related complications to be evaluated, the negative appendectomy rate and costs of caring to be lowered and differential diagnosis to be sought. Identifying perforated clinical appendicitis depends on clinical examination supported by raised inflammatory and biochemical markers. An early diagnosis of perforation improves outcomes, allowing the surgeon to prepare for a relatively difficult procedure<sup>10</sup>. The negative appendectomy and perforated appendicitis rates are both important quality measures of the treatment of acute appendicitis. There is an inverse relationship between these two measures<sup>11</sup>.

The primary aim of this study was to establish whether there is a correlation between clinical, biochemical and radiological parameters in patients of appendicitis. Also to explore the role of CT scan as complementary imaging tool in management of these patients.

## Method

This is a prospective hospital based observational study which was done after obtaining ethical approval from the Ethical Committee of Institute of Medical Sciences, Banaras Hindu University from September 2015 to June 2017. The study includes 61 patients who presented with peri-umbilical pain or pain in right iliac fossa was included in the study. Patients with age group <15 and >65 years, pregnant women and patients having history of previous abdominal surgery or diagnosis of appendicular lump or other abdominal conditions such as perforation peritonitis, ovarian malignancy, pancreatitis etc. where raised value of biochemical markers were excluded from the study.

Patients demographic profile was recorded clinically

followed by detailed history related to symptoms and their duration, presence or absence of similar complains in past, any history of diabetes or other co-morbidities, trauma, surgery, drug intake history were taken. A detailed abdominal examination to look for contour of abdomen (flat/distended/visible lump in right iliac fossa), local temperature, direct, indirect and rebound tenderness, lump in right iliac fossa, presence/absence of Rovsing's sign, Obturator sign and Psoas sign, presence of free fluid and bowel sound were also recorded.

Relevant hematological tests like complete blood count (CBC) with special test like serum C-reactive protein (CRP) and D-dimer was carried out. Soon after the report of CBC patients were graded according to Modified Alvarado Score. Further patients were subjected to high resolution sonography (HRS) at a frequency of 7.5 MHz where the points of interest were probe tenderness in RIF, visualization of appendix, mesenteric echogenicity and presence or absence of appendicitis. In case of discordance between clinical finding/scoring and ultrasonography patients were subjected to multidetector 128-slice CT scan abdomen where the points of interest were appendicular perforation, peri-appendiceal collection and presence or absence of dilated inflamed appendix. The patient was then subjected to laparoscopic/open appendectomy and the specimen was sent for histopathological examination.

Modified Alvarado scoring was done along with the biochemical, Ultrasound and CT scan findings, finally these were correlated with their histopathology report.

All these data were statistically analyzed using SPSS 16.0 software Windows version.

## Results and Discussion

Acute appendicitis the accuracy of the clinical diagnosis is approximately 80%, which corresponds to a negative appendectomy rate of around 20%<sup>12</sup>. 61 patients were suspected to have acute appendicitis. In 27 patients (44.3%) patients had Modified Alvarado scoring (MAS) 5-6 (Appendicitis possible) followed by MAS 7-9 (Appendicitis definitive) which was present in 24 (39.3%) patients. Raised leucocyte count 49 (80.32%) patients, neutrophil count above 75% was present in 47 (77%) patients. Raised CRP was present in 55 (90.16%) patients, D-dimer was elevated in 44 (72.13%) patients.

CECT abdomen was done in only 12 patients. 4 (33.3%) patients had appendicular perforation and 9

(75%) patients had peri appendigeal lymph node and dilated inflamed appendix (**Figure 1**) on CECT abdomen. Out of 12 patients, 10 (83.3%) had diagnosis of acute appendicitis in CECT abdomen. (**Figure 1**)HPE was positive in 60 (98.4%) patients.(**Table-1**) On correlating modified Alvarado score with TLS, neutrophil (%), lymphocyte (%), CRP (mg/l) and D-dimer (mg/l). Positive significant correlation was observed between MAS with TLC ( $r=0.514$ ,  $p<0.001$ ), CRP ( $r=0.613$ ,  $p<0.001$ ) and D-dimer ( $r=0.628$ ,  $p<0.001$ ) (Fig. 1-3). Negative significant correlation was observed only in MAS with lymphocyte ( $r= -0.438$ ,  $p<0.001$ ).(**Table 2**)

All clinically positive patients (n=55) had appendicitis on HPE, while in 6 patients having no clinical features of appendicitis, 5 were positive on histopathology and one had no appendicitis on HPE. So the sensitivity and specificity of clinical evaluation of our study is 91.67% and 100% respectively. The sensitivity of clinical assessment was almost equivalent with the results of the study conducted by MojcaGroselj-Grenc et al<sup>13</sup> which was 93.9%.

In present study, total leucocyte count was raised in 80.3% (n=49) patients while it was normal in the rest 19.7% (n=12). All patients having raised count were found to have appendicitis on HPE, while of 12 patients having normal TLC, 11 patients were positive on HPE and one had no appendicitis in histology. The sensitivity and specificity of total leucocyte count of the study was 81.67% and 100% respectively. This sensitivity was consistent with the study by Lau<sup>14</sup>.

In the present study, 77% (n=47) patients had neutrophil percentage above 75% and all these patients were positive on HPE. of 23% (n=14) cases having normal neutrophil percentage, 21.3% (n=13) had appendicitis on HPE while one was negative on histology. This gives sensitivity, specificity and accuracy of 78.33%, 100% and 78.69% respectively. This sensitivity was comparable to study by Sasso et al<sup>15</sup> In present study raised value of MAS (>4) was present in 83.6% (n=51) cases while in other 16.4% (n=10) MAS value was <4. In patients having raised MAS value, 50 cases were positive on HPE and one patient had no appendicitis on HPE. All the remaining 16.4% (n=10) cases having MAS<4 were histologically positive which makes sensitivity of 98% and specificity 0%. The sensitivity of studies by Ohle et al<sup>16</sup> and Musharraf Husain et al<sup>17</sup> had concordance to our study.

The preoperative serum C-reactive protein (CRP) levels were correlated with the histopathology. Out of 61 patients, 90.2% (n=55) cases had raised C-reactive protein level and all these patients were histologically found to have appendicitis. CRP level was normal in 9.8% (n=6) of which 8.2% (n=5) cases were having appendicitis while one patient had no features of appendicitis on HPE. In our study, sensitivity and specificity of C-reactive protein was 91.67% and 100% respectively. This result of Present study is in concordance with the study done by Wu et al<sup>18</sup>.

In our study D-Dimer was raised in 72.1% (n=44) patients while it was normal in 27.9% (n=17). All patients having raised value of D-Dimer had appendicitis on HPE while of the remaining 17 patients one had normal appendix and 26.23% (n=16) had appendicitis on histology. The sensitivity, specificity & accuracy in diagnosing appendicitis was 73.33%, 100% and 73.77% respectively which is much more than previous studies and is due to low cut-off D-dimer (>5mg/L taken as raised level). Our study was in concordance to Cayrol et al<sup>19</sup> which took D-dimer cut-off point of 0.230 mg/L. Combining the results of CRP and D-dimer improves the sensitivity value for diagnosing appendicitis. If we use both inflammatory marker (CRP & D-Dimer) we get a higher sensitivity value as 97%. The use of these biochemical tests is limited and so should only be used as a guide, with the wider clinical picture being of greatest importance rather than solely relying on the biochemical markers for a diagnosis.

In present study, USG suggested appendicitis in 80.33% (n=49) patients and all these patients had appendicitis on histopathological examination also. In other 19.7% (n=12) cases having no appendicitis on USG, 18% (n=11) had appendicitis on HPE while one patient was found to be negative on histology. Sensitivity, specificity and accuracy of High-resolution ultrasonography came out to be 81.67%, 100% and 81.97% respectively. Present study was also consistent with the study done by MojcaGroselj-Grenc et al<sup>12</sup> having sensitivity of 91% and specificity of 95% respectively. Accuracy of CT scan is higher as compared to USG for diagnosing acute appendicitis<sup>20</sup> but till today still there is utility of USG for the diagnosis of acute appendicitis particularly in pediatric cases<sup>21</sup>. CECT was not performed routinely in all patients but done only when there was discordance between clinical findings and Ultrasonography. In present study done in

only 12 cases out of 12 cases 83.33% (n=10) had acute appendicitis on CECT and HPE, one case was negative on CECT but positive in HPE and one had appendicitis neither on CECT nor in HPE. Sensitivity of CECT was 92.86%, while specificity 100% and accuracy 93.33%, positive predictive values of 100%. Similarly Lazarus et al<sup>22</sup> had sensitivity and specificity values in concordance to our study.

### Conclusion

The diagnosis of acute appendicitis is generally made on clinical grounds but on many occasions especially in children and female clinical findings alone cannot be used unequivocally for making treatment decisions. In our study we have shown that the combination of CRP & D-Dimer is a better predictor of acute appendicitis and complimentary to clinical diagnosis. A combination of thorough clinical evaluation along with routine biochemical & specific biomarkers and ultrasonography as the primary imaging modality is sufficient in establishing a diagnosis of acute appendicitis and reduce the rates of negative appendicectomy. Limited CECT abdomen can help in patients with discordant clinical and USG findings.

**Table 1: Ultrasonography, CECT abdomen and Histopathological finding**

Findings	Number (%)
<b>USG Finding (n=61)</b>	
Probe tenderness RIF	54 (88.5)
Appendix Visualisation	34 (55.7)
Periappendiceal Echogenicity	41 (67.2)
Acute appendicitis	47 (77.0)
Chronic appendicitis	1 (1.6)
Resolving appendicitis	2 (3.3)
<b>CECT Abdomen (n=12)</b>	
Appendicular perforation	4 (33.3)
Periappendiceal collection	9 (75.0)
Appendicitis	10 (83.3)
<b>Histopathology</b>	
No Appendicitis	1 (1.6)
Appendicitis	60 (98.4)
Reactive appendix	6 (9.8)
Acute aappendicitis	12 (19.7)
Acute on chronic appendicitis	7 (11.5)
Chronic appendicitis	31 (50.8)
Resolving appendicitis	4 (6.6)

**Table 2: The sensitivity, specificity, PPV, NPV and diagnostic accuracy of diagnostic variables with histopathological finding as gold standard**

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagnostic Accuracy (%)
TLC	81.67	100	100	8.33	81.97
Neutrophil	78.33	100	100	7.14	78.69
MAS	98.04	0	83.33	0	81.97
CRP	91.67	100	100	16.67	91.8
D-dimer	73.33	100	100	5.88	73.77
USG	81.67	100	100	8.33	81.97
CECT	92.86	100	100	50	93.33
CRP plus D-Dimer	97.73	0	71.67	0	70.49



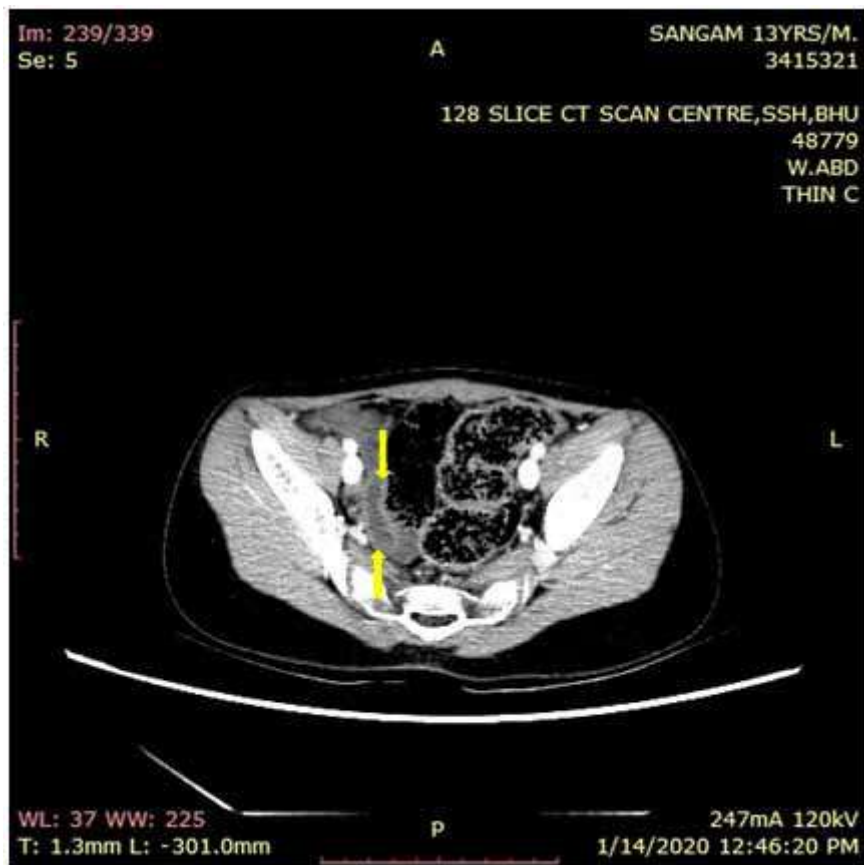


Figure 1: Axial CECT abdomen shows dilated appendix with periappendiceal fluid s/o acute appendicitis.

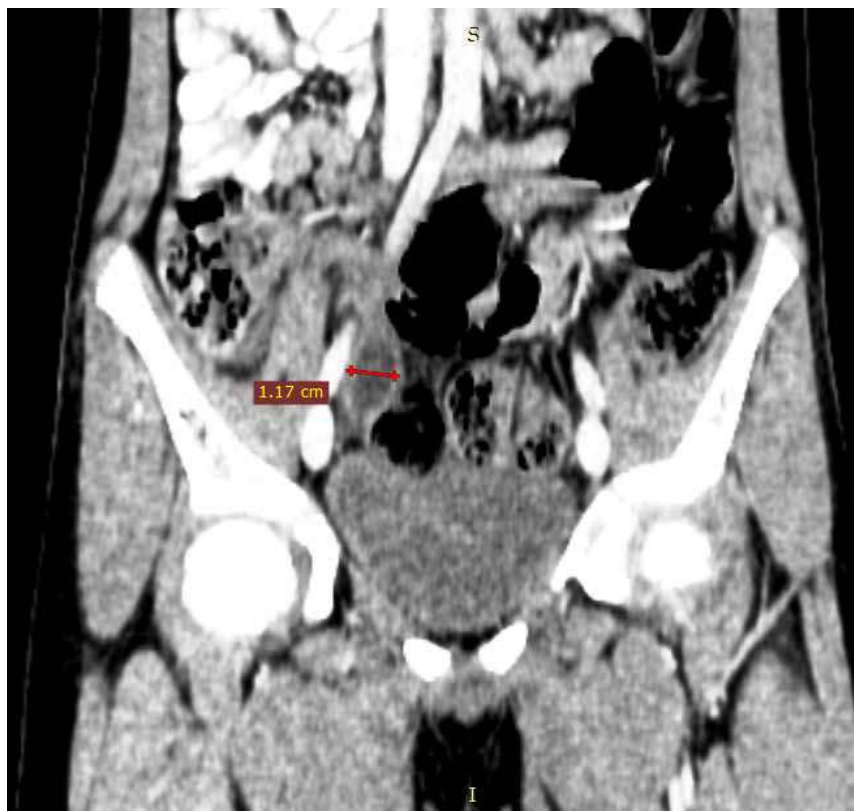


Figure 2: Coronal CECT image showing features of acute appendicitis in right iliac fossa.

**Ethical Clearance:** Taken from institutional committee.

**Funding Agency:** Self

**Conflict of Interest:** Nil

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# Psychosocial Impact of Overactive Bladder Symptoms among Adults in a Selected Hospital at Mangaluru

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## Abstract

**Introduction:** Overactive bladder symptoms (OABS) have a detrimental impact on mental health and social wellbeing. The apprehensions about frequent voiding, leakage and wetting, or unavailability of toilet facility which leads to embarrassment, anxiety, stress, social isolation and disrupts the daily activities of the people. Besides the psychosocial impact of OABS is seldom studied in south India. Understanding the impact on the psychosocial aspects among adults is vital in controlling and managing OABS. Therefore the aim of this study was to determine the psychosocial impact of overactive bladder symptoms among adults.

**Method:** An exploratory descriptive study design was adopted. The sample consisted of 142 male adults of 35-75 years of age recruited using purposive sampling from the department of Urology in selected Hospitals at Mangaluru. The subjects were interviewed for baseline Proforma, Overactive bladder symptom score (OABSS) and self reported questionnaire on Psychosocial impact of overactive bladder symptoms. The data was analysed using descriptive and inferential statistics.

**Results:** The subjects 52.8% had moderate and 31.0% had severe forms of OABS. Overall psychosocial impact was  $80 \pm 10.9$ , the Mean percentage 76.9 shows that OABS are severely affected the adults psychosocially. There was significant association between Psychosocial Impact of Overactive bladder symptoms and selected Demographic Variables such as age ( $p \leq 0.024$ ), Education ( $p \leq 0.03$ ) and Marital status ( $p \leq 0.02$ ) as well as there was a high positive correlation between OABS and Psychosocial impact of adults with OABS ( $r = 0.7$ .  $r^2$  value is 0.467).

**Conclusion:** The OABS have a major psychosocial impact in adult's life; the stress, frustration, hopelessness, uncomfortable to travel and attend social gathering and disturbed sleep.

**Keywords:** OABS; psychosocial impact; adults; OABSS.

## Introduction

The deliberate control of voiding is a necessity for the sense of normality. Overactive bladder syndrome is

a significant voiding condition which has a tremendous impact on mental health and social life of an individual. It impairs the self-esteem, independence, daily and social activities such as self care, work, exercise, travelling, shopping, sexual function and sleep. International continence society defines; "Overactive Bladder as a complex symptoms characterized by urinary urgency, with or without urge incontinence, usually with frequency and nocturia."<sup>1</sup> The embarrassment of urgency leads to social withdrawal and limits the normal activities. Furthermore it develops preoccupied thoughts such as "when I've got to go, I've got to go,

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I have to rush because I think I may wet myself”<sup>2</sup> and anxiety which may lead to impairment of the emotional & psychological well being. Getting up many times at night and lack of sleep give rise to risk of fall, accidents, day time snap and irritability for simple matters etc. The OABS reduces the occupational productivity and people restrict or stop travelling, staying in relatives house and attending social and recreational functions due to worry about unavailability of toilet facilities. Moreover, the use, frequent change and disposal of sanitary pads generate the major stress among the affected. In spite of the negative impact on emotional and social well-being people do consider these conditions as normal as they get older. The mortification about being wet and the smell of urine restrict social interaction leading to social isolation. They develop a sense of hopelessness due to the thoughts of people avoiding them, neglected by family members, not able to play social and family role satisfactorily and becoming a burden to others due to illness. Though this condition has a severe impact on mental health and social life of the affected, OABS seldom received attention in the medical literature. Awareness of these issues among health care professionals is the prerequisite in the gentle management of the above discussed problems. Therefore the aim of this study was to find the psychosocial impact of overactive bladder symptoms among adults.

**Method**

An exploratory descriptive design was adopted in this study to assess the psychosocial impact of overactive bladder symptoms among adults. The institutional ethical clearance and permission to conduct the study was obtained from the concerned authority. The duration of the study was one year. The study was conducted among 142 male adults between the age group of 35 and 75 years. The formal consent from the subjects has been taken and conducted the structured interview. They were recruited using purposive sampling from the department of Urology of selected Hospital at Mangaluru. Those who have three symptoms of OABSS such as urgency,

frequency, nocturia and with or without leak of urine were recruited. The data was collected using Overactive bladder symptoms score (OABSS) (Homma et al)<sup>3</sup> and self reported questionnaire on psychosocial impact of overactive bladder symptoms. The severity of the symptom graded as Mild (0-7) moderate (8-12), severe (13-15).The reliability of the tool was obtained 0.75 by using Cronbach alpha method and validated in local languages. The data was analysed using descriptive and inferential statistics such as Frequency, percentage, Standard Error of Mean (SEM), Chi-square and Karl Pearson coefficient of correlation.

**Inclusion Criteria for Sampling:**

1. Male adults attending Urology OPD with the age group of 35 – 75 years.
2. Male adults will be selected based on the self reported symptom of overactive bladder not by the diagnosis.
3. The subjects will be selected based on OABSS screening and with or without treatment for overactive bladder symptoms

**Exclusion Criteria:** Adults with Neurogenic bladder and who are on urinary catheter

**Results**

**Baseline Characteristics of adults with Overactive Bladder Symptoms (OABS):** More than half of subjects 53(37.4%) were in the age group of 65-75 years. The mean age was 58±12.4. In the educational status 70 (49.3%) had primary education and only 5(3.5%) of them were graduate. The majority 132(93.0%) of them were married and 67(47.2%) subjects had 1-2 children with the mean 2.4±1.4. More than half of the subjects 80 (56.3%) were unskilled workers and 10(7.0%) of them were professional. The subjects 81(57.0%) had income between 5000 and 10000 with the mean 11897±5907. The majority 136 (95.8%) were consuming mixed diet.

**Frequency and percentage of Overactive Bladder Symptom Score:**

n=142

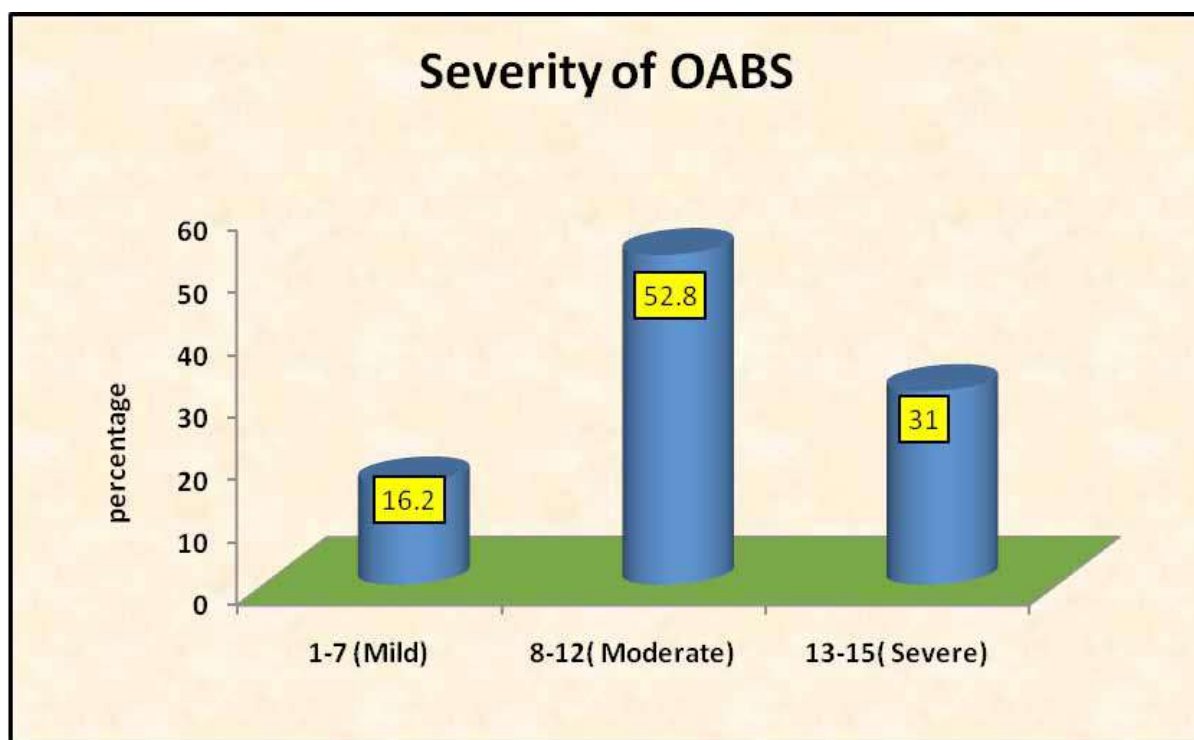
	OABS	Score	Frequency	Percentage
1.	<b>Frequency of urine</b>			
	≤7	0	4	2.8
	8-14	1	49	34.5
	≥15	2	89	62.7

	OABS	Score	Frequency	Percentage
<b>2</b>	<b>Nocturia</b>			
	1	1	0	0
	2	2	29	20.4
	≥3	3	113	79.6
<b>3</b>	<b>Urgency</b>			
	Not at all	0	1	.7
	Less than once a week	1	0	0
	Once a week or more	2	1	.7
	About once a day	3	12	8.5
	2-4 times a day	4	36	25.4
	5 times a day or more	5	92	64.8
<b>4</b>	<b>Urge Incontinence</b>			
	Not at all	0	49	34.5
	Less than once a week	1	19	13.4
	Once a week or more	2	19	13.4
	About once a day	3	15	10.6
	2-4 times a day	4	17	12.0
	5 times a day or more	5	23	16.2

Table 1 reveals that 62.9% subjects had frequency of urine ≥15 times from waking in the morning until sleeping at night, 79.6% of them had nocturia ≥3 times, 64.8 % subjects had a sudden desire to urinate 5 times a day or more and 16.2 % of them had incontinence 5 times a day or more

**Severity of Overactive Bladder Symptoms:**

n=142



The figure 1 depicts more than half 75(52.8%) had moderate, 44(31.0%) severe and 23(16.2%) mild form of overactive bladder symptoms.

**Overall and component wise Mean, Standard deviation, Mean percentage, SEM and CI of psychosocial impact of OABS:**

n=142

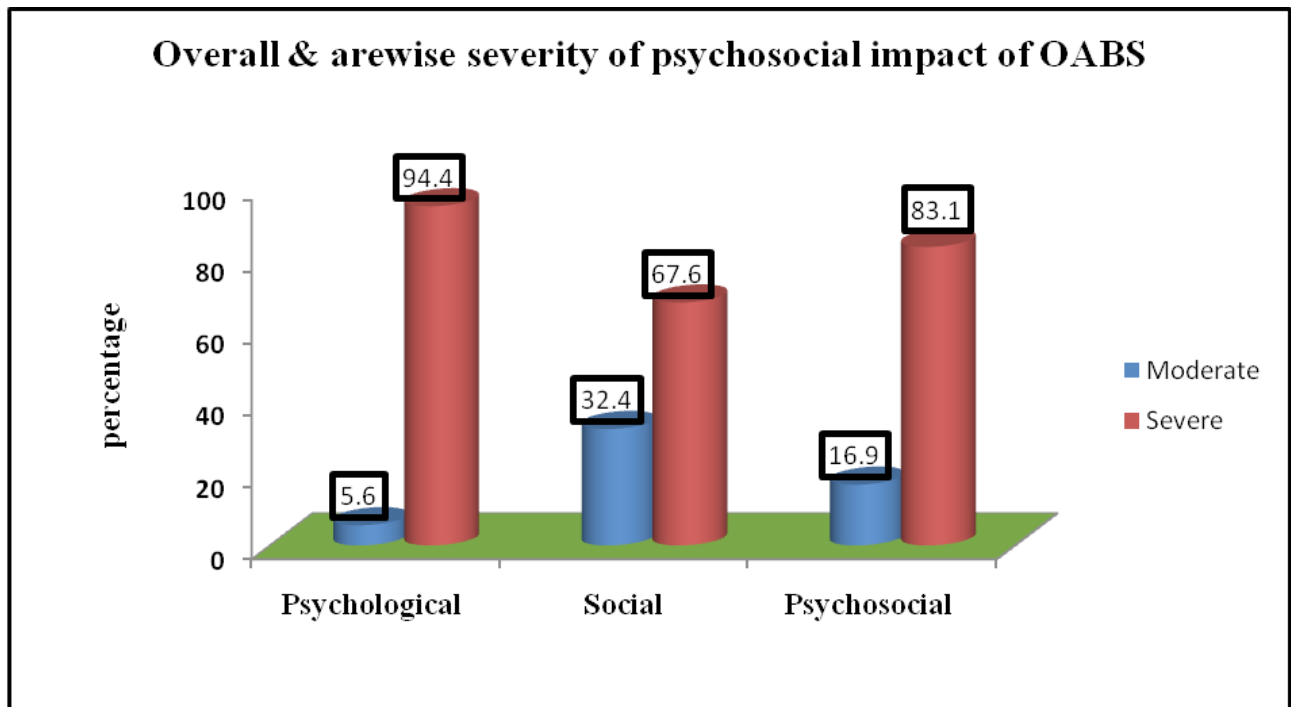
Components	Max.Score	Mean±SD	Mean Percentage	SEM	95% CI	
					Lower	Upper
Psychological impact	56	46.45±6.09	82.9%	0.51	45.45	47.44
Social impact	48	33.54±5.64	69.8%	0.47	32.61	34.46
Overall psychosocial impact	104	80±10.9	76.9%	0.92	78.20	81.80

**Table 2:** Among component wise psychosocial impact scores the highest mean percentage score was with Psychological impact (82.9%) which indicates that subjects had severe impact in this component. The least mean percentage was found in the Social impact (69.8%) but which also indicates that the subjects had high psychosocial impact in this component. The highest SD value was in the psychological impact (46.45±6.09) and found that the least SD value was in Social impact (33.54±5.64). However in component wise assessment, there is not much difference in range of SD value. Overall psychosocial impact was (80±10.9), with

Mean percentage 76.9 % which shows that OABS are severely affected the adults psychosocially. The SEM value in the both component and overall indicates there is less variability in these samples means (0.51, 0.47 and 0.92) respectively. The least variability was seen in the component related to social impact (SEM 0.47) Confidence Interval: In the component related to psychological impact 95% of the population mean was between 45.45 and 47.44. In the component related to social impact 95% of the population mean was between 32.6v and 34.96 as well as overall it found to be between 78.20 and 81.80.

**Frequency and Percentage, of Severity of Psychological, social and overall psychosocial impact of adults with OABS:**

n=142



**Figure 2:** On the observation of the data depicted shows that in the domain of psychological impact 134 (94.4%) subjects had severe, only eight (5.6 %) had moderate and none of them had mild psychological impact of OABS. In the domain of social impact 96 (67.6%) subjects had severe and, only 46(32.4 %) had moderate Social impact of OABS and in the overall area of psychosocial impact 118 (83.1%) subjects had severe and, only 24(16.9 %) had moderate impact of OABS.

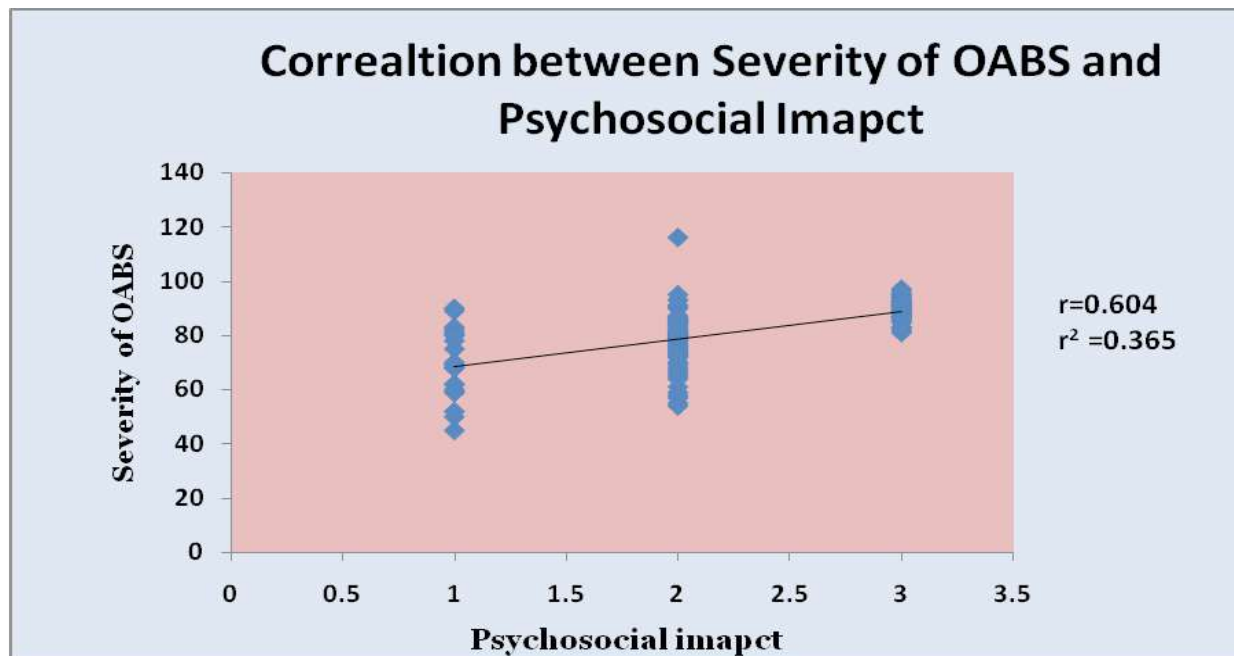
**Association between the Psychosocial Impact of OABS among adults and selected Demographic Variables:** The Chi Square value shows that there was a significant association between Psychosocial Impact of

Overactive bladder symptoms and selected Demographic Variables such as age ( $p \leq 0.024$ ), education ( $p \leq 0.03$ ) and marital status ( $p \leq 0.02$ ). Therefore the Research Hypothesis is retained.

**Correlation between OABS and Psychosocial impact:** The calculated Karl Pearson correlation value was 0.7 and the ‘p’ values was  $< 0.001$ . Therefore there was a high positive correlation between OABS and Psychosocial impact of adults with OABS.  $r^2$  linear value was 0.467. It shows that out of thousand 467 subjects have correlation between OABS and Psychosocial impact.

**Correlation between severity of OABS and psychosocial impact among adults:**

n=142



**Figure 3:** The calculated Karl Pearson correlation value was 0.604 and the ‘p’ value is  $< 0.001$ . Therefore there was a positive moderate correlation between severity of OABS and Psychosocial impact of adults. ( $r^2$  square linear value was 0.365).

**Discussion**

**Demographic Variables:** In the current study 53(37.4%) were in the age group of 65-75 years with the mean age  $58 \pm 12.4$ . This finding consistent with the study conducted to determine Health-Related Quality of Life in Overactive Bladder shows that the mean age was 54.2

$\pm 16.4$  years<sup>4</sup>. In present study the subjects only 5(3.5%) of them were graduate. A previous study findings shows that 8.3 % of the subjects were graduate.<sup>4</sup> The majority 132(93.0%) of them were married and findings were consistent with other studies’ result was 54.7 and 59.2%<sup>4,5</sup>. In this study 80 (56.3%) were unskilled workers and 10(7.0%) of them were professional.

**Severity of OABSS:** Current study reveals that more than half 75(52.8%) have severe, 44(31.0%) moderate and 23(16.2%) mild form of overactive bladder symptoms. The findings supported by other studies observed that most participants reported moderate bladder problems (34.4%)<sup>4</sup> and among the OAB subjects, the most common severity of symptom was moderate (72.6%), followed by mild (21.2%) and severe (5.8%)<sup>6</sup>. Another study shows the incontinence was severe in 9% of the affected subjects<sup>7</sup>.

**Severity of psychosocial impact of OABS:** In the present study, overall area of psychosocial impact assessment showed that 118 (83.1%) subjects had severe and, only 24(16.9 %) had moderate impact of OABS. The findings were supported by the study conducted to identify the quality of life of incontinent men revealed that 50% moderately and 26% were extremely upset<sup>8</sup>

Among component wise psychosocial impact scores the highest mean percentage score was with Psychological impact (82.9%) and the lowest score was in the area of social impact with 69.8%, which indicates that subjects had severe impact in these components. This finding is consisted with similar study showed that the respondents scored lowest in the role physical domain and highest in the mental domain, with mean scores of 33.8 and 72.1, respectively<sup>9</sup>. In another study half of the incontinent subjects expressed social limitations and negative feelings related to incontinence and 21% expressed that incontinence negatively affected their life<sup>7</sup>. In current study the overall mean percentage score of psychosocial impact scores was 76.9%. The findings is supported another study shows that about 18% of persons with Urge Incontinence (UI) felt depressed or sad much of the time in the past year, whereas less than 10% of continent respondents felt the same way. Similarly, 17.7% of persons with UI had experienced depression for 2 or more years compared with 9.7% in the non-UI group<sup>10</sup>.

**Correlation of psychosocial impact and OABS:** In this study there was high positive correlation between OABS and Psychological impact of adults with OABS. This findings is consisted with similar study showed that the overactive bladder symptoms group presented a positive low correlation with anxiety symptoms ( $r=0.345$ )<sup>11</sup> and in another study 27.5 % of OAB patients had depression (HADS  $\geq 8$ ) and 12 % of OAB patients had moderate to severe depression (HADS-D  $\geq 11$ ). OAB patients with depression reported more severe

incontinence symptoms (ICIQ-UI), greater bother and more impact on quality of life (UDI-6, IIQ-7) compared to OAB patients without depression ( $p=0.001, 0.01, <0.001$ , respectively)<sup>12</sup>. Present study shows there was positive moderate correlation between severity of OABS and Psychosocial impact of adults. ( $r^2$  linear value was 0.365) .The current study findings are congruent with another study reveals that among OAB patients, there was a positive correlation between perceived stress levels and urinary incontinence symptoms (ICIQ-UI, Spearman's correlation coefficient= $0.39, p=0.007$ ) and impacts on quality of life (UDI-6, IIQ-7, OAB-q quality of life subscale; Spearman's correlation coefficient= $0.32, 0.31, 0.39$  and  $p=0.028, 0.005, 0.029$ , respectively)<sup>13</sup>.

**Strength and Limitations:** The study population were only males and the samples with OABS wet and dry were studied as combined were obvious limitations of the study. Similar studies could be conducted with the larger sample, different design and study would be done on OABS wet and dry separately. Since the present study has explored the severity of OABS and its psychosocial impact among adult male, it will facilitate the need to develop appropriate strategies and alternative therapies in the health care settings to manage OABS.

## Conclusion

The study reveals OABS severely affects the psychosocial life of adults. The effected individuals with OABS are embarrassed, worried, having feeling of low self confidence, sense of hopelessness, being neglected, disturbed and ashamed. These various aspects lead them to social isolation and unable to play a societal and family role satisfactorily; furthermore to an extend of interruption in family and societal relationship and ultimately being less productive. These factors suggest necessity for developing multiple alternative approaches including pharmacological treatment to handle this problem sensitively. Hence the awareness regarding psychosocial problems of OABS among healthcare professionals is necessary to provide appropriate care to manage such problems.

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# Etiological Factors of Failure in Endonasal Dacryocystorhinostomy

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## Abstract

**Background:** External dacryocystorhinostomy was first performed by Addeo Toti in 1904. Before, in 1893 Caldwell did mention about endonasal approach in lacrimal surgery. In 1989, the first endonasal dacryocystorhinostomy (DCR) performed by McDonogh and Meiring. The knowledge about etiological factor of failure of DCR would immensely help in its prevention.

**Aim:** To find out the causes of failure of endonasal DCR.

**Materials and Method:** All the cases having epiphora following endonasal DCR surgery which completed minimum one year period irrespective of their gender were included in the study. A total of 50 cases from otorhinolaryngology and ophthalmology having epiphora were enrolled in the study. All cases were subjected to diagnostic as well as therapeutic endoscopy using '0' degree endoscope, causes like deviated nasal septum, intranasal synechia, cicatricial closure as well as inadequate size or non-dependant position of neo-ostium, inadequate sac marsupialization, etc. leading to failure were searched and corrected. All cases were followed for six months.

**Results:** There were 12 male and 38 female, epiphora was commonest symptom in all cases and the least common was redness and swelling of eyelid in 1. The most common etiological factor for failure of endonasal DCR was inadequate ostium size in 41, followed by inadequate sac marsupialization in 31, cicatricial closure of ostium in 26, intranasal synechia and ostium malposition in 18 each, ostium stenosis in 13, common canalicular obstruction in 11 and deviated nasal septum in 8 cases.

**Conclusion:** The most common aetiological factor responsible for failure of endonasal DCR was inadequate ostium size whereas; the least common was malpositioning of neoostium. The number of female having failed DCR was more than three times higher than male.

**Keywords:** Endoscopy, Lacrimal apparatus, Lacrimal duct obstruction.

## Introduction

Endonasal dacryocystorhinostomy (DCR) is

procedure for obstruction in lacrimal drainage system by way of nasal approach, with the help of a nasal endoscope. In 1904 the surgical modality by way of external dacryocystorhinostomy was first performed by Addeo Toti.<sup>[1]</sup> Before, in 1893 Caldwell mentioned endonasal approach in lacrimal surgery but due to narrowness of cavity it did not come in to practice.<sup>[2]</sup> With the development of the rigid fiberoptic endoscope the first modern endonasal endoscopic DCR procedure was described by McDonogh and Meiring in 1989.<sup>[3]</sup> Various causes of its failure are known like obstruction of the nasal ostium, canalicular obstruction, functional

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epiphora, granuloma formation in the nasal ostium etc. The precise knowledge of such causes would immensely help in prevention of failure in endoscopic DCR.

**Objective:** To find out the causes of failure of endonasal DCR.

### Materials and Method

All the cases having epiphora following endonasal DCR surgery which completed minimum one year period, irrespective of their gender were included in the study. All pregnant or lactating mothers, previous nasal injury at ostium site, neoplastic lesions of nose and lacrimal apparatus and known cases of immunodeficiency were excluded from the study.

A total of 50 cases from otorhinolaryngology and ophthalmology OPD of tertiary care teaching hospital, as per set inclusion and exclusion criteria and willing to participate were enrolled in the study. In all cases demographic characteristics, clinical history and past medical history etc were recorded. The nose and eye examination for any obvious deformity, turbinate hypertrophy, nasal polyposis, watering or purulent discharge in the medial canthal area etc. was carried out in all cases. Regurgitation on pressure over lacrimal sac (ROPLAS) test was done in all cases for diagnosis of nasolacrimal duct (NLD) block. Also probing and syringing was carried out for testing the patency of tract. Further, all cases were subjected to imaging and laboratory tests like dacryocystography, CT-PNS and routine CBC, BT, CT, PT, urine, BUN, creatinine and blood sugar. Both diagnostic as well as therapeutic nasal endoscopy was performed under anaesthesia using '0' degree endoscope in every case. Diagnostic nasal endoscopy (DNE) was done to note various etiological factors in nasal cavity like, deviated nasal septum, intranasal synechia and non- dependant neo-ostium of previous surgery. At revision endoscopy as a part of corrective surgery additional causes like inadequate size of ostium, inadequate sac marsupialization, cicatricial closure of ostium etc. leading to failure were searched and corrected. After revision surgery during immediate follow up the crust were looked for and removed. Patency check of new stoma was made in all cases by syringing weekly for 1 month, monthly for 3 months and then at 6 month.

**Statistical Analysis:** Using statistical analysis the frequency distribution of collected data was obtained

with the help of SPSS (Statistical Packaging for Social Sciences) IBM, India software version 22.0.

### Observation and Results

Amongst 50 cases, there were 12 male (24%) and 38 female (76%) in the ratio of 1: 3.16. All study participants were between age group of 20-70 years (table-1). Most of the cases 15 (30%) were of age between 51-60 years and the least 5 (10 %) belonged to the age group of 20-30 years. Amongst all cases the commonest presenting symptom (table-2) was watering of eyes in 50 (100 %), followed by pain in lower corner of the eye in 38 (76 %), swelling at medial canthus in 33 (66 %) and lacrimal abscess in 2 (4%) cases, whereas the least common symptom was redness and swelling of eyelid consequent to preseptal cellulitis in 1 (2%) case. In all cases using dacryocystography and CT-PNS the cause of failure noted was common canalicular obstruction, deviated nasal septum in 11 (22%) and 8 (16%) cases respectively while in 31 it could not be ascertained. At DNE in all cases of revision endonasal DCR the most common etiological factor for failure noted was inadequate ostium size in 41 (82 %), followed by inadequate sac marsupialization in 31 (62 %), cicatricial closure of ostium in 26 (52 %), intranasal synechia and ostium malposition in 18 (36 %) each, ostium stenosis in 13 (26%) -(table-3). The mean duration between first surgery and revision surgery amongst all cases was 5.08 years  $\pm$  2.23 years. The mean duration of symptom free period between two surgeries was 8.42 months  $\pm$  3.38 months.

**Table 1: Age wise distribution of cases.**

Years of Age	Number of Subjects	Percent
20-30	5	10
31-40	9	18
41-50	10	20
51-60	15	30
61-70	11	22
<b>Total</b>	<b>50</b>	<b>100</b>

**Table 2: Distribution of cases according to their symptoms**

Signs and Symptoms	Number of Cases	Percent
Watering of eyes	50	100
Local pain	38	76
Swelling of medial canthus	33	66
Lacrimal abscess	2	4
Redness and swelling of eyelid	1	2

**Table 3: Distribution of cases according to Causes of failed DCR**

Causes of Failed DCR	Number of Subjects	Percent
Cicatricial closure of ostium	26	52
Common canalicular obstruction	11	22
Intranasal synechia	18	36
Ostium stenosis	13	26
Deviated nasal septum	8	16
Inadequate ostium size	41	82
Ostium malposition	18	36
Inadequate sac marsupialization	31	62

**Discussion**

This study of failed DCR cases stressed up on finding different etiological factors such as opening of ostium, site of ostium, various other intranasal and septal pathologies. In study by Dave TV et al the majority of the cases are females 66.6% and males 33.3%.<sup>[4]</sup> And in the study of Baek JS et al, out of the total 61 cases, 46 are female i.e. 75% of the sample and the overall mean age is 54 years.<sup>[5]</sup> The percentage of gender distribution of participants in this study was 24 and 76% amongst male and female respectively in the ratio of 1: 3.16. The majority of the study participants belonged to the age group of 51-60 years i.e. 15(30%) and the least in 20-30 years i.e. 5 (10%). Dacryocystitis is more common amongst females due to narrow lumen of the bony canal and it often results in partial or complete closure of the NLD.<sup>[6]</sup> Acute dacryocystitis is more common in 5th decade.<sup>[6]</sup> Acute dacryocystitis presents with complaints of local pain, watering and purulent discharge from eye, swelling of the lacrimal sac region and occasionally there may be pre septal cellulitis and lacrimal abscess. In the similar study by Dave et al the epiphora is commonest presentation in 100% of cases.<sup>[4]</sup> The study by Goyal R et al, persistent watering from affected eye in 44 cases, regurgitation of pus from sac in 34, mucocele in 18 and pyocele and fistula formation in 8 each.<sup>[7]</sup> In majority of the cases of this study the clinical presentation was epiphora in 50 (100%) and it was in accordance with above two studies, pain in lower corner of the eye in 38 (76%), swelling at medial canthus in 33 (66 %) and lacrimal abscess in 2 (4%) cases, whereas the least common was redness and swelling of eyelid consequent to preseptal cellulitis in 1 (2%) case. In study by Dave TV et al, majority of previous DCR cases are having inadequate ostium size (82%), commonest cause of failure is insufficient osteotomy 85.1% followed

by inadequate marsupialization of sac 77.7% and cicatricial closure of the ostium 55.5%.<sup>[4]</sup> In this study the causes leading to failure of DCR were inadequate ostium size in 41 (82 %) cases, followed by inadequate sac marsupialization 31 (62 %), cicatricial closure of ostium 26 (52 %) and it was in accordance with above two studies. Further, in this study the intranasal synechia and ostium malposition in 18 (36%) each, ostium stenosis 13 (26%), common canalicular obstruction 11 (22%) and deviated nasal septum 8 (16%) were the additional causes. The study conducted by Choussy et al revision endoscopic DCRs in 17 patients and reported ostium scarring in 13 (76.47%) patients and improper ostium site in 3 (17.64%) patients.<sup>[8]</sup> In this study the commonest cause of failure was inadequate ostium size in 41 (82%) cases. Hull et al in their study of failed endonasal DCR found 14 (74%) cases with failure due to ostium blockage as a result of scarring and the least common cause was high ostium 1(5%).<sup>[9]</sup>

In study by Goyal R et al, the patency of NLD is 85.10 %, whereas, partial block and clear fluid regurgitation in 06.38 % during 12 months follow up after surgery. In this study the NLD patency was confirmed by sac syringing at all follow ups after 1 week, 1 month and 3 months and 6 months post-operatively. Our findings was not in accordance with the study by Goyal R et al which could be due to almost double the period of follow up and sample size in their study.<sup>[7]</sup> In the study by Goyal R et al, during follow up over period of 1 year amongst their cases the complications are scarred and fibrosed ostium in 08, intranasal synechia formation in 07, ostium site granuloma with narrowing in 06, whereas common canalicular duct obstruction in 1.<sup>[7]</sup> Amongst all cases in this study, intra-operative complication were hemorrhage in 4 (8%), post-operative epistaxis 3 (6%) and local infection in 1(2%). However, no such complications mentioned by Goyal R et al were noted in this study.

Amongst 31 out of 50 cases of failed endonasal DCR in this study at dacryocystography and CT-PNS the cause of failure could not be ascertained whereas, the common canalicular obstruction, deviated nasal septum was found in 11 (22%) and 8 (16%) cases respectively.

**Conclusion**

The aetiological factors responsible for failure of endonasal DCR noted being many, the most common noted in this study during DNE was inadequate

ostium size in 41 (82 %) followed by inadequate marsupialization of sac 31 (62 %), cicatricial narrowing of ostium 26 (52%) and intranasal synechia and ostium malposition in 18 (36 %) each, ostium stenosis in 13 (26%). The pre-operative dacryocystography and CT-PNS per say in failed cases of DCR could not ascertain the cause for failure in 31 (62%) cases. The total number of female having failed DCR was more than three times higher than male (F: M -3.16 : 1).

**Summary:** The commonest aetiological factors for failure of endonasal DCR in this study was inadequate size of ostium followed by inadequate marsupialization of sac, cicatricial narrowing of ostium and intranasal synechia around ostium site whereas, the least common was malpositioning of neo ostium. The total number of female having failed DCR was more than three times higher than male. The findings of the present study suggests preoperative work up like paranasal sinus-CT scan and dacryocystography should be routinely undertaken for discovering the intranasal structural abnormalities so that the failure rate of endonasal DCR can be minimised. Meticulous endoscopic evaluation must be included as a part of preoperative work up in all cases for preventing failure of DCR.

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**Conflict of Interest:** None.

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# Evaluation of Sensory Responsiveness in Children with Autism Spectrum Disorder

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## Abstract

**Objective:** To identify the sensory responsiveness pattern using Dunn's Sensory Profile and severity of social impairment using Social Responsiveness Scale in children with Autism Spectrum Disorder.

**Methodology:** Cross sectional quantitative study design with convenient sampling was used. This study involved 20 children diagnosed with Autism Spectrum Disorder aged 5-6 from special School in and around Chennai. Caregiver's Sensory profile and social Responsiveness Scale was administered in order to quantify the severity and pattern of sensory responsiveness.

**Result:** Significant relation were found between social responsiveness scores and each of the six sensory system profile scores for children with Autism Spectrum Disorder

**Conclusion:** Atypical sensory responsiveness pattern is predominant in children with Autism Spectrum Disorder.

**Keywords:** Sensory responsiveness, Autism Spectrum Disorder, Primary schools, special schools.

## Introduction

Autism spectrum disorders (ASD) are complex neuro-developmental disorders that can cause problems with thinking, feeling, language and the ability to relate to others. The core feature includes persistent deficits in social communication and social interaction across multiple contexts, Restricted, repetitive patterns of behavior, interests, or activities which cannot be explained by intellectual disability and significantly impairs the functioning (DSM-5™ Diagnostic Criteria). Autism is known as a "spectrum" disorder because there is wide variation in the type and severity of symptoms people experience. ASD occurs in all ethnic, racial and economic groups. Although ASD can be a lifelong

disorder, treatments and services can improve a person's symptoms and ability to function<sup>1</sup>.

Abnormalities at the level of synapses, including newly described genetic perturbations and autism susceptibility genes, have been implicated in the pathogenesis of autism (Simone Khaliifeh et al 2016). Non-invasive modalities like Diffusion Tensor Magnetic Resonance Imaging have identified white matter tract involvement in the brains of autistic individuals and socio-emotional processing<sup>2</sup>.

Early and intensive intervention impact prognosis. Though no known medication relieves core symptoms of social and communication impairment, but fluoxetine is used to decrease anxiety and risperi done and aripiprazole are approved for irritability in autistic patient. Early identification and intervention with ABA(applied Behavior Analysis, speech, psychomotor and occupational therapies are crucial as is social integration. Early diagnosis and intervention with therapies remains the mainstay of insuring an improved outcomes and a better chance at full integration into society<sup>3</sup>.

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The sensory systems are the sources for a living being to acquire information about the world, which support that being in successfully responding and adapting to the environmental demands (Claudia L. Hilton et al 2010). Sensory processing (SP) refers to the way that sensory information e.g. visual, auditory, vestibular or stimuli is processed and managed in the brain to generate adaptive responses to the environment and engagement in meaningful daily life activities (Johnson- Ecker & Parham 2000). SP theory suggests that optimal functioning in daily environments requires efficient reception and integration of incoming sensory stimuli and when this fails the individuals is unable to respond to sensory information with behavior that is regulated relative to the intensity of the input (Miller et al. 2007). Studies show that between 69% and 95% of individuals with an autism diagnosis experience sensory processing that is atypical (Ausderau, Baranek et al 2016). Sensory symptoms were first included as part of the ASD diagnosis in the most recent (2013) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and atypical sensory processing is now considered to be a core feature of Autism.

Dunn (1997) proposed a model for classifying patterns of dysfunction in SP according to individuals' behavioral response to stimuli and neurological thresholds, describing four patterns of SP dysfunction: Low Registration, Sensation Seeking, Sensory Sensitivity and Sensation Avoiding<sup>4</sup>. The most common atypical sensory processing that observed and studied in people on the autism spectrum are challenges with sensory modulation, where atypical responses to sensory stimuli make it difficult for the individual to function effectively within a particular environment (Hazen, Stornell et al 2014).

There are three types of atypical sensory modulation: (1). Sensory over- responsivity describes when an individual has an exaggerated negative response to sensory input, often leading to avoidance and hyper vigilance of the stimulus. (2). Sensory under-

responsivity describes when an individual may seem to be unaware of, or slow to respond to, a stimulus that would typically be expected to elicit a response. (3). Sensory-seeking behavior describes when an individual has an unusual craving for, or preoccupation with, certain sensory experiences. Many people on the autism spectrum experience a combination of sensory under- and over- responsivity (Baranek 2002). In addition, their sensory-seeking behaviors are associated with both under- and over- reactivity<sup>6,7</sup>. (Lane, Baker et al. 2010.). Abnormalities occurs across all sensory domains, including tactile, vestibular, auditory and visual (Harrison and Hare 2004, Rogers 1998) and in the absence of known peripheral dysfunction such as a visual or hearing loss (Baranek 2002).

## Methodology

Children diagnosed with Autism Spectrum Disorder aged 5-6 was selected from Child Therapy Service and special schools around Chennai. Twenty children diagnosed with ASD were recruited through the convenient sampling from there habilitation centers, hospitals and special schools in Chennai. All the participants were selected following physician diagnosis confirmed by the DSM-IV-TR criteria and Children with Intellectual Disability and other neuro development disorder, visual and hearing impairment were excluded. The purpose of the study was explained to the caregivers of the children with ASD. Written consent form was obtained from the caregivers and duly filled and signed demographic details were obtained. After obtaining the written consent the participants were administered sensory profile in order to quantify these verity of sensory issues

## Result

The Spearman rank correlation coefficient was used to compare the SP sensory raw scores with the SRS raw scores raw scores were also used to quantify the sensory responsiveness for each of the senses.

**Table 1: Demographic DATA**

S.No.	Demographic Variables	Class	No. of Children	Percentage
1	Age	5 Years	9	20.7%
		6 Years	11	79.3%
2	Gender	Male	15	76.7%
		Female	5	23.3%

**Table 2: Sensory profile score for children with Autism Spectrum Disorder based on gender**

S.No.	Domains Of Sensory Profile	Gender	Mean	SD
1	Auditory Processing	Male	20.11	5.122
		Female	35.13	5.555
2	Visual Processing	Male	32.40	4.233
		Female	34.15	4.532
3	Vestibular Processing	Male	40.12	3.747
		Female	43.11	3.847
4	Touch Processing	Male	72.21	18.748
		Female	70.22	14.384
5	Multi-Sensory	Male	22.35	4.648
		Female	25.34	4.748
6	Oral/Olfactory Sensory	Male	45.31	6.748
		Female	42.24	6.433

**Discussion**

Table 1 shows the characteristics of the participants based on the age and gender distribution. Most of the children were between the age of 5-6. Table 2 shows the mean scores of the following component of the sensory profile based on gender: auditory processing, visual processing, vestibular processing and touch processing, multi sensory and oral/olfactory processing. It displays the pattern of distribution of atypical sensory processing in various domains and shows very less difference in the scores between male and female children therefore indicating similar atypical sensory pattern in both the genders. Atypical sensory modulation is an important consideration in diagnosis and treatment of AS D. Difficulties in sensory responsiveness are often among the first indicators of autism noticed by parents and therefore, may be useful to facilitate early diagnosis and intervention (Bakeretal. 2008). The earlier ad is order is recognized, the earlier a child is able to receive help and the more effective outcomes of treatment can be achieved.

Additionally, there lationship between sensory modulation and other autistic traits seems more important than previously recognized and addressing sensory responsiveness issues in children with ASD may be more critical than previously understood. atypical scores from multi sensory responsiveness and responsiveness of the proximal senses of oral sensory/olfactory and touch as the strongest predictors of greater social impairment in the participants. This study would increase the understanding of OT practitioner on differential associations of sensory

responsiveness with autism and could contribute to development of intervention linking sensory processing with social, communication and language functioning in children with autism. It would help OT practitioner in assessing sensory processing patterns in young children with autism for earlier identification of children with a poor prognosis for later social and/or communicative competence. This may offer sensory implications for diagnosis and intervention addressing social issues in children with ASD for OTs.

**Conclusion**

Atypical sensory responsiveness is often one of the first signs that parents notice in their children with autism and therefore, may facilitate early diagnosis and intervention. Atypical responses to multi-sensory, touch and oral sensory/olfactory stimuli were identified as possible predictors of social severity.

**Conflict of Interest:** Nil

**Ethical Clearance:** Obtained from SRM College of Occupational therapy.

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# Assessment of Diabetes Risk and the Factors Associated in Adult Population Using Indian Diabetes Risk Score: A Community Based Study in Coastal Andhra Pradesh

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## Abstract

**Introduction:** Diabetes is the chronic metabolic disease with rising prevalence in low and middle income countries. According to WHO diabetes is the seventh leading cause of death in 2016 and is major cause for complications like cardiovascular diseases and stroke. Hence, early identification of people at risk of diabetes is required to reduce the disease burden.

**Objectives:** To assess the diabetes risk among the adult population using Indian Diabetes Risk Score. To identify the factors associated with the diabetes risk score.

**Materials and Method:** A community based cross sectional study was done in an urban resettlement colony to identify the people at risk of developing type 2 diabetes. Indian Diabetes Risk Score was used to identify at risk individuals. The study subjects were categorized into low, medium, high risk groups based on IDRS scores. Random blood sugar levels of subjects were obtained at time of data collection after taking informed consent. The data was entered in Microsoft Excel and analyzed by using SPSS version 21. Chi square test was used to find any significant association between socio-demographic profile, RBS values and risk categories.

**Results:** In the study among 129 subjects, 64.3 % were males, 35.7% were females. IDRS scores indicate 12(9.3%) were in the low risk, 53(41%) were in medium risk and 64 (49.7%) were in high risk category. About 21.7% had Random blood sugar values  $\geq 200$ mg/dl at the time of study. There was significant association between RBS values and IDRS.

**Conclusion:** The present study showed that majority of subjects were in medium and high risk categories. Hence, the study recommended life style modification and further monitoring of blood glucose levels to prevent the risk of development of diabetes.

**Keywords:** Adult population, community, diabetes risk, Indian Diabetes risk score, Coastal Andhra Pradesh.

## Introduction

Non-communicable diseases (NCDs), including heart disease, stroke, cancer, diabetes and chronic lung disease, are collectively responsible for almost 70%

of all deaths worldwide. Almost three quarters of all NCD deaths and 82% of the 16 million people who died prematurely, or before reaching 70 years of age, occur in low- and middle-income countries.<sup>1</sup> The rise of NCDs has been driven by non-modifiable risk factors like age, gender, family history and modifiable risk factors tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets. Thus for NCD principles of primordial, primary prevention have to be applied for early detection of risk factors. These lead to identification

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of “Risk Scores or Tests”. Several diabetic risk scores have been devised for the last decade for prevention programs in the USA, Scandinavia and U.K.<sup>2,3</sup>. All these scores are useful mass screening tools which are based on population based criteria from the respective countries. Mohan et al group from the Chennai Urban Rural Epidemiology Study (CURES) have attempted to develop a simple user friendly Indian Diabetes Risk Score.<sup>4</sup>

India currently represents 49% of the world’s diabetes burden, with an estimated 72 million cases in 2017, a figure expected to almost double to 134 million by 2025. Diabetes prevalence has increased by 64% across India.<sup>5,6</sup> Up to 2 % of women aged 15-19 years and 2.6 % aged 20-25 years had high or very high blood glucose levels. In men, this rose to 2.9 % and 3.7 %, respectively (NFHS 2015-16). Currently, 1 in 4 under age 25 years has adult-onset diabetes.<sup>7,8</sup> Challenges like early-onset diabetes, genetically predisposition, poverty, illiteracy, non-adherence to diabetic management etc indicate that diabetes must be carefully screened and monitored regardless of patient age within India.<sup>9,10</sup> About 66% of Indian Diabetics are not diagnosed as compared to 50% in Europe and 33% in USA. There is a need to unmask hidden burden of the disease. The IDRS has a sensitivity of 72.5% and specificity of 60.1% and is derived based on the largest population based study on diabetes in India CURES.<sup>11,12</sup> IDRS uses two modifiable risk factors (waist circumference and physical inactivity) and two non-modifiable risk factors (age and family history of diabetes), providing a clear message that if modifiable risk factors are altered, the risk score can be considerably reduced. This score may be incorporated into the proposed Indian National Diabetes Program and surveillance studies on NCD by WHO and ICMR.<sup>13</sup>. Hence the present study was conducted to assess risk for diabetes among adult population using IDRS.

### **Objectives:**

1. To assess the diabetes risk among the adult population using Indian Diabetes Risk Score.
2. To identify the factors associated with the diabetes risk score.

### **Materials and Method**

**Study Design:** A Community based cross-sectional study

**Study Setting:** Urban resettlement colony in the

urban field practice area of GITAM Institute of Medical Sciences and Research, Visakhapatnam, Coastal Andhra Pradesh.

**Study Period:** January- February 2019

**Sample Size:** 129

**Sampling Method:** Purposive sampling

**Procedure of data collection:** An urban resettlement colony was selected for the study in the urban field practice area of GITAM Institute of Medical Sciences and Research, Visakhapatnam. A regular free medical camp was conducted in the area in the month of January 2019. The study participants were selected from the population attending the camp based on inclusion and exclusion criteria. Data was collected using a Questionnaire including variables related to Socio-demographic profile and Indian Diabetes Risk Score (IDRS). The IDRS was based on four simple parameters namely age, abdominal obesity, family history of diabetes and physical activity. The information for these risk factors was obtained based on four simple questions and one anthropometric measurement namely waist circumference. Subjects with an IDRS value of  $\geq 60$  was categorized as high risk, 30-50 moderate and,  $< 30$  as low risk. The purpose of the study was explained and informed consent was taken from the subjects. Socio-economic status was assessed by using Modified kuppaswamy scale for 2019. The height, waist and hip circumference of the study subjects were measured in centimeters by using a non-stretchable measuring tape following WHO STEPS protocol.<sup>14</sup> The weight was measured in kilograms with the help of standardized weighing scale. BMI, WHR were calculated. The blood pressure of the participants was measured using a standardized sphygmomanometer in mmHg and BP  $\geq 140/90$  is considered as hypertensive according to JNC VII classification.<sup>15</sup> The levels of the Random blood sugar (RBS) of the participants were detected at the time of data collection by using standard glucometer.

### **Inclusion Criteria:**

1. All persons attending camp with age  $> 18$  years.
2. Those who are not clinically diagnosed as having diabetes.
3. Those who are willing to participate in the study.

### **Exclusion Criteria:**

1. Those who are already diagnosed to have diabetes.

2. Pregnant women, chronically ill patients.
3. Those who are not willing to participate in the study.

**Statistical Method:** Data was entered in Microsoft Excel and analyzed by using SPSS software version 21. Chi-square test was used to test the association between categorical variables and  $p < 0.05$  was taken significant.

### Results

About 129 subjects participated in the present study. **Table No. 1** represents the socio-demographic profile of the participants. The study subjects were in the age group of 22 to 65 years of age with mean age 39.71 years and  $SD = 12.211$ . Among the study participants 64.3 % were males, 35.7% were females. The distribution of participants based on education, occupation, socio-economic status is shown in **Table No. 2**.

The distribution of the subjects based on WHO cut off values (Asian standards) for BMI and anthropometry for men and women is represented in the **Table No. 3**. Among males ( $n = 83$ ), 62.66% had waist circumference  $\geq 90$  cm and 55.4% had waist hip ratio  $> 0.9$ . Among females ( $n = 46$ ), 82.6% had waist circumference  $\geq 80$  cm and 43.48% had waist hip ratio  $> 0.85$ . Among the participants 42.6% were obese based on BMI.

About 14.7% of the men were current smokers and 10.1% were current alcoholics. In the study participants 10.1 % were known hypertensive. About 14% of the individuals had blood pressure  $\geq 140/90$  and 21.7% had Random blood sugar values  $\geq 200$ mg/dl at the time of study as shown in **Table No. 4**.

The distribution of the study subjects into low, medium, high risk groups based on their IDRS scores is shown in **Figure no. 1**. Out of 129, 12(9.3%) were in the low risk, 53(41%) were in medium risk and 64 (49.7%) were in high risk category.

The study showed no significant association between socio-demographic variables and IDRS categories. The study participants were categorized into two categories based on their RBS values as individuals with  $RBS \geq 200$ mg/dl and others with  $\leq 200$ mg/dl. Chi-square test was done to find any significant association between RBS values and IDRS. The study showed a significant association between RBS values and IDRS as shown in **Table No. 5**.

**Table No. 1: Socio-demographic profile of participants (N=129)**

Socio-Demographic Variable	Frequency	Percentage
<b>Age</b>		
<35yrs	40	31%
35-49	62	48%
>50	27	21%
<b>Gender</b>		
Female	46	35.7%
Male	83	64.3%
<b>Religion</b>		
Christian	4	3.1%
Hindu	119	92.2%
Muslim	6	4.7%

**Table No. 2: Socioeconomic status of participants (N=129)**

Variable	Frequency	Percentage
<b>Education</b>		
Graduate	65	50.4%
High	7	5.4%
Inter	14	10.9%
Post graduate	41	31.8%
Secondary	2	1.6%
<b>Occupation</b>		
Clerk	1	0.8%
Home maker	6	4.7%
Legislator	1	0.8%
Manager	1	0.8%
Professionals	50	38.8%
Shop keeper	1	0.8%
Skilled	15	11.6%
Technician	18	14.0%
Unemployed	36	27.9%
<b>Socioeconomic status</b>		
Lower middle	1	0.8%
Middle	19	14.7%
Upper middle	16	12.4%
Upper	93	72.1%

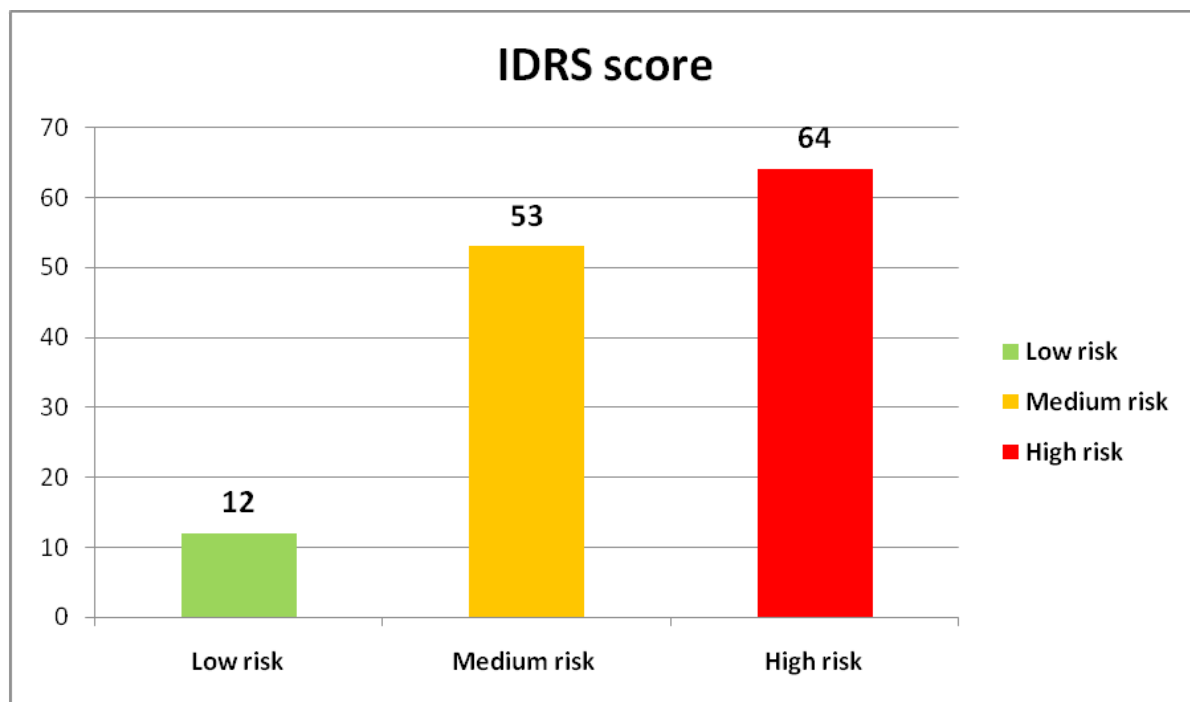
**Table No. 3: Anthropometry of participants (N=129)**

Variable	Frequency	Percentage
<b>Waist Circumference</b>		
<b>Male (n=83)</b>		
<90cm	31	37.34%
>90cm	52	62.66%

Variable	Frequency	Percentage
<b>Females(n=46)</b>		
<80cm	8	17.4%
>80cm	38	82.6%
<b>Waist Hip Ratio</b>		
<b>Male (n=83)</b>		
<0.9	37	44.6%
>0.9	46	55.4%
<b>Females(n=46)</b>		
<0.85	26	56.52%
>0.85	20	43.48%
<b>BMI (N=129)</b>		
<18.5	1	0.8%
18.5-22.9	18	14%
23-27.5	55	42.6%
>27.5	55	42.6%
<b>Total</b>	<b>129</b>	<b>100%</b>

**Table No. 4: Life style and Biochemical risk factors among participants (N=129)**

Risk Factors	Frequency	Percentage
Current smoker	19	14.7%
Current alcoholic	13	10.1%
<b>Known history of hypertension</b>		
No	116	89.9
Yes	13	10.1
<b>Blood pressure (mmHg)</b>		
≥140/90	18	14%
<140/90	111	86%
<b>Random blood sugar (mg/dl)</b>		
≥200	28	21.7%
<200	101	78.3%



**Figure No. 1: Distribution of risk categories based on IDRS score among participants.**

**Table No. 5: Association between RBS and IDRS among participants.**

RBS	IDRS Score			Total
	Low Risk	Medium Risk	High Risk	
≥200	2	6	20	28 (21.7%)
<200	10	47	44	101 (78.3%)
	12	53	64	129 (100%)

\*Chi-square=6.97,df=2, p value=0.03

## Discussion

The present study was done among 129 subjects to identify the risk of development of diabetes by using IDRS. Although various risk factor scoring systems (Ramachandran et al)<sup>16</sup> were developed previously, IDRS developed by Mohan *et al*<sup>4</sup> is considered simple, fast, inexpensive, non-invasive and reliable tool to identify individuals at high risk of type 2 diabetes which has been previously validated by other researchers in India. The IDRS scoring system clearly indicates that the risk of development of diabetes can be minimized by modifying the modifiable risk factors. In the study, out of 129, 12 (9.3%) were in the low risk, 53 (41%) were in medium risk and 64 (49.7%) were in high risk category. Similarly in the studies done by Mohan V et al<sup>4</sup> in Chennai city, Gupta et al<sup>17</sup> in urban Pondicherry, Nagalingam S<sup>18</sup> et al in semi urban area of Tamil Nadu the study subjects in high risk group were 43%, 31%, 37% respectively. In the studies done by Randip C et al<sup>19</sup> in rural West Bengal and Brinda P et al<sup>20</sup> in rural Karnataka the population in the high risk category were 31.5% and 25.7% respectively. The differences in the risk score among different studies might be due to differences in socio demographic profiles.

In the study, subjects were tested for RBS levels as it is the most convenient method and can be done in large scale at any time of the day depending on availability of the person and does not need venipuncture. In the present study 31.25% of the subjects in high risk group were having RBS  $\geq 200$ . Similarly in the studies done by Sumana M et al<sup>21</sup> and Arun A et al<sup>22</sup> 35% and 47% of the high risk group were having RBS  $\geq 200$  respectively. Thus validating IDRS. Various other studies were done (Vardhan A et al, Stanley JML et al, Adhikari P et al)<sup>23-25</sup> validating the IDRS score. Hence IDRS tool is cost effective in screening risk of type 2 diabetes in a developing country like India with rising burden of diabetes and where most of the people are unaware of their diabetes status.

## Conclusion

In the present study majority of the participants were in medium and high risk categories based on IDRS scores. The study showed significant association between RBS values and the IDRS. Hence the study showed that IDRS is a cost effective mass screening tool for early identification of people at the risk of developing diabetes.

**Recommendations:** All the subjects with RBS value more than the cut-off were advised to undergo further confirmatory test and follow up for diabetes. Those who belonged to IDRS moderate and high risk categories were advised lifestyle modifications and dietary changes. Those who were in the low risk category were advised health promotion activities.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Taken from Institutional Ethical Committee.

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# Passive Tobacco Exposure in School Age Children with Recurrent Respiratory Illness using Salivary Cotinine Assay

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## Abstract

The micro (indoor) and macro (outdoor) environments play a significant role in recurrent respiratory illnesses in school-age children. Passive tobacco exposure is a leading underestimated cause of respiratory disease burden.

**Aim:** To assess passive tobacco exposure in school-age children with recurrent respiratory illness by measuring salivary cotinine.

**Method:** It is a cross-sectional study that included 160 children between 5 and 15 years with recurrent upper and lower respiratory illness. A validated questionnaire was administered for patterns of respiratory illness, socioeconomic status, micro and macro environment exposures with emphasis on tobacco. Salivary cotinine was measured by ELISA and value >10ng/ml was considered equivalent to passive tobacco exposure. Descriptive statistics were applied to compare tobacco exposed and unexposed groups. Chi-square test and binary logistic regression were used to calculate significance.

**Results:** History of exposure to ETS and/or tobacco dust within households was present in 30.6%. In 23.1%, bidi rolling was a family occupation. Passive tobacco exposure as determined by cotinine assay was present in 63.7%. Salivary cotinine levels ranged from none to 21.2ng/mL with a median of 12.04ng/mL. Among children with elevated cotinine, the history of tobacco exposure was present only in 38.2%. Residing in joint family was significant ( $p=0.009$ ) for elevated cotinine levels. There was no identifiable single significant risk factor including tobacco exposure for asthma.

**Conclusion:** Passive exposure to tobacco is an underestimated risk factor in childhood respiratory illness.

**Keywords:** Asthma; Bidi rolling; Environmental tobacco smoke; Nicotine.

## Introduction

**Background:** Childhood respiratory illness is a major cause of morbidity in low- and middle-income

countries.<sup>[1]</sup> Both the micro environment (housing characteristics) and the macro environment (outdoor air pollution) play a major role in childhood respiratory illnesses.<sup>[2]</sup> Recurrent childhood respiratory diseases especially asthma can be prevented or ameliorated by several basic measures and this includes improving living conditions, avoiding tobacco smoke exposure and reducing air pollution. Environmental tobacco smoke (ETS) is a leading cause of respiratory disease burden.<sup>[2-4]</sup> From side stream smoke, children are passively exposed to nicotine, sulfur dioxide and polycyclic aromatic hydrocarbons. It is estimated that globally, 40% of children are exposed to ETS within their households.<sup>[5]</sup>

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Gupta et al. have shown a positive association between the prevalence of all respiratory symptoms and asthma in children with tobacco exposure.<sup>[2]</sup> Exposure to ETS is correlated with recurrent otitis media and tonsillitis as well.<sup>[3]</sup>

About 34% of smokers in India use bidis.<sup>[6]</sup> The content of tobacco and therefore nicotine is higher in a bidi than the conventional cigarette.<sup>[7]</sup> In addition, bidi rolling with exposure to tobacco dust is a traditional household occupation in most states of India.<sup>[6]</sup> Cotinine is a metabolite of nicotine and is a reliable biomarker for nicotine estimation and can be assayed from serum, saliva and urine. Salivary cotinine assay provides valid and quantitative measures of average ETS exposure.<sup>[8]</sup> Studies have used salivary cotinine assay as an objective measure to assess exposure to ETS in children with respiratory illness.<sup>[3,4,9,10]</sup> There are no Indian studies on cotinine estimation in childhood respiratory illness.

Children are vulnerable to adverse health effects because of the immature lung and immune system. We hypothesized that exposure to ETS by history alone would underestimate its contribution to recurrent respiratory illness. The contribution of bidi rolling practices to the micro environment is often overlooked. The aim of the present study was to establish the contribution of passive exposure to tobacco smoke and dust in school-age children with recurrent respiratory illness by history and quantitative estimation of salivary cotinine. We also looked at the contribution of individual factors in the persistence of asthma.

## Method

**Design:** It was a cross-sectional study done in rural outreach centers attached to a teaching hospital. School children, 160 in total, aged between 5 and 15 years with recurrent upper and lower respiratory illness with a history of at least one acute episode in the last six months were included. The sample size was calculated based on the formula:  $[(1.96)^2 \times p(1-p)]/d^2$ , where  $p$  is the prevalence (0.4),  $d$  is the precision (20% of  $p$ ).<sup>[11]</sup> Diagnosis of recurrent upper and recurrent lower respiratory illnesses were made using standard definitions.<sup>[11]</sup> Children with systemic conditions contributing to recurrent respiratory illnesses like congenital heart disease, gastroesophageal reflux, chronic systemic diseases and severe malnutrition were excluded.

**Demographic Data:** The questionnaire used in the study was adapted from the International Study of

Asthma and Allergies in Childhood. It consisted of three parts that included information on socio-demographic data, micro and macro environment exposures.<sup>[12]</sup> Socioeconomic status was assessed by the updated Kuppuswamy scale.<sup>[13]</sup> Exposure to tobacco dust through bidi rolling practices in the family was also ascertained. The questionnaire was validated before use and administered to either of the parent. All children were clinically examined and diagnosis documented.

**Lab:** A salivary sample of three ml was collected by asking the child to pool saliva in the mouth and then blow into the sterile container with a straw. The collected sample was stored at -80°C until analysis. Cotinine assay was done by enzyme-linked immunosorbent assay using a commercial kit (Calbiotech, USA). Salivary cotinine level >10ng/ml was considered equivalent to heavy passive exposure to tobacco.<sup>[14]</sup> The test was repeated twice for confirmation.

Institutional Ethical Committee approval was obtained prior to the initiation of the study. Written informed consent was obtained from a caregiver (either parent). For children  $\geq 12$  years an assent was taken along with parental consent.

**Statistical Analysis:** The software Statistical Package for Social Sciences version 20.0 (IBM SPSS, USA) was used for analysis. Demography, family reported exposures, pattern of respiratory illness and clinical data were expressed in percentages. Median with interquartile range (IQR) was used for central tendency. Based on the salivary cotinine level, children were categorized into those with and without heavy passive exposure to tobacco. Chi-square test ( $\chi^2$ ) was applied for the comparison of the two groups. Mann Whitney U test was used to compare the salivary cotinine values in those with and without the history of tobacco exposure. Binary logistic regression was used to assess the significance of tobacco exposure as a risk factor for asthma. A  $p$  value < 0.05 was considered significant.

## Results

The median age of the study population was 8 years (IQR 36 months). About two-thirds were boys (66%,  $n=106$ ). Table 1 gives the pattern of respiratory illness among the study population. The median age at onset of symptoms was 48 months (IQR 24 months). On average, children had six episodes of acute respiratory illness in a year. About 34% of had a prior hospital admission.

Table 2 gives the risk factors related to micro and macroenvironments in the study. Exposure to ETS and/or tobacco dust within households was present in 30.6% (n=49). Among them, the family occupation of bidi rolling was present in 23.1% (n=37). None committed to passive exposure in the school environment or neighborhood. Salivary cotinine levels ranged from none to 21.2ng/mL. Median salivary cotinine was 12.0ng/mL (IQR 4.9 ng/mL). A value >10ng/mL was seen in 63.7% (n=102). Nearly 81.6% residing in joint accommodation had elevated cotinine and this was statistically significant ( $\chi^2=6.85; p=0.009$ ). Among those with a history of household tobacco exposure (n=49), increased salivary cotinine was present in 75.5% (n=37). The median cotinine value in this group was 13.8 (IQR 5.5)ng/mL. Table 3 gives the median salivary cotinine for children with individual forms of tobacco exposure. Among children with elevated cotinine, there was no history of exposure to tobacco in 61.8% (n=63).

Table 4 shows the pattern of respiratory illness in children with a history of exposure to ETS and elevated cotinine. A comparison of measured salivary cotinine in those with and without a history of tobacco exposure showed that salivary cotinine in those children with a definite history of exposure was significantly higher than those with unknown source of exposure (U=3359 and p=0.018). There was no identifiable single significant risk factor including tobacco exposure for asthma.

**Table 1. Pattern of respiratory illness in the study population.**

Diagnosis <sup>a</sup>	n=160 (%)
Otitis media	8 (5.0)
Allergic rhinitis	47 (29.4)
Adenotonsillitis	88 (55.0)
Asthma	57 (35.6)
Lower respiratory infection	5 (3.1)

<sup>a</sup> Combined upper and lower respiratory in 42 (26.2%)

**Table 2. Risk factors related to recurrent respiratory illness.**

Risk Factor	n=160 (%)
<b>Socioeconomic class</b>	
Upper middle	66 (41.2)
Lower middle	71 (44.4)
Upper lower	22 (13.8)
Lower	1 (0.6)
Prematurity	12 (7.5)
Low birth weight	19 (11.9)
Inadequate breastfeeding	48 (30.0)
<b>Malnutrition</b>	
Weight <3 <sup>rd</sup> centile	37 (23.1)
Height <3 <sup>rd</sup> centile	29 (18.1)
Body mass index (<3 <sup>rd</sup> centile)	43 (26.9)
Joint family	41 (25.6)
Poor housing conditions	41 (25.7)
Poor ventilation	61 (38.1)
Moulds	54 (33.7)
Inappropriate bedding	134 (84.4)
Tobacco exposure	49 (30.6)
Solid fuel smoke	61 (38.1)
<b>Pets</b>	
Dogs	37 (23.1)
Cats	24 (15.0)
Multiple	13 (8.1)
<b>Environmental Pollution</b>	
Vehicles	42 (26.0)
Construction	8 (5.0)
Factories	7 (4.0)
Garbage	4 (2.5)

**Table 3. Median salivary cotinine in various forms of tobacco exposure.**

Exposure	Number n (%)	Cotinine Measure (ng/mL)	
		Median	IQR
None	111 (69.4)	11.8	7.80
Bidi rolling	30 (18.8)	12.8	7.95
Smoking	12 (7.5)	14.2	5.77
Both	7 (4.4)	16.6	6.20

**Table 4. Pattern of respiratory illness among children with a history of tobacco exposure and elevated salivary cotinine**

Diagnosis	Number of Children	
	History of tobacco exposure n=49(%)	Elevated salivary cotinine n=102(%)
Otitis media	-	1 (0.9)
Adenotonsillitis	23 (46.9)	38 (37.2)
Allergic rhinitis	6 (12.2)	18 (17.6)
Asthma	18 (36.7)	42 (41.1)
Lower respiratory infection	2 (4.0)	3 (2.9)
Multiple	18 (36.7)	29 (28.4)

## Discussion

The airways of children are vulnerable to adverse micro and macroenvironment. The resting metabolic rate, oxygen consumption per unit body weight, oxygen demand, respiratory rates are higher in children and this with narrower airways makes them susceptible to allergens. Immunological and molecular influences can contribute to the infants propensity to wheeze which the children outgrow as they grow older.

In our study, exposure to ETS and/or tobacco dust within households was present in about one-third. These children had higher cotinine values than those without. Bidi rolling is an important home industry in the study area. The exposure to tobacco dust through bidi rolling was considerably higher than the exposure to tobacco smoke in our setting. The content of nicotine in a bidi and conventional cigarette is 2.4mg and 1 mg respectively.<sup>[7]</sup> Each bidi contains 0.2-0.3g of tobacco dust. With an average of 500-1000 bidis rolled per day per member of the family, children are exposed to 1.2-1.4g of nicotine in a day.<sup>[6]</sup> In households with bidi rolling, a week's requirement of tobacco is stored and women's family members get together to roll bidis. Children residing in joint families had significantly higher salivary cotinine values.

About 60% of children in our study had elevated cotinine and the source for exposure was not ascertained in the majority. Certain foods like potatoes, tomatoes, cauliflower and black tea contain nicotine. Dietary nicotine consumption accounts for only 10% of the total nicotine exposure experienced by a person with significant ETS exposure. Half-life of cotinine is 17 hours whereas nicotine half-life is 2-3 hours. The half-life of cotinine in children is reported to be 28 hours higher than that of adults.<sup>[15]</sup> In the questionnaire study

by Gupta et al., 30% of schoolchildren reported exposure to ETS within their households. Passive exposure was seen in 41% of asthmatics.<sup>[2]</sup> Kumar et al. found elevated salivary cotinine in 68.5% of children with persistent asthma; only 49.6% reported exposure.<sup>[4]</sup> A cotinine-validated exposure was seen in 45.6% of children with asthma in the study by Delpisheh et al.<sup>[9]</sup> About 30% of mothers and 28% of fathers reported smoking. The pattern of illness in children with elevated cotinine showed that tobacco exposure may be an important factor even in recurrent upper respiratory illness. Clark et al. found elevated cotinine in >50% of children undergoing surgery for tonsillectomy or middle ear disorders.<sup>[3]</sup> Nearly 47% of children including controls had objective evidence of ETS exposure in this study, though history was forthcoming only in 40%.

Analysis of other socio-demographic data suggested that prematurity, low birth weight and inadequate breastfeeding were not major risk factors in comparison to the micro and macroenvironment. Vedanthan et al. from southern India noted that 26% of children were not exclusively breastfed among children with respiratory illness.<sup>[16]</sup> Risk factors related to micro and macroenvironment were based on history and not by field survey and this would be a limitation of the study.

In conclusion, exposure of children to tobacco smoke and dust is an underestimated but an important contributing factor in childhood respiratory illness. Bidi rolling as a family occupation should be ascertained. Salivary cotinine estimation is a simple and useful test to establish exposure and will also help in quantifying the severity of exposure.

**Conflict of Interest:** None

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# A Retrospective Study on Most Common Symptoms in Dengue Viral Infection of Paediatric Age Group Presented in a Tertiary Care Hospital, Visakhapatnam

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## Abstract

**Background:** Dengue is a virus infection caused by four dengue virus serotypes (DENV1-DENV4). Children diagnosed with dengue virus have symptoms ranging from mild fever to dengue haemorrhagic shock. The present research is a retrospective analysis designed to determine the prevalence rate of dengue viral infection in pediatric cases with primarily gastrointestinal symptoms.

**Study Design:** It is a retrospective study.

**Method:** The study was conducted in the Department of Paediatrics at the Tertiary care Hospital, Visakhapatnam from June 2018 to October 2018. A maximum of 85 OPD/IPD cases have been registered in the study for a period of five months. The research examined clinical, laboratory, treatment and outcome data for 85 children (6 months to 14 years of age) admitted to hospital with fever and suspected dengue diagnosis. Full medical history of all dengue cases including signs and symptoms, method of diagnosis, management, length of stay and clinical outcomes are collected from patient information. Pan Bio ELISA was performed as a confirmatory test.

**Results:** Among the 85 suspected cases of dengue reported to OPD/IPD 65(76%) were confirmed as dengue positive and 20(24%) were found to be non-dengue cases with ELISA. Gender wise distribution of dengue positive cases, more cases were noticed in males 35(53%). Prevalence was more in the age group 5-11 years 24(37%). Among the 65 positive cases of dengue, more number of cases were supported with fever 65 (100%) followed by GI symptoms like vomiting 31(47%), nausea 26(40%) and diarrhoea with abdominal pain 29(44%).

**Conclusion:** This study will provide a clear insight into the prevalence of dengue in children, the symptoms of the disease and the outcome. The understanding of dengue in children, including its clinical manifestations, pathogenesis, diagnostic tests, management and prevention, is very important in reducing the mortality rate.

**Keywords:** Dengue, ELISA, Prevalence, Paediatric age group.

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## Introduction

Dengue fever is one of the most prevalent infectious diseases in the world and is growing every year. The average seroprevalence of dengue viral infection in India is 48.7 per cent, rising from 28.3 per cent for children aged 5–8 years to 41.0 per cent for children aged 9–17 years and 56.2 per cent for individuals aged

18–45 years. Seroprevalence is high in the southern, western and northern regions of the country<sup>[1]</sup>. Dengue is a viral infection caused by four serotypes (DENV1-DENV4) of dengue virus belonging to the flaviviridae family. Individuals infected with any serotype will have long-term immunity from virus re-infection, but only partial protection against infection with another dengue virus serotype. Such infections with different serotypes often lead to severe clinical manifestation such as dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Other Arboviral diseases that are present in India, are Japanese encephalitis, West Nile viral disease, Chikungunya fever, Crimean-Congo hemorrhagic fever and Kyasanur forest disease<sup>[2]</sup>. This virus is spread by the mosquitoes *Aedes aegypti* and *Aedes albopictus*. Over the last 30 years, the spread of dengue and its vector has increased dramatically due to insufficient vector control, increased urbanization and air travel. In July 2017, in India, NVBDCP (National Vector Borne Disease Control and Prevention) reported about 28,702 cases of dengue dengue, with 46 deaths of dengue haemorrhagic fever reported as a major cause of death in children. Children infected with dengue virus present with symptoms ranging from mild fever to dengue haemorrhagic shock. Symptoms such as fever, myalgia, nausea, vomiting, rash, body aches and leukopenia include probable dengue symptoms. Warning signs include abdominal pain, persistent vomiting, fluid build-up and enlargement of the liver. In severe dengue shock, fluid accumulation and involvement of other organs is seen. Therefore, early prognostication of potentially severe dengue cases, especially in children, will aid in the timely and appropriate management and thereby improve the outcome. Cutaneous involvement can facilitate clinical diagnosis, however it is not present in all patients. There is no significant difference in complications and mortality in patients with DF with or without skin rash<sup>[3]</sup>. Rapid and accurate diagnosis of dengue in the acute phase of illness is important for initiation of therapy as well as for early enhancement of epidemic control measures especially in low endemic areas<sup>[4]</sup>. Diagnosis is done by detection of specific IgM antibody by ELISA which rise after 4-5 days of fever. Tests to detect NS1 antigen can also be performed but are less reliable<sup>[5-6]</sup>. The present investigation is a retrospective study designed to find out the prevalence rate of dengue viral infection in paediatric cases presented mainly with gastrointestinal symptoms.

## Materials and Method

**Study design:** It is a retrospective study conducted in the Department of Paediatrics in a Tertiary care hospital, Visakhapatnam from June 2018 to October 2018. This study was reviewed and approved by The Ethics Committee of GITAM Institute of Medical sciences and Research, Tertiary care hospital, GITAM (Deemed to be University).

### Inclusion Criteria:

- Age: varied from 6 months to 14 years
- Children presented with dengue fever to OPD and suspected cases of dengue

### Exclusion Criteria:

- Febrile cases with other proven etiology (malaria, typhoid upper respiratory tract infections)
- Negative cases for dengue serology.
- Cases with any co-morbidity that may alter the laboratory and/or clinical findings such as other viral infection.

**Study population:** A total of 85 recorded OPD/IPD cases were taken into the study for a period of five months. Data regarding most common clinical signs and symptoms like fever, arthralgia, myalgia, head-ache, body-aches, skin rash, bleeding manifestations and gastrointestinal (GI) symptoms like vomiting and pain abdomen were noted. The study reviewed the clinical, laboratory, treatment and outcome data of 85 children (6 months to 14 years of age) admitted to the hospital with fever and a suspected diagnosis of dengue. Complete medical record of all dengue cases which included signs and symptoms, method of diagnosis, management, duration of stay and clinical outcome was retrieved from patient's information reports. The study included children (<14 years of age) serologically diagnosed as dengue-positive at the time of admission using the dengue IgM specific antibodies ELISAs (Panbio® Dengue IgM capture ELISA, Alere™, Australia). According to the WHO recommendations (2009), all cases were classified clinically as severe dengue, DS and DWS. The Dengue IgM capture ELISA determines the level of IgM antibodies to dengue in a patient's serum. Children with confirmed dengue diagnosis (tested positive for IgM ELISA) were considered as dengue-positive group with IgMELISA titre value of >11 Pan-Bio Units (PBU), while the rest were grouped as non-dengue fever/other febrile illness (<9 PBU) and equivocal dengue (9-11

PBU). A positive result is indicative of either an active primary or secondary dengue infection.

Optical Density (OD) was measured at 450 nm using ELISA reader method at Department of Microbiology and test results were interpreted either positive or negative or equivocal according to manufacturers' instructions. The sensitivity and specificity of detection quoted by the manufacturer were 94.7% and 100%, respectively. This diagnostic kit provided qualitative detection of IgM antibodies specific to dengue virus in human serum, dependent on the following principle. IgM antibodies in patients' serum are captured by antihuman IgM ( $\mu$  chain specific) coated on to the solid surface (wells). In the next step, dengue antigen is added, which binds to capture human IgM in the sample. Unbound antigen is removed during the washing step. In the subsequent step, biotinylated flavivirus anti-DEN monoclonal antibodies are added followed by Avidin-HRP. Subsequently, chromogenic substrate (TMB/H<sub>2</sub>O<sub>2</sub>) is added. The reaction is stopped by 1N H<sub>2</sub>SO<sub>4</sub>. The optical density is measured at 450 nm.

Statistical analysis: The collected data was coded using Excel sheet (Window 2010) and analysis was done using software SPSS 24.0 version. Chi-square test was used to compare the categorical variables and  $p \leq 0.05$  was considered statistically significant.

## Results

After enrolment, baseline information including demographic characteristics, clinical history and examination findings was documented using a structured case report form. Among the 85 suspected cases of dengue reported to OPD/IPD 65 (76%) were confirmed as dengue positive and 20(24%) were found to be non-dengue cases. By studying the influence of demographic variable age on the prevalence of dengue viral infection it was observed that the prevalence was more in the age group 5-11 years with the total cases reported were 24(37%) followed by 1-5 years 21(32%) cases, 11-14 years age 17 (26%) and less than one year age 3 (5%). By Gender wise distribution of dengue positive cases, more cases were noticed in males 35(53%) than females 30(47%). Among the 65 positive cases of dengue, more number of cases were supported with fever 65(100%) followed by GI symptoms like vomiting 31(47%), nausea 26(40%) and diarrhoea with abdominal pain 29(44%). However very few cases were reported with headache 12(18%) and malaena 2(5%) (Table 1). The results also found that more number of dengue positive cases were reported from rural areas 36(55%) than urban areas 29(45%) (Table 2). By using gold standard method like ELISA, out of the 85 reported cases 65 were confirmed as dengue positive and 20 cases were found to be non-dengue. Majority of the reported cases at the time of admission have more than one lakh of platelet count and very few cases were recorded in the range of 21,000 to 1,00,000 platelet count (Table 3 and Figure 1). Platelet transfusion had been done in some reported cases.

**Table 1: Clinical characteristics of study cohort**

S.No.	Signs and Symptoms	Dengue (N=65)		Non-Dengue (N=20)	
		Positive	Negative	Positive	Negative
1.	Head-ache	12	53	05	10
2.	Myalgia	21	44	2	18
3.	Arthralgia	25	40	1	19
4.	Rash	20	45	0	20
5.	Fever	65	00	18	02
<b>GI Symptoms</b>					
1.	Vomiting	31	34	4	21
2.	Nausea	26	39	2	18
3.	Diarrhoea	29	36	1	19
4.	Malaena	2	63	0	20

- Statistics: Dengue (N=65): Standard deviation: 34.5, Standard error mean: 11.5, t value: -1.187, p value: 0.00001 (Significant)
- Statistics: Non-dengue (N=20): Standard deviation: 11.5, Standard error mean: 3.8, t value: -3.149, p value: 0.014 (Significant)

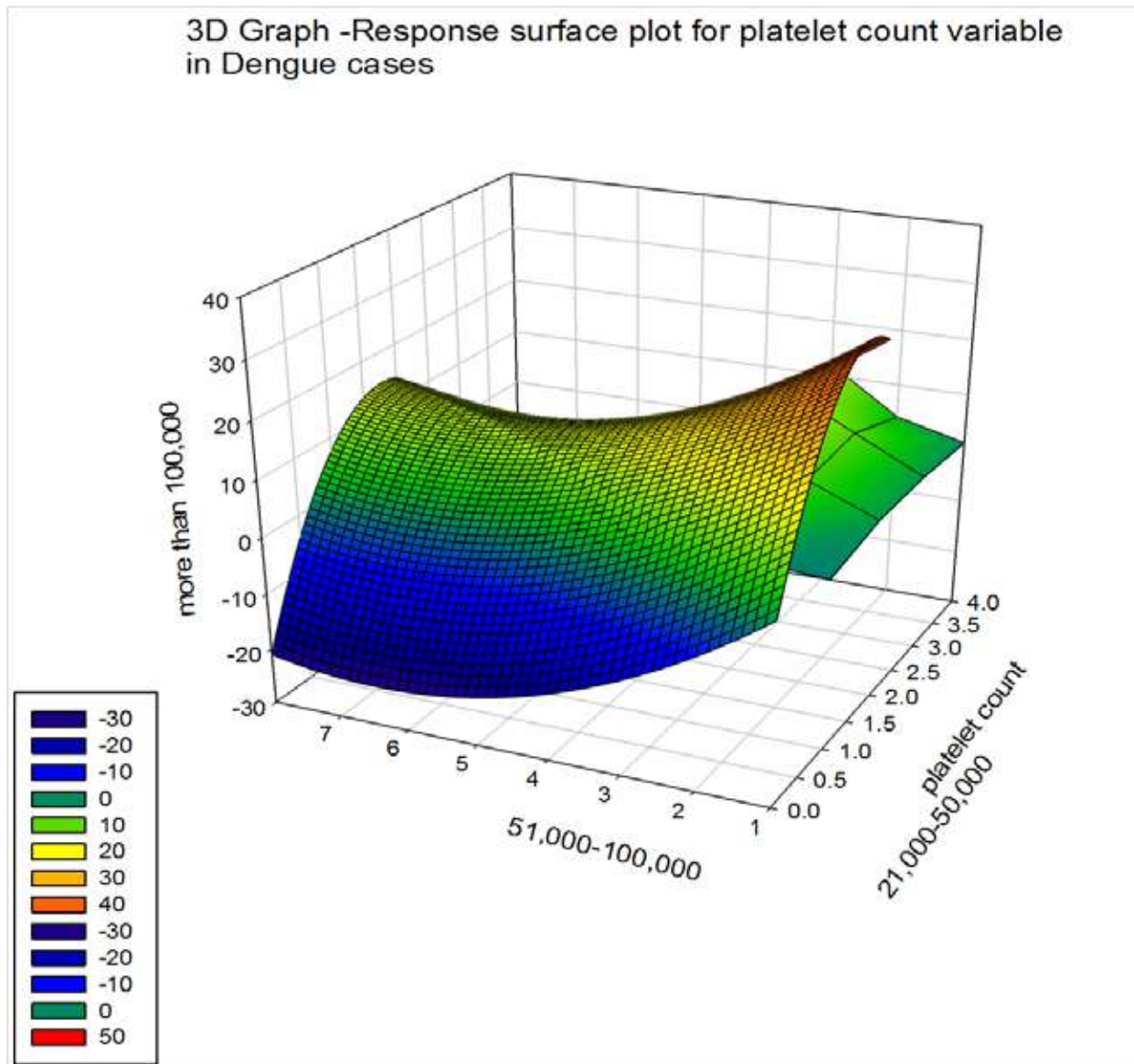
**Table 2: Area wise distribution of study cases**

Area	Dengue (N=65)	Non-dengue (N=20)
Urban	29	12
Rural	36	8

• Statistics: Standard deviation: 7.7, Standard error mean: 5.5, t value: 4.09, p value: 0.15 (In-significant)

**Table 3: Platelet count of study cohort**

Age Group (Years)	Total Number Cases (N=65)	Platelet count/mm <sup>3</sup>			
		<20,000	21,000–50,000	51,000–100,000	>100,000
< 1	3	0	0	1	2
1-5	21	0	2	7	12
5-11	24	0	2	8	14
11-14	17	0	1	4	12



**Figure 1: Response surface analysis for the number of cases with variable platelet count**



## Discussion

Dengue has the most varied presentation, it can present as simple self-resolving fever or as dengue shock syndrome. Early detection and treatment reduce the associated morbidity and mortality. In this study the authors attempted to retrospectively analyze the various demographic and clinical parameters associated with dengue fever in children of ages varying from 6 months to 14 years. The authors found that the incidence of dengue in infants was less compared to other age groups. The incidence was highest in the 5 to 11 year age group, followed by the 11 to 14 year age group. These age groups are generally more exposed to the outside environment. However in the study conducted by Padmanabhan et al. 2018)<sup>[7]</sup>, the highest incidence was found in the 1 to 5 year age group followed by 11 to 14 year age group. Mital et al. 2016)<sup>[8]</sup> found that prevalence was highest in the 11 to 20 year age group. Vazhayil et al. 2017)<sup>[9]</sup> found highest prevalence in 11 to 15 year age group. In this study there was a male predominance in the incidence of dengue fever, 53% male to 47% female. Vazhayil et al. 2017)<sup>[9]</sup>, Rafique et al. 2015)<sup>[10]</sup> found that male predominance in the incidence of dengue fever in their study. However Padhiet al. 2014)<sup>[11]</sup> in their study observed that there was a female predominance in the occurrence of dengue. The classical clinical presentation of dengue is this is not always observed in the clinical practice. In the present study fever was present in all cases (100%) and vomiting was the most commonly associated symptom (47%), followed by nausea (40%), arthralgia (30%), myalgia (32%), rash (30%), head-ache (18%), diarrhea (15%), abdominal pain (12%) and malena (3%). In a study by Vazhayil et al. 2017)<sup>[9]</sup> fever was present in all cases and the following symptoms were associated in the decreasing order of incidence vomiting, headache, myalgia, abdominal pain, petechial rash and malena. In a study by Alok Kumar et al. 2017)<sup>[12]</sup> fever was present in all cases and the following symptoms were associated in the decreasing order of incidence vomiting, respiratory distress, weakness, pain abdomen, myalgia and rashes. In a study by Arunet al. 2017)<sup>[13]</sup> there was increased incidence of neurological manifestations, which were not seen in the present study. In this study dengue was more common in the monsoon period (July to September). The study conducted by Bandyopadhyay et al. 2013)<sup>[14]</sup> had proved that there was an increased prevalence of dengue viral infection in the monsoon and post monsoon period. In this study there is higher incidence of dengue fever in rural than urban populations. Diagnosis of dengue fever

can be done using ELISA for IgM, IgG. Detection of NS<sub>1</sub> antigen and RT-PCR techniques. Samples must be taken within 1–5 days after the onset of symptoms, to detect the antigen NS<sub>1</sub> protein), within 1–6 days to detect IgM antibodies for enzyme-linked immunosorbent assay (ELISA) or a rapid test after day 5 of starting the symptoms, within 1–5 to detect IgG. In this study diagnosis was done by using IgM ELISA as this is more sensitive and more easily available. Out of total 85 cases 65 were positive and 20 were negative and were treated as sero negative cases of dengue. Total positive ELISA cases with low platelet count were 31 and six cases were ELISA negative with low platelet count. Total count was supposed to be low in dengue cases but in our observation only 12 ELISA positive and 3 ELISA negative cases had a low total count. Development of a dengue vaccine is considered a high public health priority. A safe and efficacious dengue vaccine would also be important for travelers.

## Conclusion

Now-a-days dengue viral disease is a common disease in this part of the world and one of the dreaded fevers for the paediatric age group. The disease has various presentations and features, but early diagnosis and management can decrease the mortality rate significantly. The present study retrospectively analyzed all the typical and atypical presentations, epidemiological data and investigations of dengue in paediatric age group. This study will give a clear insight on the prevalence of dengue in children, about the disease symptoms and the outcome. Fever and GI symptoms are most commonly presented in the study population of the current study which is accordance to the results of past literature. Understanding of dengue in children, including its clinical manifestations, pathogenesis, diagnostic tests, management and prevention is very important to reduce the mortality rate.

**Institutional Review Board Statement:** This study was reviewed and approved by The Ethics Committee of GITAM Institute of Medical sciences and Research, Tertiary care hospital, GITAM (Deemed to be University), Visakhapatnam.

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# Impact of Internal Branding on Employee Engagement: An Empirical Study Conducted among Medical Staff's Brand Supporting Behaviour in Indian Hospitals

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## Abstract

Building an internal brand is a critical function of service organizations today. The employee's attitude and behaviour must represent the organization's brand, values and culture. Internal branding is highly relevant in healthcare, where it includes a range of strategies aimed at employees to help them deliver the desired service to patients. This empirical research paper focuses on the impact of internal branding dimensions on employee engagement among medical staff in select Indian hospitals. The analysis of the data collected from a sample of 176 respondents using structured questionnaires show that internal branding dimensions such as internal communication, HR processes during internal branding, brand focused training and leadership assist in engaging the medical staff while providing healthcare services. Considering social exchange theory (SET) as the theoretical foundation, the research indicates that medical staff show high level of engagement when hospitals implement internal branding programs.

**Keywords:** *Internal branding, employee engagement, employee behaviour, internal communication, HR processes, brand focused training, leadership, hospital.*

## Introduction

Employee engagement is a measurable degree of an employee's positive or negative emotional attachment to their job, colleagues and organization that influences their willingness to perform at work. It is defined as the "harnessing of organization members' selves to

their work roles"<sup>1</sup>. When engaged, employees express themselves cognitively, behaviourally and emotionally at work during role performance.<sup>1,2,3</sup>

Engaged employees often display positive emotional connection with their work and workplace and are likely to display high level of attentiveness and psychological involvement in their work.<sup>2</sup> They are more productive, better performers, satisfied, healthier and less likely to leave their employer.<sup>4,5</sup> To create a service delivery driven organization, it is important to equate employee engagement with both long term (relational) as well as short term (transactional) relationship with the organization. Some healthcare organizations highly focus on implementing employee oriented initiatives to reap the benefit of brand supporting behaviour of their staff. Past studies predict a deficiency of medical staff comprising of nursing staff, specialists, generalist physicians and other clinicians, which will hamper healthcare organizations' ability to deliver high-quality healthcare services in the coming decade. Hence to

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enhance the healthcare productivity and patient safety through quality service delivery, employees need to be engaged and aligned with the hospital brand.

Internal branding is one such multidisciplinary practice which helps in aligning hospital's strategies and values with the employee's values, thus creating a brand which employees can trust. It provides a competitive advantage as it consists of activities which help employees feel connected to their hospital. Internal communications and involvement of HR during internal branding implementation, along with proper brand focused training give them a feeling of belongingness which is crucial in aligning the staff with the hospital.

**Literature Review:** The studies conducted by Punjaisri et. al.<sup>6,7</sup> in hospitality sector provide an extended view of the internal branding. Löhndorf & Diamantopoulos<sup>8</sup> suggested the link between social identity and internal branding leading to employee behaviour. These studies have indicated that there are many internal branding factors which lead to employee engagement. Although Lee et al.<sup>9</sup> suggested internal communication, training and reward as key factors of internal branding, they fail to explain the descriptive influence of these factors in detail as well as how they affect engagement. Asha<sup>10</sup> explained the role of internal branding resulting in employees' brand based outcomes such as employee engagement in services sector through employees' well-being. Similarly, Huang & Lai<sup>11</sup> showed that successful hospital brand management enables employees to understand the hospital's brand value which affect their behaviour and job performance. Internal brand expresses the hospital's ability to align its mission, vision, values and professional practices which support a consistent health service to patients.<sup>12</sup> Hence the first hypothesis is formulated based on the above rationale.

Hypothesis H1: Internal branding has a positive impact on employee engagement.

Internal branding is a means to create a powerful corporate brand.<sup>13,14</sup> While expecting an employees' brand supporting behaviour, hospitals need to communicate their brand message. Hence internal communications should be the first point of focus in an internal branding program aiming to secure people's commitment and encourage behavioural change to support patient orientation. It plays a significant role in internal branding as it influences employee's brand

knowledge, attitudes and behaviour in hospitality industry.<sup>13</sup> Based on these arguments, the second hypothesis was formulated.

Hypothesis H2: Internal communication during internal branding has a positive impact on employee engagement.

Involvement of HR in internal branding has been studied by de Chernatony et al.<sup>14</sup> who claim that HR plays a vital role in implementation of internal branding through recruitment, rewards and other practices aligned with the brand values. Hence HR department need to be aware of brand values and should help in instilling these values in daily operations.<sup>15</sup> This is because it is the responsibility of HR practices to create a work environment to induce engagement.<sup>16</sup> Hence the role of HR in engaging the employees while implementing internal branding initiatives is explicit. The third hypothesis was based on these arguments.

Hypothesis H3: HR practices during internal branding have a positive impact on employee engagement.

Using training programs for building an internal brand is also considered very effective by employees.<sup>17</sup> Unlike the traditional trainings, these programs must be focussed on instilling brand values among the employees, educating them about the importance of brand values and how to align their work with brand values, how to carry out their specific roles,<sup>16</sup> how to treat customers,<sup>18</sup> which further engages them with their work and workplace. This has provided a rationale for the fourth hypothesis.

Hypothesis H4: Brand focused training during internal branding has a positive impact on employee engagement.

Another variable, leadership was repeatedly mentioned in the services branding literature as a mechanism of motivating employees to "live the brand".<sup>19</sup> Research indicates that change oriented, dynamic and people oriented leadership style can induce engagement. Patient orientation and service delivery are also essentially affected by the way internal brand is managed by the leaders in hospitals. Therefore leaders have an inevitable role in developing an internal brand in hospitals, which employees can trust and finally represent during their on role performance and interactions with patients. The fourth hypothesis was based on this rationale.

Hypothesis H4: Leadership role during internal branding has a positive impact on employee engagement.

**Theoretical framework:**

**Social exchange theory:** One of the most influential theories for understanding workplace behaviour is social exchange theory (SET), which explains that parties dwell by certain reciprocity rule which is best known as an exchange rule.<sup>20</sup> It explains that people make social decisions based on perceived cost and benefits during their employment tenure leading to an economic and a social exchange relationship. Blau's<sup>21</sup> contribution outlined the impact of exchanged benefits on employees' attitude and behaviour such as commitment and engagement. Internal branding incorporates many programs which engage employees through various social exchange processes. Hence the present study has considered SET for developing the theoretical framework and further tried to analyse the questions like what is the impact of internal branding dimensions on employee engagement, viewing this relationship as an exchange process.

In hospitals, employee engagement underpins increased patient safety. Adoption of a comprehensive employee engagement strategy has a major impact on patient satisfaction. SET provides a valid rationale to discuss the same and how it is influenced by internal branding. The purpose of this study, therefore, is to empirically analyse the impact of dimensions of internal branding on employee engagement among the medical staff in Indian hospitals.

**Method**

**Sample Design:** The study was conducted among a sample of 176 medical staff in select private hospitals in India. All respondents selected through a criterion sampling took part in a structured survey. Approximately 290 questionnaires were distributed in hard copies as well as online forms, from which 189 responses were received. Only 176 questionnaires could be further considered for analysis. The sample consisted of 71% female employees and 29% male employees. The demographic distribution of the sample reflected 74% employees with an experience of 2 years to 8 years in their current hospital, 23% employees with an experience of 9 years to 15 years in their current hospital and 3% employees with an experience of more than 15 years in their current hospital.

**Data Collection:**

**Measures of variables**

**Perception of internal branding:** Internal branding was measured as a 3-dimensional construct comprising internal communication, brand focused training and HR involvement in internal branding. The measurement items were adapted from Aurand et al.<sup>15</sup> and Punjaisri, et al.<sup>6</sup> The reliability test has shown a Cronbach's alpha value of 0.81 for the adapted internal branding scale.

**Employee engagement construct:** The study used Soane et al.'s<sup>22</sup> ISA Engagement scale, which comprised of three components of engagement: intellectual, social and affective engagement. This instrument has three dimensions with three items each.

**Results**

**Table 1: Means, standard deviations and correlations among the variables in the study**

	Variable	1	2	3	4	5	M	SD
1	Internal Communication	-					4.06	.69
2	HR practices during internal branding	.63	-				4.19	.65
3	Brand focused training	.40	.42	-			4.01	.75
4	Leadership	.50	.63	.67	-		3.82	.69
5	Employee engagement	.66	.75	.60	.57	-	3.97	.70

**Note:** Correlations are significant at 0.01 level respectively. Correlation coefficients of 0.5 or greater are significant at p<.01, N= 176

As observed in table 1, descriptive statistics show that HR practices during internal branding have the maximum mean value (4.19) among all the variables and leadership has the minimum mean value of 3.82. Involvement of HR department in various brand building activities was the profound tool used in internal branding.

Table 1 also shows correlation between dimensions of internal branding and employee engagement. Involvement of HR, internal communication through various media and provision of necessary brand oriented training to the medical staff at all levels can help in stronger incorporation of brand message into operational activities. This would reinforce the brand values in medical staffs' attitude towards the brand. Leadership too moderately affects the effectiveness of implementation of these internal branding dimensions, facilitating the brand supporting behaviour, i.e., engagement. Results of table 1 provide support for all proposed hypotheses. This is further tested by regression analysis.

**Table 2: Model summary Regression of employee engagement on internal branding**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.823	.711	.701	.4023

According to the results of stepwise regression in table 2, model 2 is accepted according to which employee engagement in organizations depend on internal branding variables namely, internal communication, brand focused training and HR practices. Though leadership has implications on the successful implementation of internal branding and engaging the employees, but the direct impact of the same is not found to be very significant according to the present study results. Hence the accepted model has only three variables excluding leadership.

The next table shows the multiple linear regression estimates including the intercept and the significance levels.

**Table 3: Regression coefficients**

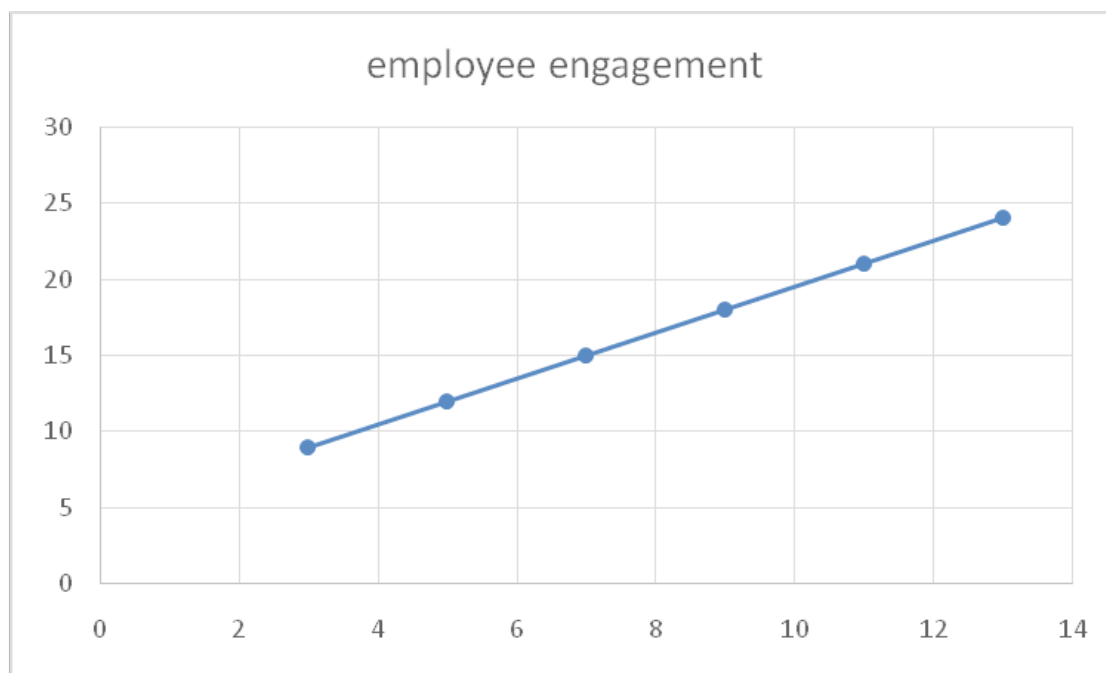
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
	B	Standard error	Beta			Tolerance	VIF
Constant	1.103	2.04	.61	.528	.501		
Internal communication	.008	.003	.357	.457	.018	.412	1.450
HR practices during internal branding	.019	.002	.426	.478	.125	.516	2.342
Brand focused training	.007	.001	.304	.347	.010	.432	1.376
Leadership	.002	.001	.256	.212	.000	.201	1.153

Table 3 shows that if all variables are forced into the multiple linear regression, it is found that only internal communication and HR practices during internal branding are significant predictors of employee engagement. As indicated by the results in table 3, HR occupies a unique position within hospitals as they link hospital's stakeholders with its service delivery objectives and medical staff.

Internal communication through various media ensures that employees understand the hospital's vision and mission statement and are aligned with the hospital's values. In addition, brand focused training instil brand values among employees and keep them informed and engaged, increasing the likelihood of them

becoming brand ambassadors. Medical staff are the major stakeholders to witness hospital's brand, values and objectives. They are also the ones that mainly communicate that experience through patient service. Supporting the previous researches, these findings provide evidence for accepting the first four research hypotheses. As observed in table 2, the three factor model consisting of internal communication, HR processes and brand based training is an effective indicator of employee engagement.

The information in the table 3 also allows to check for multicollinearity in the multiple linear regression model. Tolerance should be > 0.1 (or VIF < 10) for all variables, which is found to exist in the analysis.



**Figure 1: Plot of regression**

Figure 1 shows that when hospitals have better tools of internal communication, greater HR involvement and provisions for brand focused trainings, employees are more engaged. With an increase in the intensity of internal branding process and implementation, greater is the employee engagement.

**Practical implications:** Internal Branding is a corporate strategy which enables employees to not only understand the brand values and deliver on the brand promise but to also to 'live' it. It is particularly important in hospitality sector, where employees need to interact with customers directly and thereby exhibit brand supporting behaviour.<sup>6</sup> This is possible when the factors of internal branding help in creating an engaged workforce.

Employee engagement being one such behaviour, the same is empirically proven in the present study. Engagement of medical staff is positively related to hospital's internal communication, the extent to which HR involves in brand building process and the brand oriented trainings provided to the staff to align themselves with hospital's values and culture. Furthermore, though leadership has a correlation with employees' engagement, it reflects a partial role in the link between internal branding and engagement. The present research provides hospitals an insight to manage

their internal branding to align with the hospital's brand values and incorporate them primarily in their duties.

**Theoretical implications:** The present research has supported the existing literature in internal branding and provided a model showing internal branding factors enabling brand supporting employee behaviour leading to employee engagement. In alignment with the research studies done by Punjaisri et. al<sup>6,7</sup> the present research has added value to literature by testing the impact of internal branding factors in hospitals. Based on SET, the study adds to current body of knowledge how internal branding can impact employees' attitude and behaviours in alignment with the organization's brand through employee engagement.

**Limitations and scope for future research:** The present cross sectional study was conducted only in Indian hospitals, hence generalizability in sectors other than services might be difficult. There lies a future scope to analyse the same variables in other services sectors like telecommunication etc.

**Ethical Clearance:** Not applicable

**Source of Funding:** Not applicable

**Conflict of Interest:** Nil

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# Effectiveness of Health Education on Myths of Menstrual Hygiene among Adolescent Girls in Selected Rural Area in Andhra Pradesh, Vizianagaram District

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## Abstract

The main aim of this study was to find out the prevailing myths about menstrual hygiene among adolescent girls in selected high school and to find out the effectiveness of structured teaching program on menstrual hygiene. A quasi experimental study using one-group pre-test and post-test design was used with a sample size of 62 adolescent high school girls. The findings of the study revealed that the myths on menstruation were decreased after providing health education on menstruation. During post-test, 93.5% said that head bath during menstruation do not increase blood flow, 92% did not accept to avoid exercises during menstruation, 96.8% did not feel that there is a need to see a doctor always during menstruation, 95.5% did not accept that periods should exactly last for 1 week, 93.5% did not accept that touching pickles during menstruation spoils it, 93.5% felt that talking to mother during menstruation is good, 98.4% felt that touching animals like cow or sheep during menstruation is not impure, 95.1% felt that touching pregnant ladies during menstruation do not lead to fetal death, 93.5% felt that touching green plants during menstruation do not lead to plants death. There was significant association between class, source of health information and type of pads used and myths like "touching pickles during menstruation spoils it", "talking to mothers about menstruation is not good" and type of pads used at 0.05% significant level. The present study showed that the structured teaching program on menstrual hygiene changed the perceptual myths.

**Keywords:** *Menstruation, menstrual hygiene, myths, adolescent girls.*

## Introduction

WHO report (1999) stated that many mothers lack correct information and skills to communicate to their children about menstrual hygiene, leading to false attitudes, beliefs and practices<sup>1</sup>. Dhingra R and Kumar A reported that menstruation is still regarded as something unclean or dirty in Indian society and it is strongly related with misconceptions and cultural restrictions<sup>2</sup>. The myths about menstrual hygiene can be decreased

by providing knowledge and information on menstrual hygiene.

**Need for the Study:** There are unwritten rules imposed on menstruating women around the world surrounded by taboos, myths and unhygienic practices. In Bangladesh, women bury their clothes to prevent them being used by evil spirits<sup>3</sup>. Sarah et.al reported that due to these taboos, women and girls are excluded from social, cultural, sanitation and menstrual hygiene services<sup>4</sup>. In Tanzania, some believe that if a menstrual cloth is seen by others, the owner of the cloth may be cursed<sup>5</sup>.

In India, there are many taboos regarding menstruating women like preventing them to visit temple, to cook food, to attend weddings etc<sup>6</sup>. Harshad reported that correct knowledge will help them practice safe and hygienic menstrual practices and come out

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of traditional beliefs, misconceptions and restrictions regarding menstruation<sup>7</sup>.

Some studies in India reported that there are restrictions ongoing to school, touching flowers and males during menstruation etc<sup>2</sup>. Even though the first menstruation is celebrated, many myths and taboos surround the practices of menstrual hygiene, causing psychological and physical trauma, affecting reproductive health<sup>8</sup>. These perceived myths can be changed by providing health education on menstrual hygiene.

#### **Objectives:**

- To compare the Pre-test and Post-test myths about menstrual hygiene among high school adolescent girls.
- To find out the effectiveness of structured teaching program on the myths about menstrual hygiene.
- To find out the association between selected demographic variables and pre-test myths.

#### **Limitations:**

- The study is limited to only high school adolescent girls
- The study is limited to only one school
- The study is limited to only rural school.

### **Methodology**

**Research Design:** A one-group pre-test and post-test research design was chosen.

**Sample:** The sampling technique used for the study was simple random sampling method. The present study included a sample of 62.

#### **Inclusion Criteria:**

- Adolescent girls studying in selected high school
- Subjects who can understand English and Telugu.

- Subjects who are willing to participate in the study.
- Subjects includes both who attained and did not attain menarche
- Students studying in 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> class.

#### **Exclusion Criteria:**

- Subjects who are not willing to participate in the study
- Subjects who are experiencing any severe health issues.

**Method of data Collection:** A questionnaire was prepared related to various myths that are prevalent among adolescent girls in consultation with subject experts and review of literature. The self-report questionnaire was used to collect pre-test and post-test information related to myths on menstrual hygiene. Structured health education program was conducted at high school using appropriate audio-visual media.

#### **Description of the Tool:**

**Section-1:** This section deals with information like age, class, attainment of menarche etc.

**Section-2:** This section includes 10 items of myths. The subjects need to tick one option of the response like 'yes' or 'no' response according to them for each item.

**Data Collection Procedure:** The permission to conduct study was obtained from the Principal of High School. Oral consent was obtained from the subjects. They were also informed that if they are not interested in the study they can withdraw from the study at any time. They were assured of their confidentiality.

**Data Analysis:** Frequency, percentage, chi-square test were used.

Chi-square was used to check the effectiveness of structured teaching program during pre-test and post-test. Chi-square is used to find the association between each myth and demographic variables.

## Results

**Table 1: Comparison of percentage of myths of adolescent girls about menstruation during Pre-test and Post-test (N=62)**

S.No.	Myths	Pre-Test				Post-Test			
		Yes		No		Yes		No	
		n	%	n	%	n	%	n	%
1.	Bath/Head bath during menstruation increases blood flow	30	48.4	32	51.6	4	6.5	58	93.5
2.	Avoid exercises during menstruation	51	82.3	11	17.8	5	8.1	57	91.9
3.	Always see a doctor during menstruation	43	69.4	19	30.6	2	3.2	60	96.8
4.	Periods should exactly last for 1 week	51	82.3	11	17.7	3	4.8	59	95.1
5.	If you touch pickles during menstruation, it gets spoiled	51	82.3	11	17.7	2	3.2	60	96.8
6.	Talking to mothers about menstruation is not good	51	82.2	11	17.7	4	6.5	58	93.5
7.	Touching the animals like cow or sheep during menstruation is bad	46	74.1	16	25.8	1	1.6	61	98.4
8.	Menstrual blood is impure	46	74.1	16	25.8	2	3.2	60	96.8
9.	During menstruation, pregnant ladies should not be touched at it causes fetal death	40	64.5	22	35.5	3	4.8	59	95.1
10.	Touching green plants during menstruation leads to death of plants	46	74.1	16	25.8	4	6.5	58	93.5

**Table-2: Effectiveness of structured teaching program on myths about menstrual hygiene (N=62)**

S.No.	Myths	Pre-test		Post-test		Chi-square	p-value
		Yes	No	Yes	No		
1.	I	30	32	4	58	27.4	0.0000
2.	II	51	11	5	57	68.9	0.0000
3.	III	43	19	2	60	58.6	0.0000
4.	IV	51	11	3	59	75.6	0.0000
5.	V	51	11	2	60	79.1	0.0000
6.	VI	51	11	4	58	72.2	0.0000
7.	VII	46	16	1	61	69.4	0.0000
8.	VIII	46	16	2	60	65.8	0.0000
9.	IX	40	22	3	59	48.7	0.0000
10.	X	46	16	4	58	59.118	0.0000

**Table-3: Association between demographic variables and pre-test Myths (N=62)**

Demographic variables		Response	Myths									
			I	II	III	IV	V	VI	VII	VIII	IX	X
Age	<14yrs	Yes	4	7	7	7	8	7	6	8	8	6
		No	5	2	2	2	1	2	3	1	1	3
	14-16yrs	Yes	26	43	35	43	42	43	39	38	32	40
		No	26	9	17	9	10	9	13	14	20	12
	>16yrs	Yes	0	1	1	1	1	1	1	1	0	0
		No	1	0	0	0	0	0	0	0	1	1
Chi-square			1.05	0.35	0.85	0.35	0.57	0.35	0.63	1.4	4.4	3.34
p-value			0.6	0.84	0.7	0.84	0.75	0.84	0.72	0.50	0.11	0.18

Demographic variables		Response	Myths									
			I	II	III	IV	V	VI	VII	VIII	IX	X
Class	8 <sup>th</sup> Class	Yes	6	10	11	12	14	11	10	12	10	11
		No	8	4	3	2	0	3	4	2	4	3
	9 <sup>th</sup> Class	Yes	17	22	21	22	18	21	17	19	19	19
		No	10	5	6	5	9	6	10	8	8	8
	10 <sup>th</sup> Class	Yes	7	19	11	17	19	19	19	15	11	16
No		14	2	10	4	2	2	2	6	10	5	
Chi-square			4.374	2.11	4.3	0.15	8.5	1.47	4.7	1.3	2.04	0.39
p-value			0.112	0.35	0.11	0.92	0.01*	0.48	0.09	0.53	0.35	0.82
Attained Menarche	Yes	Yes	27	47	38	46	46	47	43	42	36	41
		No	3	10	19	11	11	10	14	15	21	16
	No	Yes	30	4	5	5	5	4	3	4	4	5
		No	2	1	0	0	0	1	2	1	1	0
Chi-square			0.3	0.01	2.4	1.17	1.17	0.01	0.57	0.09	0.57	1.89
p-value			0.59	0.89	0.1	0.27	0.27	0.89	0.44	0.75	0.45	0.16
Source of information related to menstrual hygiene	TV	Yes	0	1	0	1	0	1	1	1	1	1
		No	1	0	1	0	1	0	0	0	0	0
	Mother	Yes	30	30	43	50	51	50	45	45	39	45
		No	31	31	18	11	10	11	16	16	22	16
	Relatives	Yes	0	0	0	0	0	0	0	0	0	0
		No	0	0	0	0	0	0	0	0	0	0
	Friends/Teacher	Yes	0	0	0	0	0	0	0	0	0	0
		No	0	0	0	0	0	0	0	0	0	0
Any Others	Yes	0	0	0	0	0	0	0	0	0	0	
	No	0	0	0	0	0	0	0	0	0	0	
Chi-square			0.95	1.01	2.30	0.21	4.71	0.21	0.35	0.35	0.55	0.35
p-value			0.33	0.3	0.12	0.63	0.02*	0.63	0.55	0.55	0.45	0.55
Type of pads used	Home made	Yes	0	0	0	0	0	0	0	0	0	0
		No	0	0	0	0	0	0	0	0	0	0
	Market available pads	Yes	21	38	29	37	40	39	32	32	26	34
		No	23	6	15	7	4	5	12	12	18	10
	Old Clothes	Yes	9	13	14	14	11	12	14	14	14	12
		No	9	5	4	4	7	6	4	4	4	6
Any others	Yes	0	0	0	0	0	0	0	0	0	0	
	No	0	0	0	0	0	0	0	0	0	0	
Chi-square			0.02	1.75	0.84	0.34	7.77	4.22	0.17	0.17	1.94	0.75
p-value			0.87	0.18	0.35	0.55	0.005*	0.03*	0.68	0.68	0.16	0.38

### Discussion

In the present study, majority of students are adolescent girls 83.9% (52) are in the age group of 14-16 yrs, 43.5% (27) are studying 9<sup>th</sup> class, majority of girls 98.6% (61) attained menarche, 98.3% (61) had mother

as their source of information related to menstruation and 70.9% (44) used marked available pads.

The present study revealed interesting facts regarding myths of menstruation. After structured teaching program, subjects' perceptions regarding myths

were changed due to information that was statistically significant. In the present study, 48.4% had a myth that taking bath/head bath during menstruation increases blood flow during pre-test. This perception was changed among 93.5% (58) girls during post-test.

Some studies also show that there are restrictions related to activities. In a study conducted by Ishita et.al (2017), Restrictions practiced during menstruation among subjects are restrict sour foods (60.6%), religious activities (86.3%), restrict shampooing hair (63.5%), restrict wearing washed clean clothes 19 (61.9)<sup>9</sup>.

During pre-test 82.3% (51) had a myth that exercises should be avoided during menstruation. This myth was changed among 91.9 % (57) during post-test. As per Keerti et.al (2011), 78.99% girls were not allowed to attend religious occasions. 22.97% and 20.63% girls respectively were restricted from doing routine household work and playing<sup>10</sup>.

For the myth “always see a doctor during menstruation, during pre-test majority 69.4% (43) had myth and during post-test 96.8% changed their perception on this myth. Majority of students 82.3% (51), had a myth during pre-test that “period should exactly last for 1 week” which was changed among 95.1% (59) of adolescent girls during post-test. Similarly, the majority of myths during pre-test like “touching pickles during menstruation causes spoilage of pickles (96.8%), talking to mother about menstruation is not good (82.2%), touching animals like cow or sheep during menstruation is bad (74.1%), menstrual blood is impure (74.1%), pregnant ladies when touched during menstruation causes fetal death (64.5%) and touching green plants during menstruation leads to death of plants (74.1%)” could change their perception during post-test on the myths among majority of girls like 96.8% (60), 93.5% (58), 98.4% (61), 96.8% (60), 95.1% (59) and 93.5% (58) respectively.

The present study showed that the structured teaching program on menstrual hygiene was effective in changing their perception of all their myths during post-test compared to pre-test ( $p < 0.0000$ ) significant at 0.05 significant level.

The study also identified significant association between class, source of information and type of pads used and myth “touching pickles during menstruation spoils it” at 0.05 significant level. There was also significant association between the myth “talking to

mothers about menstruation is not good” and type of pads used.

In India, menstruation blood is considered as dirty and polluting. This was also reported that 63.4% of respondents had this misconception in the study conducted by Rajkumar Patil et.al<sup>11</sup>. In southern Africa, Kuper, reported about the perception that “menstrual blood of women is dangerous to men and also to the fertility of cattle and of crops”<sup>12</sup>.

**Conclusion:** As there are many myths among women regarding menstruation, nurses can implement health education program to women, thereby increasing quality of life.

### **Implications to Nursing:**

### **Implications to Nursing Practice:**

As many myths, taboos and restrictions are imparted on menstruating women, they are deprived of basic services like water and food for well being. Nurses working in community areas have an opportunity to provide health education on menstruation and can involve in changing the myths that are harmful to the well being of women. Even women need to be well informed about menstrual facts, to pass correct information and practices to their daughters, thereby helping them to adjust to the menstrual requirements.

**Nursing Research:** More research is required on the menstrual issues of women. Similar research can be conducted with large sample. Research is also needed in areas of issues related to factors contributing to the deprivation of health facilities. Further studies are required on involvement of health care personnel, teachers, friends in providing health information to adolescent girls and method of improving transmission of information to the target groups.

### **Conflict of Interest:** None

**Informed Consent:** Permission was obtained from the Principal of school. The participants were informed about the purpose of the study and were explained about the confidentiality and withdrawal anytime in due course of the study.

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# Polymorphism in XRCC1, XRCC2, XRCC3 Genes and Risk of Gastrointestinal Cancer: A Case-Control Study from South-Western Maharashtra

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## Abstract

**Background:** Alarming increased incidence of gastrointestinal (GI) cancer in rural parts of Maharashtra intended us to elucidate association of polymorphism in DNA repair genes with GI cancer risk.

**Objective:** Hospital based case-control study designed to investigate association of polymorphisms in XRCC1, XRCC2, XRCC3 genes with risk of GI in Maharashtrian population.

**Method:** PCR-RFLP method was used to genotype polymorphisms in exon 6, 9 and 10 of XRCC1, exon 3 of XRCC2 and exon 7 of XRCC3 gene from 200 GI cancer patients and 300 controls.

**Results:** The genotypic frequency of variant allele His/His of cd280 of XRCC1 showed association with increased risk of GI cancer as compared to Arg/Arg genotype in rural population (OR = 14.04; 95% CI: 9.05-21.78,  $p < 0.0001$ ). The results of XRCC2 interpreted negative association (OR = 0.27; 95% CI: 0.10–0.73,  $p = 0.006$ ) and no association of XRCC3 (OR = 0.20; 95% CI: 0.08–0.53,  $p = 0.004$ ) with GI cancer.

**Conclusion:** The findings from this study revealed possible association of XRCC1 codon 280 polymorphism with increased risk of GI carcinogenesis in rural population of Maharashtra.

**Keywords:** Gastrointestinal cancer, PCR-RFLP, Genetic Polymorphism.

## Introduction

Gastrointestinal (GI) cancer is 4<sup>th</sup> most leading cancer and 2<sup>nd</sup> most common cause of cancer related deaths in India accounting 57,394 new cases in 2018 <sup>(1)</sup>. The etiology of GI Cancer is diverse and multifactorial where the presumed risk factors contributing to development and progression of GI cancer are related

to lifestyle factors including dietary habits, tobacco and alcohol consumption which have been considered to be associated with an increased risk<sup>(2,3)</sup>. Modulatory impact of environmental factors on genetic determinants may also be responsible for GI carcinogenesis<sup>(4)</sup>. However, exact means of GI cancer development has not been fully understood till date. It is evident from studies that the consequences of oxidative stress caused by multiple processes may damage cellular DNA which may contribute to promotion of carcinogenesis<sup>(5)</sup>. Multiple DNA repair pathways have been implicated in damaged DNA repair contributing to genetic stability<sup>(6)</sup>. XRCC1 is a major component of BER pathway important in repair of single strand breaks<sup>(7)</sup> where as XRCC2 and XRCC3 are DSB repair genes are key mediators in repair of double strand breaks<sup>(8)</sup>.

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The single nucleotide polymorphisms (SNPs) in DNA repair genes are presumed to modulate DNA repair capacity and associated with altered cancer risk. Till date, 300 SNPs in XRCC genes, amongst which XRCC1 (rs1799782, rs25489, rs25487), XRCC2 (rs3218536) and XRCC3 (rs1799796, rs861539) are extensively investigated to explore their impact on cancer susceptibility. Recent years, number of studies illustrated association of SNPs in XRCC1 gene with breast<sup>(9)</sup> cervix<sup>(10)</sup> and head and neck cancer risk<sup>(11)</sup>. Similarly, association of XRCC2 and XRCC3 polymorphism with lung<sup>(12)</sup> and breast cancer<sup>(13)</sup> have been studied. However, findings from earlier studies continued with contradiction which failed to prove the association of SNPs in XRCC genes with risk of multiple cancers<sup>(14,15)</sup>. Number of studies demonstrated the pronounced susceptibility of gastric cancer in association with SNPs of XRCC genes<sup>(16, 17)</sup>. Few Indian studies also investigated the association between XRCC1 (Arg194Trp, Arg399Gln) polymorphisms and GI cancer<sup>(18, 19)</sup> but with incongruity, where Nisar et al 2018<sup>(20)</sup> reported no association of XRCC1 Arg399Gln with GI cancer in Kashmiri population. Also, polymorphisms of either XRCC2 (Arg188His) or XRCC3 Thr241Met did not show any relationship with GI cancer risk in any of Indian Population<sup>(21)</sup>.

Similarly, other researchers failed to prove significant association of polymorphism in XRCC2 (Arg188His) and XRCC3 (Thr241Met) with GI cancer risk in other population<sup>(22,23)</sup>. However, until now, no association of DNA repair gene polymorphisms with GI cancer is reported in rural population of Maharashtra. Therefore, present case-control study was aimed to investigate possible association of XRCC1 (*rs1799782*, *rs25489*, *rs25487*), XRCC2 (*rs3218536*) and XRCC3 (*rs861539*) genes with GI cancer risk, either autonomously or in relations with other demographic variables in rural population of Maharashtra.

## Materials and Method

**Study Subjects:** This case-control study included 200 histologically confirmed GI cancer patients and 300 healthy age and gender matched controls. All cases ranged in age from 20-75 years were enrolled immediately after being diagnosed during the year 2018-2019 from Krishna Hospital & Medical Research Centre. The demographic information including age, sex, place of residence, dietary habits, family history, tobacco and alcohol consumption status and other confounding risk

factors were collected from personal interviews in the form of structured questionnaire. Informed consent was obtained from all participants.

### Genomic DNA isolation from whole blood:

Genomic DNA extraction was carried out from 2-5 milliliter of whole blood samples of cases and controls as described earlier<sup>(10)</sup>. The DNA was used for further genotyping by polymerase chain reaction (PCR) and Restriction fragment Length Polymorphism (RFLP).

### Genotyping Assays:

Single nucleotide polymorphisms in XRCC1, XRCC2 and XRCC3 genes were studied by PCR-RFLP method. Each PCR reaction were carried separately in 20 microliter volume with 100 nanogram (ng) of purified genomic DNA template, 1X PCR buffer, 0.2 mM each dNTP, 1U Taq DNA polymerase and 10 picomole (pmol) primers described earlier<sup>(9, 10)</sup>. PCR amplification of 485bp codon 194 and 257 bp codon 280 of XRCC1 were carried out at annealing temperature 61°C with 30 cycles of 95°C- 30 seconds (sec), 61°C- 30 sec, 72°C- 30 sec. The codon 399 of XRCC1 (871bp) amplified with PCR conditions including initial denaturation at 95°C for 10 min followed by 30 cycles of 95°C- 20 sec, 56°C- 30 sec, 72°C- 20 sec and final extension at 72°C- 10 min. The PCR conditions for 290 bp XRCC2 codon 188 and 455bp sized codon 241 of XRCC3 were annealed at 58°C and 53°C for 30 sec respectively following 30 cycles of 95°C- 30 sec, 58/53°C- 30 sec, 72°C- 30 sec, 72°C- 10 min). After confirmation of PCR, each PCR product of XRCC1 exon 6, exon 9, exon 10, XRCC2 exon 3 and XRCC3 exon 7 were digested overnight at 37°C with 1 unit of restriction enzymes PvuII, RsaI, NciI, HphI and NlaII respectively. The restriction digestion products were separated on a 2-3% low EEO agarose (GeNei, Merck Biosciences) gel at 100 V for 30 min, stained with ethidium bromide (10mg/ml) and photographed with gel documentation system.

**Statistical Analysis:** The risk of GI cancer in association with XRCC1, XRCC2 and XRCC3 polymorphisms was studied by logistic regression model by calculating the odds ratio (OR) with 95% confidence intervals (CI) after adjustment of variables to determine the cancer risk associated with genotypes.

## Results

The mean age  $\pm$  SD of selected cases were 58.50  $\pm$  13.46 and controls were 53.13  $\pm$  12.55 who resided in the rural areas of south-western Maharashtra. Tobacco



chewing habit was prevalent in cases (66.80 %) than in controls (22.30%). The age and gender distributions were not different in cases than controls (Male: 56.9% and 62.7%); Female: 43.10% and 37.30%). Both cases and controls were educated and exhibited high non-vegetarian diet 82.2 % in cases and 73% in controls.

**Association of XRCC1, XRCC2, XRCC3 genotypes with GI cancer:** The genotype frequencies of detected XRCC1, XRCC2 and XRCC3 polymorphisms are summarized in table-1. The allele frequencies for XRCC1 cd 194 (C, 80.7%; T, 0%) in GI cancer cases were not much different from those of controls (C, 80.7%; 7.3%). The allele frequency of cd 280 of XRCC1 in cases of GI cancer (G, 28.20%; A, 71.80%) and controls (G, 84.70%; A, 15.30%) which found significantly different from each other. The genotypic frequency of homozygous variants of cd280 showing strong association with development of GI cancer in rural population (OR = 14.04; 95% CI: 9.05-21.78,  $p < 0.0001$ ). The wild type allele frequency of cd 399 of XRCC1 in GI cancer cases (G, 39.10%) and controls (G, 77.30%) which did not show much variation when

compared to variant allele A, (10%) in cases and 13.3% in controls. The results of XRCC2 interpreted negative association of XRCC2 (OR = 0.27; 95% CI: 0.10–0.73,  $p = 0.006$ ) with GI cancer in studied population. Similarly, we did not find any significant association of studied polymorphisms of XRCC3 (OR = 0.20; 95% CI: 0.08–0.53,  $p = 0.004$ ) with GI cancer.

**Interaction of demographic factors with XRCC1, XRCC2, XRCC3 genotypes and their association with GI Cancer:** We also considered the probable interaction of XRCC1, XRCC2 and XRCC3 gene polymorphisms with demographic risk factors. The analysis revealed that the Arg280His genotype in the exon 9 of XRCC1 and Gln399Arg genotype in exon 10 of XRCC1 associated with GI cancer when considered for mixed diet (OR = 13.26; 95% CI: 7.96–22.09,  $p < 0.0001$  for Arg280His genotype & OR = 6.54; 95% CI: 4.11–10.39,  $p < 0.0001$  for Gln399Arg genotype). Similarly high tobacco consumption is considered as significant risk factor for GI cancer when considered His/His homozygote variant genotype (OR = 19.53; 95% CI: 8.52–44.78,  $p < 0.0001$  of XRCC1 cd 280 of exon 9).

**Table: 1. The genotype frequencies of XRCC1, XRCC2 and XRCC3 gene polymorphisms in untreated GI cancer patients and controls**

GENE	Genotype	CASES (n= 200) (%)	CONTROL (n = 300) (%)	Odds' Ratio (95% CI)	P value	Adjusted Odds Ratio (95% CI)	P value
XRCC1 cd194 ex-6	Arg/Arg	163(81.50)	242(80.67)	1		1	
	Arg/Trp	39(19.50)	36(12.00)	1.60(0.98-2.63)	0.05	1.23(0.59-2.56)	0.57
	Trp/Trp	0(0.00)	22(7.33)	0.03(0.001-0.54)	0.0002	0.00	0.00
	Arg/Trp+Trp/Trp	39(19.50)	58(19.33)	0.99(0.63-1.56)	0.99	1.08(0.59-1.98)	0.78
XRCC1 cd280 ex-9	Arg/Arg	57(28.50)	254(84.67)	1		1	
	Arg/His	0(0.00)	0(0.00)	0.00	0.00	0.00	0.00
	His/His	145(72.50)	46(15.33)	14.04(9.05-21.78)	<0.0001*	16.92(10.15-28.20)	<0.0001
	Arg/His+His/His	145(72.50)	46(15.33)	14.04(9.05-21.78)	<0.0001*	16.92(10.15-28.20)	<0.0001
XRCC1 cd399 ex-10	Arg/Arg	79(39.50)	232(77.33)	1		1	
	Arg/Gln	101(50.50)	28(9.33)	10.59(6.48-17.29)	<0.0001	10.74(5.64- 20.42)	<0.05
	Gln/Gln	22(11.00)	40(13.34)	1.61(0.90-2.88)	0.10	2.07(0.91- 4.70)	0.08
	Arg/Gln+ Gln/Gln	123(61.50)	68(22.67)	5.31(3.59-7.85)	<0.0001	6.89(4.13-11.48)	<0.05
XRCC2 cd188 ex-3	Arg/Arg	157(78.50)	244(81.34)	1		1	
	Arg/His	40(20.00)	28(9.33)	2.22(1.31-3.74)	0.002	1.51(0.71-3.24)	0.28
	His/His	5(2.50)	28(9.33)	0.27(0.10-0.73)	0.006	0.20(0.05-0.81)	0.024
	Arg/His+His/His	45(22.50)	56(18.66)	1.24(0.80-1.94)	0.32	1.01(0.56-1.81)	0.97
XRCC3 Cd241 Ex-7	Thr/Thr	125(62.50)	235(78.33)	1		1	
	Thr/Met	72(36.00)	20(6.67)	6.76(3.94-11.62)	<0.0001	5.07(2.39-10.78)	0.005
	Met/Met	5(2.50)	45(15.00)	0.20(0.080-0.53)	0.0004	0.16(0.04-0.52)	0.003
	Thr/Met+Met/Met	77(38.50)	65(21.67)	2.22(1.50-3.30)	<0.0001	1.53(0.91-2.58)	0.10

\*: Indicates significant Odds Ratio ( $p < 0.001$ ), p value determined based on  $\chi^2$

## Discussion

The emerging evidences implied that the SNPs of most common DNA repair genes are concerned with several infrequent cancers including GI cancer (24, 25). In present study, we discovered whether substitution in the XRCC1, XRCC2 and XRCC3 concerned with the advancement of GI cancer in rural population. Our results highlighted that epidemiological factors including diet, tobacco could promote GI cancer along with the polymorphisms of XRCC1 cd 280 of exon 9 and association of GI cancer was observed in this population. Results interestingly showed no association in genotypic frequencies of XRCC1 cd 194 and cd 399 of exon 6 and 10 polymorphisms between control and patient groups with GI cancer but cd 280 of exon 9 showed increased association with development of GI cancer. Thus our results seem to be in agreement with previous studies suggested that no association of XRCC1 cd 399 genotypes with GC cancer risk in Korean (26) Chinese (27) Brazilian population (28). Some researchers have summarized the association between SNPs in XRCC1 gene and clinical outcome of gastric cancer patients (29), however, results were not consistent. Some Indian studies proved association of XRCC 399 with gastric cancer development (30) but others failed to prove their association with GI cancer (20). Earlier studies demonstrated that XRCC1 gene polymorphism may modify risk of GI associated with low intake of fruits or vegetables. Secondly, food with high fat content associated with XRCC1 Arg/Arg genotype in relation with GI cancer risk. A study from Brazil revealed interaction between of XRCC1 399Gln with smoking, alcohol consumption in terms of gastric cancer (28). When considered XRCC2 Arg188His polymorphism in association with cancer development, some researchers found significant relationship of XRCC2 with GI cancer development but some are not in favor of proving susceptibility of other cancer with this polymorphism. Limited information on association of XRCC1, XRCC2 and XRCC3 polymorphisms with GI cancer susceptibility in rural Indian population challenged us to determine relationship of XRCC genes with risk of GI cancer. In answer to this, we depicted positive association of XRCC1 His 280 of exon 9 and negative association of either of XRCC2 (188His) and XRCC3 (241Met) with development of GI cancer in Maharashtrian population.

## Conclusion

Our study revealed that the *rs25489* polymorphisms of XRCC1 at cd 280 of exon 9 may associated with the GC risk in the rural population. Our results conferred negative association of XRCC2 and XRCC3 with development of GI cancer.

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**Conflicts of Interest:** None declared

**Ethical Clearance:** The study protocol was approved by Institutional Ethics Committee of KIMSDU.

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# Correlation of Anthropometric Parameters with Blood Pressure: An Anthropometric Study among Two Endogamous Groups of Haryana

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## Abstract

**Background:** The present study is undertaken to study the correlation of anthropometric measurements with blood pressure in females and to find out effectiveness of anthropometric indicators as predictors to different grades of high blood pressure.

**Materials and Method:** A cross sectional study was conducted in 300 females aged 25-40 years belonging to two endogamous groups (baniya & jats) of haryana. various anthropometric measurements including height, weight, WC and HC were measured and derived anthropometric indices were calculated. Blood pressure including systolic and distolic was measured and data was statically analysed to find the prevalence of hypertension, to compare the correlation coefficient and to find the regression analysis of different anthropometric variables with BP(SBP, DBP) among the study group.

**Results:** . : Mean and standard deviation of weight, DBP, WC, HC and WHtR was more in Baniyas . p value was highly significant for age, height, WHR and significant for WC and HC. Among the study groups, prevalence of hypertension was 46%. A positive correlation of BP (SBP, DBP) was observed among all basic and derived anthropometric indices in both endogamous groups of Haryana and it was found to be highly significant. BMI and WC was found to be a better predictor for SBP and DBP in Haryanvi Baniyas with highly significant p value. WHR & BMI had a strongest predictability for SBP & DBP in Jat group .

**Conclusion:** To conclude, anthropometric parameters are strongly correlated and are good predictors of blood pressure in study population. Hence the present study recommends the screening programs and public awareness to detect the anthropometric parameters which can lead to prevalence of hypertension.

**Keywords:** *Anthropometry, Obesity, Haryanvi, Blood Pressure, baniya, Jats, Females.*

## Introduction

Anthropometric measurements are a set of non-invasive, quantitative techniques of determining an individual's body fat composition by measuring, recording and analyzing specific dimensions of the

body. Despite the modern techniques, anthropometric measurements such as height (HT), weight (WT), body mass index (BMI) and waist-hip circumference ratio (WHR) etc. are traditionally important method to study the genetic structure and prediction of risk factors of many complex diseases in human health.<sup>1</sup>

Body mass index (BMI), as an indicator of obesity, has been found to be consistently associated with increased risk of hypertension and other chronic diseases.<sup>2</sup>

BMI does not account for variation in body fat distribution and abdominal fat mass, which can differ

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greatly across populations and can vary substantially within a narrow range of BMI<sup>3</sup>. Excess intra-abdominal fat is associated with greater risk of obesity-related morbidity than is overall adiposity and its association shows a significant gender difference.<sup>4</sup> Thus measurements of waist circumference and waist hip ratio (WHR) have been viewed as alternatives to BMI. Waist circumference has been shown to be the best simple measure of both intra-abdominal fat mass and total fat.<sup>5</sup>

WHO has opined that lower cut-off points than currently recommended should be used in some populations, especially in Asia, this is attributed to body fat distribution. Asian Indians tend to have more visceral adipose tissue despite having lean BMI.<sup>6</sup> Obesity and hypertension are on the rise in the world. Hypertension seems to be the most common obesity related health problem and visceral obesity seems to be the major culprit. Hypertension is an important public health problem in India. Various studies among Indians have shown a high prevalence of hypertension.<sup>7</sup>

Thus rapid urbanization, life style modification, demanding and stressful employment, sedentary life style and low rates of physical activity have increased the risk of obesity and hypertension in females. Therefore, it has become very important to screen the population at risk at an early age so as to apply preventive strategies. Hence the present study is undertaken to study the correlation of anthropometric measurements in females with blood pressure and to find out effectiveness of anthropometric indicators as predictors to different grades of high blood pressure.

## Material and Method

A cross sectional study in Department of Anatomy MMIMSR, Mullana - Ambala was conducted among 300 females (25-40 years of age) of known endogamous groups (baniyas & jats) of Haryana in the year (2012-2014). The subjects were taken from the urban and rural population of haryana. Persons with known hypertension, coronary artery disease, diabetes mellitus were excluded from the study. The study was approved by institutional ethical committee. The subjects were informed about the study, formal consent was taken, blood pressure was recorded and following anthropometric measurements were taken:

**1. Height:** Height in centimeters was measured (to the nearest 0.1 centimeter and then converted in meter by dividing the reading by 100) with a flexible

metallic measuring tape with the subject, standing barefooted in an erect position against an even wall or hard surface with the head positioned so that the top of the external auditory meatus in level with the inferior margin of the bony orbit.<sup>8</sup>

**2. Weight:** Weight in kilograms (to the nearest 0.5kg) was recorded with the subject standing motionless on the weighing scale, barefooted wearing minimum clothes and maintaining the privacy.

**3. Circumferences:** The waist and hip circumferences in centimeters were measured with a non-stretchable measuring tape. These circumferences were measured twice, to the nearest centimeter and the mean was used for subsequent analysis.

(i) Waist circumference (cms) was measured by using bone landmarks as references. The WHO guidelines recommend the measurement of waist circumference at the mid point between the lowest rib and the iliac crest (the highest point of the ilium)<sup>9</sup>

(ii) Hip circumference (cms) was measured at the level of the greater trochanters in centimeters. It should be taken around the widest portion of buttocks, with the tape parallel to the floor.

**Derived Anthropometric indices were calculated as follows:**

**1. Body Mass Index (BMI):** Weight (kgs)/height (m)<sup>2</sup>.

Asian Pacific classification for BMI was applied to classify the studied population into the following:

I. Underweight = <18.5 Kg/m<sup>2</sup>

II. Normal weight = 18.5 - 22.9 Kg/m<sup>2</sup>

III. Over weight = ≥ 23.0 Kg/m<sup>2</sup>

IV. At risk = 23.0-24.9 kg/m<sup>2</sup>

V. Obese I = 25.0-29.9 Kg/m<sup>2</sup>

VI. Obese II = > 30 Kg/m<sup>2</sup>

**Waist-Hip Ratio (WHR):** WHR = WC (cm)/ HC (cm)

Cut-off value used was 0.81<sup>6</sup>

**Waist-Height Ratio (WHtR):** WHtR = WC(cm)/ Height (cm)

The cut-off value used was 0.5<sup>10</sup>

**Blood Pressure:** As per JNC (Joint National Committee) guidelines<sup>11</sup>

Normal–Systolic and Diastolic < 120/80 mm Hg Prehypertension – Systolic 120-129; Diastolic 80-89mm of Hg Hypertension (stage -1) - Systolic 140-159;Diastolic 90-99 of mmHg (stage -2) - systolic > 160;diastolic>100 mm of Hg

For statistical analysis the data was imported in SPSS 20 software and was analysed for descriptive frequency of all variables. Pearson’s correlation coefficient were used to investigate the correlation between anthropometric indices and blood pressure among study groups. Regression analysis of different anthropometric variables with systolic and diastolic blood pressure was calculated in the study group.

**Results**

Mean and standard deviation of weight, DBP, WC, HC and WHtR was more in Baniyas . p value was highly significant for age, height, WHR and significant for WC and HC (Table-1). Overweight and obesity were seen in both groups. Derived anthropometric indices for example WC, WHtR and WHR were raised among both endogamous groups. Prevalence of hypertension was same in both endogamous groups (46%) (Table - 2).A positive correlation of BP (SBP, DBP) was observed among all basic and derived anthropometric indices in both endogamous groups of Haryana and it was found to be highly significant (Table – 3) . WHR & BMI had a strongest predictability for SBP & DBP in jat females. BMI & WC was found to be a better predictor for SBP & DBP in baniya females with highly significant p values. (Table-4,5).

**Table 1: Baseline data of study population**

Variables	Baniya (n=150)	Jat (n=150)	p value
Age	32±5.7	29±4.7	0.0001**HS
Height (m)	1.62±0.02	1.62±0.02	0.0001**HS
Weight	62.55±6.7	61.70±6.3	0.2586
SBP	125±7.1	125±6.6	1.0000
DBP	84±6.1	83±6.5	0.1705
WC	86.70±8.5	84.69±8.3	0.0391*
HC	93.38±8.4	90.92±8.31	0.0113**HS
BMI	23.4±2.69	23.14±2.37	0.3751
WHR	0.92±0.03	0.93±0.03	0.0042**HS
WHtR	0.53±0.05	0.52±0.05	0.0843

\*\* p value highly significant at 0.001 level. \* p value significant at 0.05

**Table 2: Prevalence of elevated anthropometric parameters among endogamous groups of Haryana**

Variables	Over Weight	Obese	WC (≥ 80 cm)	WHR (≥ 0.81 cm)	WHtR (≥ 0.5)	Hypertension
Baniya (N=150)	39(26.0%)	41 (27.3%)	125 (83.3%)	149 (99.3%)	107 (71.3%)	69(46%)
Jat (N=150)	40(26.6%)	33 (22.0%)	114 (76.0%)	149 (99.3%)	94 (62.7%)	69(46%)

**Table 3: Comparison of Correlation Coefficient for Blood Pressure With Anthropometric Variables Among Endogamous Groups of Haryana**

Variables	Systolic Blood Pressure		Diastolic Blood Pressur	
	JAT	BANIYA	JAT	BANIYA
Weight	0.523**	0.587**	0.299**	0.509**
BMI	0.526**	0.571**	0.297**	0.449**
WC	0.402**	0.366**	0.421**	0.536**
WHR	0.260**	0.294**	0.248**	0.299**
WHtR	0.406**	0.365**	0.421**	0.527**

\*\*p value highly significant at 0.0001, \*p value significant at 0.01

**Table 4: Regression Analysis of Different Anthropometric Variables With Systolic Blood Pressure In The Study Groups**

Group	Predictors	Regression Equation	R <sup>2</sup>	p value
Jat	WHR	$Y = 60.76 * X + 68.99$	0.068	< 0.001
Baniya	BMI	$Y = 1.500 * X + 90.29$	0.326	< 0.0001

\*p value highly significant at 0.001, Y= SBP, R= Regression equation, X= Predictors

**Table 5: Regression Analysis of Different Anthropometric Variables With diastolic Blood Pressure In The Study Groups**

Group	Predictors	Regression Equation	R <sup>2</sup>	p value
Jat	BMI	$Y = 0.8110 * X + 64.88$	0.088	< 0.0002
Baniya	WC	$Y = 0.2479 * X + 62.48$	0.119	< 0.0001

\*p value significant at 0.0001, Y= DBP, R= Regression equation and X= Predictors.

## Discussion

BMI indicates general obesity whereas derived anthropometric indices for example WC, WHR and WHtR indicates central obesity. In the present study, mean and standard deviation of weight, DBP, WC, HC and WHtR was more in Baniyas. p value was highly significant for age, height, WHR and significant for WC and HC (Table-1). Derived anthropometric indices for example WC, WHtR and WHR were raised among both endogamous groups (Table 2). A similar study done by Khanna et al in which the elevated WHtR was showing significant p value. Various studies had concluded that WHtR was strongly associated with cardiovascular risk factors. WHtR is an important index of central obesity, which is free from any bias due to hip width changes along with waist circumference of short and tall subjects.<sup>12</sup> Unlike BMI, WHtR takes into account the distribution of body fat in the abdominal region which has been shown to be more associated with cardiovascular risks than body weight. WHtR is a better predictor of CVD risk primarily among Asian population.

The prevalence of hypertension was 46% in both endogamous groups (Table -2). Study done by Sidhu et al<sup>13</sup> showed the prevalence of hypertension to be highest among Baniya females (26.4%) followed by Jat Sikh (20.80%). The comparative profile of the incidence of hypertension among two endogamous groups indicates that the frequency of this silent killer i.e hypertension was maximum in both endogamous females. The possible reasons may include their higher socio-economic status, sedentary life style, changes in dietary practices and hereditary factors.

In the present study, a positive correlation of BP (SBP, DBP) was observed among all basic and derived anthropometric indices in both endogamous groups of Haryana and it was found to be highly significant. BMI, WHR, WC were found to be a better predictor for blood pressure in the study population. Similar study done by Badaruddoza et al<sup>14</sup> concluded that BMI and WHR are important indicators to predict the risk of CVD. A study done on Bengali kayastha population depicted strong correlation of BMI, WC and WHtR with DBP<sup>15</sup>. However WHR has shown better prediction power for cardiovascular disease among women. Dalton et al<sup>16</sup> advocated that WC as well as WHR have strongest relation with the elevation of BP in females. Waist and Hip circumferences are most important variables in women for obesity and BP. Study done by Deshmukh et al<sup>17</sup> reported BMI and WC had strong correlation with hypertension. In a study done by Bishnoi et al<sup>18</sup> on Bishnoi, Sikh and Hindu females, WC was found to be a significant predictor of CVD. Physical inactivity demonstrated a strong association with the elevation of CVD risk as seen in the present study. Hypertension was seen among study population due to their high socio-economic status, elevated anthropometric parameters i.e WC, WHR and WHtR, sedentary lifestyle and dietary modifications in the form of high salt and fat intake.

Therefore, generalised approach for all females including weight loss for overweight, regular physical activity, dietary modifications to reduce fat and sodium intake; increase intake of vitamins and fibres from food sources should be promoted to reduce the risk of hypertension.

**Ethical Clearance:** Taken from Institutional ethical committee.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# A Cross Sectional Study on Drug Adherence among Type 2 Diabetes Mellitus Patients Attending a Tertiary Care Hospital in Chennai

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## Abstract

**Background:** Diabetes Mellitus (DM), pose a major public health problem. With the fact of increasing burden of DM and its complications, it is essential to take measures to control blood glucose levels among patients. Adherence to medicine plays a vital role in maintaining the blood glucose level, hence the study was planned to assess the drug adherence among type 2 DM patients attending a tertiary care hospital in Chennai and to assess the factors associated with non-adherence in these patients.

**Method:** Ninety three participants with Type 2 DM attending a tertiary care center were selected by systematic random sampling method. Type 1 DM and Gestational DM patients were excluded. A semi-structured interview with particulars about socio-demographic, clinical characteristics and adherence scores tool were used to collect the data. Data entry and analysis was done using SPSS version 20.

**Results:** Mean age of participants was  $54 \pm 8.5$  years. Sixty six percent of the participants were found to be adherent to their diabetic medications. Common reason for non-adherence was found to be forgetfulness 49.5%. Patients with DM for more than 5 years and patients not following regular physical activity were likely to be non adherent. Patients with family support were more adherent.

**Conclusion:** In spite of several public health measures, adherence level to medications was not satisfactory. The results emphasize the need to educate the patients about complications of DM and importance of adherence to medication. Further, programme should encourage family support by educating the family members during home visits by health workers.

**Keywords:** *Diabetes mellitus, Adherence, medication, factors, non- adherence.*

## Introduction

Diabetes Mellitus (DM), a common endocrine problem worldwide, which has serious economic and

medical consequences. The World Health Organization (WHO) estimated that the number of people living with diabetes and its prevalence are growing in all regions of the world. In 2014, 422 million adults<sup>1</sup> were estimated to have (8.5% of the population) diabetes, compared with 108 million (4.7%) in 1980. Across the South East Asian Region; approximately 72 million people were estimated to have diabetes in 2014, close to one fifth of all adults with diabetes in the world.<sup>2</sup>

Prevalence of diabetes in India among adults (20-79 years) was estimated to be 8.7% in 2015 as per International Diabetes Federation<sup>2</sup>. Though the burden

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is high, Diabetes can be treated and its complications can be better prevented by lifestyle modifications and appropriate medical management. Appropriate medical management includes- choosing the right medication, advising on the importance of adherence to medication, patient adherence to the medicine and regular follow up.

In 2003, the WHO identified medication non-adherence as the leading cause of preventable morbidity, mortality and health care cost. Complex drug regimens make the patients difficult to follow the treatment. One of the major reasons for developing complications of DM is lack of adherence to medications<sup>3</sup>.

Ensuring that patients take oral anti-diabetic medications as prescribed and achieve near normal blood sugar control is the most challenge encountered by the health care providers. Hence, adherence assessment to the treatment should be considered in patients who do not reach the desired therapeutic goal.

Therefore it is important to break the barriers for non adherence, so that morbidity and mortality related to diabetes complications can be reduced. With this in view, this study was planned to know the drug adherence among diabetic patients and the factors associated with non-adherence.

**Objectives:** To assess the drug adherence among type 2 Diabetes Mellitus patients attending a tertiary care hospital in Chennai and to assess the factors associated with non-adherence in these patients.

## Materials and Method

The study was carried out among Type 2 Diabetes Mellitus (DM) patients attending the Non Communicable Disease (NCD) clinic in Sri Ramachandra Medical College and Research Institute, a tertiary care hospital in Chennai, during the month of January 2018. The NCD clinic is attached with the General Medicine Department and a separate register is maintained for these patients. On a daily basis around 300 patients visit the NCD out-patient department. They are prescribed free medicines for one month, blood sugar and urine sugar examination done once in three months and appropriate health education given on a regular basis.

Based on review literature, the non-adherence levels among diabetics were expected to be around 60%<sup>3</sup>. The minimum sample size calculated for a desired absolute precision of 10% and an  $\alpha$  of 5% was arrived to be

93. Participants were selected by systematic random sampling method from the NCD register.

All the patients with type 2 DM on medical management for at least 6 months were included in the study. Patients with type 1 DM and Gestational DM were excluded from the study.

**Study Tool:** A semi-structured interview schedule was used to obtain information from the participants. The questionnaire comprised of socio-demographic and clinical characteristics of the participants and the Adherence scores tool developed by Belayneh Kefale Gelaw et al, Adama, Ethiopia, 2014<sup>4</sup>. The adherence tool comprises of six questions with each question scored from 1 to 4 (1: daily 2: frequently 3: rarely 4: never) with higher scores favoring adherence. A score of 24 or 23 (with one point missed from question 1) were considered as adherent others as non adherent as per the adherence tool.

**Statistical Analysis:** Data entry and analysis was done using statistical package for social sciences (SPSS) version 20 software. Following a descriptive analyses, odd's ratio was computed to find out the association between risk factors & non-adherence. A p-value of < 0.05 was considered to be statistically significant.

**Ethical Issues:** The study was approved by the Institutional Ethics Committee of Sri Ramachandra Medical College and Research Institute (deemed to be university). Written informed consent was obtained from each participant.

## Results

The mean age of participants was 54 years (SD  $\pm$ 8.5 years) with a higher proportion being females (68.8%). There was no non-response rate in this study. Literacy level was found to be 78.5%. According to modified Prasad classification 64.5% of the participants were of socio-economic class I or II.

It was observed a large proportion (62.4%) of participants was diagnosed to have Diabetes Mellitus for less than 5 years. Around 41% of the participants were known hypertensive and 80.6% of the participants had tested their blood sugar level at least once in 3 months. In this study 93.5% of the participants were taking oral hypoglycemic drugs for their blood sugar control (Table 1).

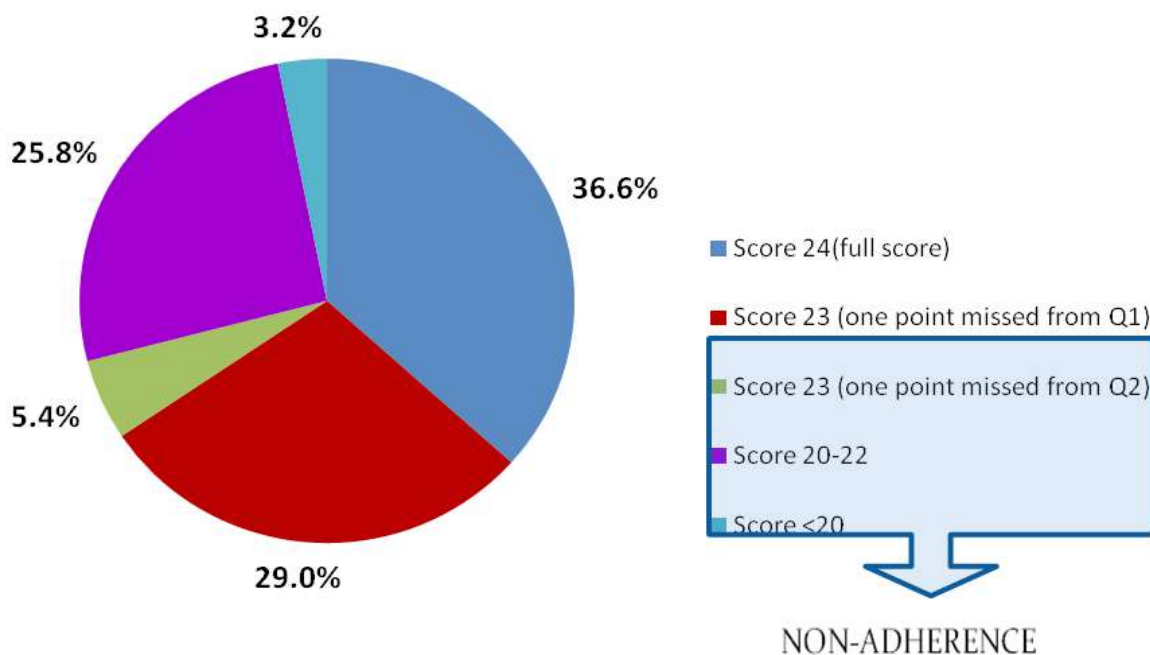
**Table 1: Clinical profile of the participants**

Characteristic	Frequency (n)	Percentage (%)
<b>Duration of Diabetes Mellitus</b>		
1-5 years	58	62.4
5-10 years	22	23.7
>10 years	13	14.0
<b>Current medication taken by the participant</b>		
OHA	87	93.5
Insulin	02	2.2
Both	04	4.3
<b>Actual medicines taken</b>		
Metformin	90	96.8
Glipizide	46	49.5
Glibenclamide	09	9.7
Insulin	06	6.5
<b>Frequency of blood sugar monitoring</b>		
Once a month	18	19.4
Once in 3 months	75	80.6
<b>Consultation</b>		
Allopathy alone	88	94.6
Allopathy & Ayurveda	03	3.2
Allopathy & Unani	02	2.2
<b>Other known chronic illness</b>		
None	45	48.4
Hypertension	38	40.9
Heart disease	03	3.2

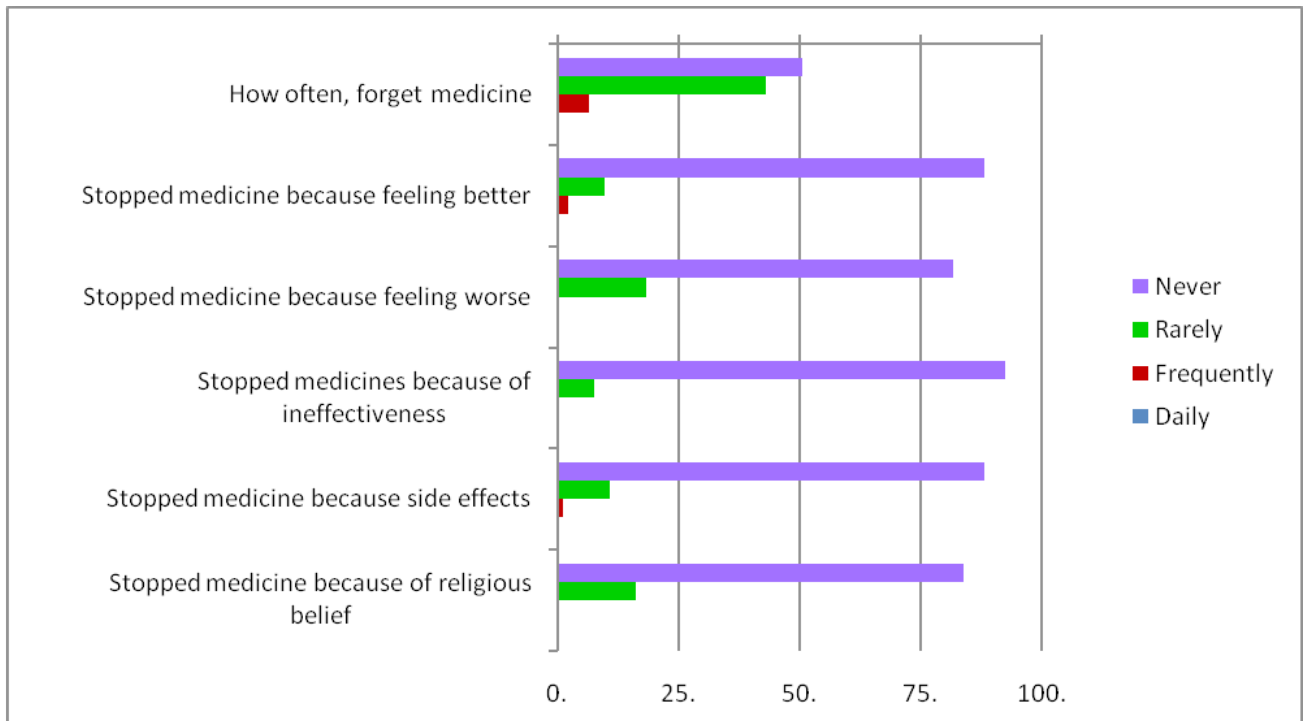
In this study 66% of the participants were found to be adherent to their medication (Figure 1). Most common reason for non-adherence in the present study was found to be forgetfulness 49.5% and 18.3% of the participants say that they stopped their medicines because they felt worse. Religious belief was also one of the factors found to be reason for non adherence (Figure 2).

Patients with DM for more than 5 years and patients not following regular physical activity were more likely to be non adherent and it was found to be statistically significant. Also, participants with more than 50 years of age, employed, travel time more than one hour, no family member support, lower educational status and participants who were not on proper diet were more likely to be non adherent to their medications. Participants who had an associated chronic illness were at lesser risk for non adherence, but it was found to be statistically not significant.

In our study it was found patients who experienced inability to purchase medicines due to cost reason were at greater risk for non adherence to medication. Participants who are on mono-therapy for Diabetes Mellitus were less adherent, compared to participants with poly drug therapy, but this was not found to be statistically significant. Participants who are not on regular physical activity were 3 times at higher risk of non adherence and it was found to be statistically significant (p value <0.01).



**Figure 1: Overall response to Adherence Scale**



**Figure 2 : Response to Medication Adherence Questionnaire**

**Discussion**

This study was done to find out the level of adherence and the risk factors associated with non-adherence. In this study, majority of the participants were in the age-group of 50-59 years, which is similar to studies by Ataur et al<sup>5</sup> and Bagonza et al<sup>6</sup>. The study group had more female participants, which was more likely due to the greater proportion of women attending the out-patient clinics. A simple tool was used to assess adherence in this study as it was easy to administer, less taxing on the participant and practically feasible compared to other. A review by Gonzalez et al<sup>7</sup> also supports the use of self-report in medications adherence.

The adherence level was found to be 66% in this study group. Similar results have been obtained in other parts of India<sup>8,9</sup>. A study done in Karnataka<sup>10</sup> in 2013 reported non-adherence of 54.6% and a study in Pondicherry<sup>11</sup> in 2010 demonstrated a non-adherence of 50.7%. A systematic review on the compliance to medication among diabetic patients showed that an average compliance to the oral hypoglycaemic agents ranged from 36% to 93%<sup>12</sup>. Studies done in Adama, Ethiopia<sup>4</sup> and UAE<sup>13</sup> report higher level of adherence of 72.2% and 84% respectively. This reveals

that adherence to medication is a challenge in many countries. The most common reason reported for non-adherence was forgetfulness. The same was observed in other studies<sup>4,13-15</sup>.

In this study the adherence level was better in those who were females, aged less than 50 years, literate, unemployed, family support and those belonging to the upper socio-economic class, but the differences were not statistically significant. A study in France also reported similar adherence levels among males and females<sup>16</sup>.

Participants diagnosed with Diabetes Mellitus within the last 5 years were more adherent to medications. Similar findings were reported by other studies<sup>4,8,13</sup>. The reason could be because of their concern of the disease and its complications. Participants who exercised regularly, followed diabetic diet and who had a co-existing chronic condition also were more adherent to medications, probably reflecting their concern on their own health. On the contrary a study done in 2012 by White et al demonstrated that those with a higher mean duration of Diabetes had more adherence. The effect of Diabetes related stress, perceived control and self efficacy on medication adherence is complex as described by Gonzalez et al<sup>17</sup>.

## Conclusion

This study was able to show adherence level to be 66% and the factors that undermine the outcomes of diabetes pharmacotherapy in diabetic patients. The main consequence of poor adherence to medications for glycemic control leads to the known complications of diabetes, including microvascular and macrovascular diseases and altered lipid metabolism.

So patients should be counseled on diabetic diet and regular physical activity as these can likely lead to good adherence. Adequate, information on diabetes and anti diabetic medications must be provided to all diabetic patients. The benefits of drug therapy and the factors related to non adherence must be stressed in health education session and measures like family support, daily reminder for medication must be made to reduce non adherence level.

Programme related modifiable factors like cost, availability of nearby health facility and ensuring availability of free drugs is important to strengthen the Non-Communicable disease programmes, based on the community needs.

Health programmes should be framed to deliver intensive education regarding the diabetes, its symptoms and various lifestyle modifications like change in dietary pattern, physical exercise, weight management, in order to control the sugar levels.

The role of health professionals is considerable in providing most effective health care. Patients should be encouraged to appropriately use anti diabetic drugs and regular awareness should be created regarding the benefits of using them, thereby preventing the non adherence.

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**Ethical Approval:** This study was registered with Institutional Human Ethical Committee.

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# p53 and c-erbB-2 Expression in Breast Cancer: An Indian Population Study

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Raghunath More<sup>1</sup>, Krishna Jee Pandey<sup>2</sup>, Puneet<sup>3</sup>, Ajay K. Khanna<sup>3</sup>

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## Abstract

**Introduction:** Indian breast cancer patients usually present in advanced stage as compared to the western population. So the aim was to study the p53 mutation and c-erbB-2 expression in Indian breast cancer population.

**Method:** 200 patients of breast cancer were studied for p53 and c-erbB-2 expression by Immunohistochemical method by using NCL-CB11 from Novacastra laboratories for c-erbB-2 over expression and NCL-p53, clone D)-7 from Novacastra laboratories for p53 mutation.

**Results:** p53 was mutated in 16% cases and all tumors with p53 mutation had positive lymph nodes. c-erbB-2 was over expressed in 40% (80) cases. Out of these 80 cases, 44 cases (55%) were having grade 2+ staining. In the 32 comedo type of tumor, 24 cases (75%) were positive for c-erbB-2 while in other types it was positive in only 33.4% cases. In 80 cases of c-erbB-2 positive tumors, 32 cases were p53 positive while in 120 cases of c-erbB-2 negative tumors only 7% cases were p53 positive while rest were negative. There was no correlation between c-erbB2 and p53 mutation.

**Conclusion:** p53 mutation present in 16% cases was seen in only lymph node positive cases while c-erbB-2 over expressed in 40% of Indian breast cancer patients.

**Keywords:** Cancer, carcinoma, marker, neoplasm, proliferation, tumor.

## Introduction

In India, breast cancer is the second common cancer in female after carcinoma cervix and the incidence of advanced breast cancer is much more than early breast cancer probably because of illiteracy, unawareness, myth and neglect of the society. Current management

of primary breast cancer involves the need for prognostication. Most extensively studied prognostic markers are lymph node metastasis, tumour size, grade, vascular invasion, AgNOR counts etc. AgNORs are loops of DNA that transcribe ribosomal RNA and it measures the proliferative activity of cells. In many study AgNOR has been reported as prognostic marker in carcinoma breast.<sup>1,2,3</sup>

In recent years, additional biological and molecular parameters have become increasingly important as adjuncts to the standard histological and clinical assessment. p53 tumor suppressor gene and c-erbB-2 oncogene are most extensively studied biological markers in breast tumorigenesis till date.<sup>4,5</sup>

p53 is well known tumour suppresser gene aptly known as molecular policeman or guardian of genome.

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Mutation of p53 gene is the most common genetic abnormality of human cancer. p53 protein is involved in several central cellular process that are critical for maintaining cellular homeostasis including gene transcription, DNA repair, cell cycling, senescence and apoptosis. Alteration in its function leads to more aggressive breast cancer and worse clinical outcome. Risk of cancer recurrence and death increase by 50% or more if p53 is mutated.<sup>5,6</sup> Immunocytochemical study of normal, benign and malignant breast tissue of different histological types revealed that p53 positive tumors are more aggressive and associated with poor prognosis.<sup>7</sup>

C-erbB-2 also known as HER2/neu is a member of type I epidermal growth factor receptor family of receptor tyrosine kinase. Members of this family have intrinsic tyrosine – kinase activity and are considered important mediator of cell growth, differentiation and survival. The protein product of HER/2 neu gene is 185 Kd surface membrane protein found in wide variety of tissues including epithelium of breast, ovary, endometrium, lung, kidney, GI tract and central nervous system.<sup>5</sup>

Paik et al (1990)<sup>8</sup> observed that c-erbB-2 over expression is second to node status in predicting the outcome in breast cancer patients. Winstanly et al (1991)<sup>9</sup> found that HER-2/neu over expression is independent predictor of overall survival. The objective of this study to find out the incidence of p53 mutation, c-erbB-2 over expression and their possible correlation with well established, clinico pathological markers like grade, tumour size, vascular invasion, lymph node status and AgNOR count in our Indian breast cancer patients.

## Material and Method

The study was conducted at University Hospital, Banaras Hindu University, India and included 200 patients of carcinoma breast. All patients underwent a detailed clinical history and thorough examination and necessary investigations were carried out for metastasis. Either Tru Cut needle biopsy specimen or specimen from operated samples were preserved for routine histology, AgNOR staining, c-erbB-2 staining and p53 staining.

Silver stained slides were examined using 1000 x magnification under oil immersion. AgNORs appeared as brown or black dots within yellowish background of nucleus. The number of dots was counted in 100 cells and the average was taken for each cell according to the method proposed by Giri et

al (1989).<sup>10</sup> **p53 Immunostaining was done by using primary antibody** (NCL-p53, clone DO-7) obtained from Novacastra laboratory using ABC technique and DAB and counter staining with haematoxylin while **c-erbB-2 Immunohistochemical Staining was done by using primary antibody** (NCL-CB 11) obtained from Novacastra laboratory using ABC technique and DAB and counterstaining with haematoxylin c-erbB-2 membrane staining was graded as grade 1+ to grade 3+.

**Grade 1+** = discontinuous membrane staining this low level staining pattern

**Grade 2+** = Continuous membrane staining involved 50% of the tumour

**Grade 3+** = Diffuse membrane staining involved 100% of tumour

**Statistical Analysis:** Statistical analysis was done using numeric and non-numeric variables. Parameter test like Pearson Chi Square Test, z test and student's 't' test, was applied. Results were referred as mean  $\pm$  SD and p value was considered significant at 5% level of significance.

## Results

Mean age for all patients was  $45.02 \pm 9.65$  yrs (range 30-70 years). Maximum numbers of patients were in stage III. Maximum patients had tumor size  $>5$  cm i.e. 132 cases (66%). Maximum number of cases had AgNOR count between 2-7/cell. Mean AgNOR/cell ranged from 2-20/cell with the mean of  $7.98 \pm 4.5$ .

c-erbB-2 expression (Table 2) was present in 80 cases (40%) and was absent in remaining 120 cases (60%). Out of these 80 cases, 44 cases (55%) were having grade 2+ staining. In the 32 comedo type of tumor, 24 cases(75%) were positive for c-erbB-2 while in other types it was positive in only 33.4% cases. p53 mutation was seen in 32 cases (16%) and was absent in remaining 168 cases (84%). 12% cases of p53 mutation showed strong staining and 4% cases showed equivocal staining .

p53 mutation showed statistically significant correlation ( $p < 0.001$ ) with lymph node metastasis. The tumour without lymph node involvement had not shown any p53 mutation while 32 cases of positive p53 mutation had lymph node metastasis. Mean tumour size  $6.25 \pm 0.886$  cm in p53 positive tumors and  $6.143 \pm 2.392$  cm in p53 negative tumor these value are also statistically not



significant. Out of total 32 cases of p53 positive tumors, 4 cases (50%) had vascular invasion on histology.

On correlation with lymph node to c-erbB-2 over expression, out of 80 tumors with c-erbB-2 positive, 52 (65.5%) cases had lymph node metastasis and 28 cases did not have lymph node metastasis (p<0.05).

Out of 80 c-erbB-2 positive cases 36 cases i.e. (45%) had vascular invasion. Mean tumour size was 6.214 ± 1.847 cm in c-erbB-2 positive cases and 6.139 ± 2.365 in c-erbB-2 negative cases.

Maximum number of c-erbB-2 positive tumor were in grade III i.e. 44 cases (64.7%) of cases of grade III tumor. 30% cases of grade II tumors had c-erbB-2 over expression. There is statistical significant correlation between grade of tumor and c-erbB-2 over expression (p<0.05).

In 80 cases of c-erbB-2 positive tumors (Table 2), 24 cases were p53 positive while in 120 cases of c-erbB-2 negative tumors only 7% cases were p53 positive while rests were negative. There was no correlation between c-erbB2 and p53 mutation. Mean AgNOR per cell in c-erbB-2 positive tumors was 10.02±4.05 and 7.08±4.40 in c-erbB-2 negative tumors which was statistically significant. Mean AgNOR per cell in p53 positive tumors were 8.75±4.27 and 7.83±4.58 in p53 negative tumors which was statistically not significant.

**Table 1: P53 mutation in 200 cases**

Present	32(16%)
Absent	168(84%)
<b>Grade</b>	
I	4(12.5%)
II	12(37.5%)
III	16(50%)
<b>Lymph Node Status</b>	
Present	32(100%)
Absent	0
<b>Tumor Size</b>	
T2	4 (12.5%)
T3	8 (25%)
T4	32 (62.5%)

**Table 2: c-erbB2 over expression in 200 cases**

Present	80(40%)
Absent	120(60%)
<b>Grade of Intensity</b>	
+	0

++	44(55%)
+++	36(45%)
<b>Type of Tumor</b>	
Comedo(32)	24(75%)
Other types(168)	56(33%)
<b>Grade</b>	
I	0
II	36(30%)
III	80(40%)
<b>Lymph Node status</b>	
Present	52(65%)
Absent	28(35%)
<b>Tumor Size</b>	
T2(44)	12(15%)
T3(76)	20(25%)
T4(80)	48(60%)

### Discussion

p 53 is a well known tumour suppressor gene known as guardian of genome. Elledge et al (1988)<sup>6</sup> observed that risk of cancer recurrence and death increased up to 50% or more if p53 mutated. Meenakshi et al (1999)<sup>7</sup> showed that p53 positive tumors are more aggressive and associated with poor prognosis. Meng et al (1999)<sup>11</sup> reported p53 mutation rate of 25-60% depending upon stage of disease and method of detection. Yokata T et al (1999)<sup>12</sup> showed that p53 mutation is associated with lymphatic invasion. Shrinivas P et al (2002)<sup>13</sup> found that p53 mutation is potential predictor of lymph node involvement. Khaliq T et al (2001)<sup>14</sup> has reported p53 mutation rate of 13.5% in Pakistani population. Iacopetta B et al (2000)<sup>15</sup> reported p53 mutation rate of 17% in case of invasive ductal carcinoma. Overgaard J et al (2000)<sup>16</sup> reported that p53 mutation is strong marker for prediction and disease free survival irrespective of nodal status and mutation is more frequent in ductal carcinoma, large size tumour, node positive and high grade tumour with detection rate of 23%.

In our study p53 mutation rate was found in 16% cases which are slightly more than p53 mutation reported by Khaliq T et al<sup>14</sup> from Pakistani population. All 32 cases of p53 positive tumor had lymph node metastasis while tumour without lymph node metastasis did not show any p53 mutation. Thus p53 mutation is significantly correlated with lymph node metastasis in our study similar to other studies.<sup>12,13</sup>

p53 mutation was present in 23.53% of grade III tumour, 10% cases of grade II tumor and 33.33% cases

of grade I tumor. This difference in positivity is due to number of cases as there are 12 cases in grade I tumor, 120 cases in grade II tumor and 68 cases in grade III tumour. Among 32 p53 positive cases 12.5% in grade I, 37.5% in grade II and 50% in grade III. Maximum number of cases is in grade III. There was no significant correlation between grade and p53 mutation.

Mean tumor size was  $6.25 \pm 0.88$  cm in p53 positive tumors and  $6.143 \pm 2.39$  cm in p53 negative tumors. There was no correlation found between p53 mutation and grade of tumour, tumour size and T-status similar to study by Shpitz B et al (2000).<sup>17</sup> Khaliq T et al (2001)<sup>14</sup> observed that there was no correlation between p53 positivity and tumor size, nodal status and histopathological diagnosis but in our study there was no correlation between tumour size, histopathology, but significant correlation between nodal status and p53 mutation. Mean AgNOR per cell in p53 positive tumors were  $8.75 \pm 4.27$  and  $7.83 \pm 4.58$  in p53 negative tumors which was statistically not significant.

Schmitt FC et al (1999) observed that c-erbB-2 was over expressed in 43.7% of but all cases of intraductal hyperplasia without atypia c-erbB-2 over expression was absent. c-erbB-2 oncoprotein overexpressed in 20-38 % of breast tumour.<sup>19,20,21,22</sup> Maximum positivity rate of c-erbB-2 has been reported in comedo carcinoma (~70%).<sup>20</sup> In our study c-erbB-2 over expressed in 40% cases of breast cancer almost similar to study by Imoto S et al (1999).<sup>22</sup> Out of 32 cases of comedocarcinoma, 24 cases (75%) are c-erbB-2 positive.

In our study 80 cases are c-erbB-2 positive. of these 65% patient had lymphatic invasion and 35% patient did not have lymphatic invasion. There is significant correlation between c-erbB-2 over expression and lymphatic invasion on histology. Studies by McGuire (1991),<sup>23</sup> Rilke et al (1991),<sup>24</sup> O'Reilly et al (1991),<sup>25</sup> Gusterson et al, (1992),<sup>26</sup> Erdem (2005)<sup>5</sup> have shown that c-erbB-2 over expression predicted outcome in node positive cases only and not in node negative cases. p 53 mutation has been linked to be associated with advanced breast cancer and resistance to chemotherapeutic agent adriamycin in a study by De Leo et al (2007).<sup>27</sup> Expression of growth factor and chemokine receptors is associated with inflammatory breast carcinoma and increased risk of recurrence and death in a study by Cabioglu A et al (2007).<sup>28</sup> In our study, 40% cases were c-erbB-2 positive and 16% cases were p53 positive. On correlating c-erbB-2 and p53, c-erbB-2 over expressed

in 80 cases (40%) out of them 24 cases (30%) was p53 positive whereas 56 cases (70%) were p53 negative. Whereas 60% of total cases were C-erbB-2 negative out of them 6.7% cases were p53 positive. There is no significant correlation found between p53 mutation and c-erbB-2 over expression.

**Ethical Clearance:** Taken from Institute Ethical Committee.

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# A Study of Internet Addiction and its Association with Big Five Personality Traits in Indian Adolescents

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## Abstract

**Background:** Internet use has become an indispensable part of our lives. Adolescents are the ones who are particularly vulnerable to internet addiction. Problematic Internet use (PIU) or internet addiction is that manner of using internet which can lead to psychological, social, educational, or vocational problems in one's life. In today's world as computer and Internet use has become a staple of everyday life, there runs a risk of overuse and dependence, which has lead to addiction and moreover, may lead to personality problems and other psychopathologies.

**Method:** A non- experimental study was conducted among adolescents between the age of 15-17 years having access to internet facility in daily routine(n=100). Big Five Personality Inventory was administered to assess the personality and Young's Internet Addiction Test (IAT: Young, 1998) was self-administered by the students after being briefed with the instructions. Subjects were classified into mild users, moderate users and addicts for comparison. It was hypothesized that a significant negative correlation will exists between Internet addiction and Big Five Personality Traits.

**Result:** Approximately 40% of the students were found to be addicted, 25% were moderate users and 35% were mild users. Users found addicted scored poorly on the Big Five Personality Traits as hypothesized indicating negative correlation.

**Conclusion:** The findings from this study identified varied levels of internet usage among adolescents which could serve as a crucial factor in understanding its effects on the personality. The findings further imply that there is a need for early interventions such as setting boundaries or professional help in addition to detecting early warning signs of underlying psychopathologies.

**Keywords:** *Internet addiction, adolescents, personality traits, Internet Addiction Test, Big five personality inventory*

## Introduction

In the four decades since its inception, internet and its easy and wide accessibility has driven dramatic

change. It has enabled flow of information, including entertainment, news, financial, and academic material. It has brought people closer together by enabling various forms of interpersonal communication, notably e-mail, instant messaging, video conferencing and social networking. In a very short period, it has become the staple of everyday life and it is difficult for most of us to imagine a world without instant and continuous access to the internet. Since the number of internet users is on an exponential rise, the issues surrounding its excessive use and abuse by people has become a hot topic of research from varied scientific fields

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including psychology, neuroscience and psychiatry. Internet addiction is characterized by excessive or poorly controlled preoccupation, urges, and/or behaviors regarding Internet use that lead to impairment or distress in several life domains.<sup>1</sup>

The term “internet addiction” was proposed by Dr. Ivan Goldberg in 1995 for pathological internet use.<sup>2</sup> However, the findings of Caplan indicated prominent role of social isolation in behavioural symptoms of pathological internet use. He therefore was of the opinion to replace the term pathological with problematic internet use.<sup>3</sup>

Internet Addiction is a problem akin to addiction of drugs, alcohol or gambling as some internet users were becoming addicted to the Internet in much the same way that others became addicted to drugs or alcohol and were even reported to have shown associated dysfunctions like increased aggression on withdrawal, increased irritation level, separation stress and anxiety etc.<sup>4</sup>

According to Young et.al. (2000) Internet addiction is a broad term covering a wide variety of behaviours and impulse control problems. The five subtypes of Internet addiction are as follows:

- Information overload.- Too much online surfing leads to decreased productivity at work and fewer interactions with family members.
- Compulsions.- Excessive time spent in online activities such as gaming, trading of stocks, gambling etc
- Cybersex addiction.- Too much surfing of porn sites often affects real-life relationships.
- Cyber-relationship addiction -. Excessive use of social networking sites to create relationships rather than spending time with family or friends may destroy real-life relationships.
- Cyber gaming addiction: obsession for online gaming.<sup>5</sup>

Griffith considered internet addiction as a subset of behavior addiction and any behavior that meets the 6 “core components” of addiction namely **salience** (*internet use becoming the most important activity that takes over thinking, feelings and behaviour of the user*) **mood modification** (*the positive subjective experiences as a consequence of engaging in Internet giving a feeling of high or a means of escape from the reality*) **tolerance**

(*the tendency to gradually increase the amount of time using internet in order to extend positive subjective experience*) **withdrawal symptoms** (*unpleasant feeling-states and/or physical effects which occur when Internet use is discontinued or suddenly reduced and might include impulsiveness, mood swings or irritability*) **conflict** (*interpersonal conflict, conflicts with other activities as academics, social life, other interests or intrapersonal conflicts*) **relapse** (*the tendency for or recurrence of prior behavioral patterns*).<sup>6</sup>

Given the present scenario the internet is actually burdening adolescent lives from gaming to sexual and emotional relationships. More and more people including adolescents are suffering from its consequences from having a negative impact on identity formation and negatively affecting the cognitive functioning causing neurological complications and social problems to poor academic performance and engaging in risky behaviour.<sup>7</sup>

In terms of prevalence the developing countries are not spared either due to extreme infiltration of technology even into the remotest corners.

There were about 42 million active internet users in urban India in 2008 as compared to 5 million in 2000.<sup>8</sup> In this exponentially growing population, youth and young adults occupy a significant number. It is estimated that in India, about 18 per 100 of the general population are active Internet users<sup>9</sup>. Surveys in the United States and Europe have also indicated alarming prevalence rates between 1.5 and 8.2%. Though it is much debated that internet has made lives of people easier but it has also inconspicuously added to the psychopathologies among its users.<sup>10</sup>

Although Internet addiction, specifically, has not been recognized as a disorder by the APA, it did recommend further research of overuse of the Internet and video games.<sup>11</sup>

## Method

A non- experimental study was conducted in a total of 100 school going adolescents of age between 15-17 years having regular access to internet . The school was selected purposively and for the sake of feasibility one section from each standard was selected randomly. Prior permission to conduct the study was sought from the concerned authorities of the school. Before initiation of the study the subjects were assured of the confidentiality. Subject consent was obtained as well as they were

informed about the purpose and nature of the study. The samples were selected using purposive sampling.

It was hypothesised that there will be a significant correlation between Internet addiction and Big Five Personality Traits

The tests administered were The Internet Addiction Test (IAT; Young, 1998) and The Big Five Inventory.

*The Internet Addiction Test* by Kimberly Young is a reliable and valid test<sup>12</sup> and is one of the most utilized diagnostic instruments for Internet addiction.<sup>1</sup>

It is a 20-item 5-point Likert scale that measures the self-reported compulsive use of the internet. Total internet addiction scores are calculated, with possible scores for the sum of 20 items ranging from 20 to 100 with a range from 20-49 (*normal*) indicating an average online user having full control over usage, 50-79 (*problematic*) indicating facing frequent problems due to excessive internet use and 80-100 (*significantly problematic*) suggesting no control at all over internet usage.<sup>1, 13</sup>

**English version of IAT is used in this study:** *The Big Five Inventory* is a 44-item inventory with a 5-point Likert scale that measures an individual on the Big Five Factors (dimensions) of personality i.e. **Openness** (traits like having wide interests, being imaginative, insightful, etc) **conscientiousness** (traits like organized, thorough, hardworking, responsible etc., **Agreeableness**, (traits like sympathetic, kind, affectionate, cooperative, cheerful, etc.) **Neuroticism and Extraversion**<sup>14</sup> to which the subject responds with degree of agreement or disagreement from 1 (*strongly disagree*) to 5 (*strongly agree*).<sup>15</sup>

Coefficient alphas and test-retest reliabilities suggests satisfactory reliability and validity.<sup>16</sup>

**Statistical Analysis:** *Pearson's correlation*

*coefficient* was used as a measure of the degree of linear dependence between the variables.<sup>17</sup>

Data was entered and analysed by SPSS program for Windows.

## Results

Mean age of the study subjects was 16.3 years. Of the 100 subjects approximately 66% were using internet on mobile phones and rest of them were using mobile and laptop or desktop interchangeably. The purpose of use comprised of entertainment, social networking, educational purpose and other uses. Majority of usage was for educational purpose comprising of 38%, social networking comprised of 27% and remaining 35% was for entertainment and general use.

When severity of internet usage using IAT was calculated it showed the following trend; 39% subjects fall under severe level users, moderate severity users comprised of 26% and 35% were among mild severity users.

Subjects who scored high on IAT scored low on Big Five Personality Trait Inventory. Pearson correlation test revealed that the personal trait of agreeableness, conscientiousness, extraversion and neuroticism have significant correlation with internet addiction level. Agreeableness, extraversion, openness and conscientiousness are negatively correlated with internet addiction level; however, neuroticism is positively associated with internet addiction level indicating poor management and control over emotions. The result of the study is shown in following Tables:

**Table 1: Internet addiction score**

Level (Score)	n	%
Mild level Users (20-49)	35	35
Moderate level Users (50-79)	26	26
Severe level Users (80-100)	39	39

**Table 2: Average scores on Big Five Personality Traits**

Traits	Mild Users (M.S) S.D	Moderate Users (M.S) S.D	Addicted Users (M.S) S.D
Extraversion	32.5 0.570	24.8 0.497	23.6 0.485
Agreeableness	33.8 0.581	25.6 0.505	23.2 0.481
Conscientiousness	33.9 0.582	25.8 0.507	24.3 0.492
Neuroticism	11 0.331	17 0.412	27.5 0.524
Openness	37.6 0.613	30.8 0.554	27.8 0.527

M.S- Mean score on each trait; S.D- Standard deviation

**Table 3: Pearson Product Moment Correlation**

Variables	Internet Addiction r p-value
Extraversion	-0.712 < 0.001
Agreeableness	-0.742 < 0.001
Conscientiousness	-0.668 < 0.001
Neuroticism	0.863 < 0.001
Openness	-0.451 < 0.001

r- Pearson Product Moment Correlation

## Discussion

A number of studies have been conducted across the world, especially among adolescents with respect to internet addiction.

In a study conducted by Syed Shah Alam et al. in 2013 showed impacts of excessive internet usages such as interpersonal problem, behavioural problem, physical problem, psychological problem, where an individual suffers from problematic personality as they are unable to control their emotions and the way of thinking and acting due to long hour use of the Internet. They tend to increase the net serving time and eliminate the set schedule indicating emotional instability and poor planning.<sup>18</sup>

Nalwa and Anand (2004) carried out a study in India among school children 16-18 years old. Dependents and non-dependents. Significant behavioural and socio occupational functional differences were revealed between the two groups. Dependents were found to have delays in the work at hand in order to spend time online. Loss of sleep due to compulsions of late night logins and feelings of boredom without internet reported by dependents were greater than those of non-dependents.<sup>19</sup>

Shapira et al. in 2003 found problematic internet use to be positively associated with subjective distress, functional impairment and Axis I psychiatric disorder.<sup>20</sup>

In the present study the severity of internet addiction and its relationship with personality traits was investigated. Individuals were able to meet a set of diagnostic criteria that show signs of impulse-control difficulty.

The findings of the study suggested nearly 40% subjects on a severe level of internet addiction while 35% and 26% came under the ambit of moderate and mild severity level respectively. The subjects who were found to be severely addicted to the internet scored poorly on

Big Five Personality Traits in comparison to the ones found on a moderate and mild level respectively.

Except for neuroticism which correlated positively with the internet addiction, rest of the traits correlate negatively with internet addiction.

Thus, the expected relationship between internet addiction and Big five personality traits was established.

Table 2 shows the average scores and standard deviation on each personality trait. The pattern of scores clearly indicates low scores on personality traits with increase in the severity level of internet addiction. Table 3 shows product moment correlation coefficient (r) of internet addiction vs Extraversion, agreeableness conscientiousness, neuroticism and openness to new experience. The r values of each trait viz - 0.712, -0.742, -0.668, 0.863 and -0.451 respectively at p-value of <0.001 indicates that the outcome value for each trait is significant.

Individuals scoring high on internet addiction have been found to have sceptical, impulsive and moody nature. Also such individuals tend to be disorganized and poor planners as per the studies done previously.

Neuroticism which correlated positively with internet addiction indicates a personality that is likely to experience negative emotions like depression anxiety, anger etc. readily, is emotionally unstable and moody. As reported by the subjects scoring high on internet addiction feelings of uneasiness and distress when not being able to use the internet. Some even reported anxiety and compulsiveness to use the social media so far so that disrupting their concentration on the task in hand, in their case, studies in addition to ruining the daily routine.

This study is just a preliminary step toward a deeper understanding of the relationship and implications of internet addiction on personality traits among adolescents.

## Conclusion

There is no way to stop science and technology development. The ever increasing need for high speed internet and its affordability has penetrated deep into our lives which has led to the emergence of internet addiction.

From the findings of previously conducted studies

as well as the current study it appears that Internet addiction can have a variety of detrimental outcomes for young people that may require professional intervention. In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the criteria for this condition are limited to “Internet Gaming Disorder” and do not include general use of the Internet, online gambling, or social media.<sup>21</sup>

There are certain limitations involved in this study which must be addressed. The sample size of 100 subjects is very small therefore, generalizability of the sample must be addressed with caution. Also present are some bias in terms of methodology by utilizing convenient purposive sampling technique.

This study is just a preliminary step and further research is required.

Albeit, on a smaller platform this study would definitely help to further strengthen the need for stringent discretion on the use of internet. Not only it would help to focus on this potential pathological condition but also on the need for preventive and interventional strategies to tackle this condition.

**Conflict of Interest:** Nil

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**Ethical Clearance:** Consent to administer the questionnaire taken from the Principle of the participating school.

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# Content Validation of Early Intervention Protocol for Preterm Infants in Indian Population

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## Abstract

**Background:** Preterm birth is defined as babies born alive at less than 37 weeks of gestation. Due to the lack of the in-vitro environment and their exposure to harmful environment of the NICU leads to the preterm infants having a long term disability. The awareness of environmental factors on development gave rise to the idea formation of various early intervention programs. The guidelines for early intervention progression should be tailored respecting the growing needs of preterm infants. Hence, the current literature states a need for a protocol with proper dosage in improving the motor outcomes.

**Objective:** The current study aimed to validate the content of early intervention protocol in Indian population.

**Materials and Method:** The process of content validation of early intervention protocol involved development stage and expert judgment stage. The early intervention protocol was designed into three stages with extensive review of literature. After designing the protocol, nine experts in field of paediatric & neurological physiotherapy performed the judgemental process. The process of validation includes rating of selected experts in a 5 point likert grading on two parameters namely relevance and ease of performance. Based on expert's inputs on early intervention protocol, the level of agreement, content validation index and kappa value was calculated.

**Results:** The three staged early intervention protocol almost exhibited an excellent agreement on all stages.

**Conclusion:** The structured early intervention protocol exhibited excellent content validity to its use in Indian population.

**Keywords:** Multimodal sensory stimulation, preterm infants, hammer smith neurological assessment scale, KMC.

## Introduction

WHO defined preterm birth as babies born alive at

less than 37 completed weeks of gestation. The highest incidence of preterm births (13.4%) occurs in southern and south-east Asia and India ranks first in yearly prevalence of preterm birth among the South Asian countries.<sup>1</sup>

During normal embryological development, developing brain is highly neuroplastic. The fetal development in the intra uterine environment provides an optimal surrounding for the formation and maturation of the neural synapses.<sup>2</sup>

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Myelination of the central nervous system begins from 14 weeks of gestation and reaches a peak at 25-37 weeks.<sup>3</sup>

Gyrification process occurs from 10-28 weeks of gestation. The fetal brain develops from the lissencephalic structure to that of an adult brain with sulcus and gyri. Surface area of the cortical grey matter increases with more neurons in the cortex, which increases the ability of the cortex to process information.<sup>4,5</sup>

This process of normal development is altered in preterm infants, further worsened by the early exposure of the preterm to the harmful NICU environment.<sup>6</sup>

These studies suggest that the infants born as very and late preterm will have extended developmental, behavioural problems which needs early intervention to address these morbidities. 'Early intervention' means educational strategies and neuroprotection strategies aimed at enhancing brain development by promoting neural plasticity and neuro-protection at improving the environmental and neurological experiences of the preterm infant during the critical period of development.<sup>7,8</sup>

The CNS receives inputs from all the sensory pathways such as touch, vision, sound, and movement to explore the possibilities of neural connection and forms new synapses, which can be further trained to produce proper developmental outcomes.<sup>9</sup>

Despite the fact that intervention strategies are large in number, all have shown to improve cognitive function but neuromotor outcomes are not well established.<sup>10</sup>

Hence, the current literature states a need for early intervention protocol and ultimately result in improved functional outcomes. The designed early intervention protocol requires a validation process for its relevance and ease of performance.

Validity means to a test/protocol measuring what it intends to measure.<sup>11</sup> The content validity is similar to face validity using subjective judgement. Hence, an expert opinion is sorted to test the protocol for its intensions and practicality. The present study aimed to validate the content of early intervention protocol in Indian population.

## Materials and Method

The process of content validation involved development stage and expert judgment stage. The protocol was designed into three stages with extensive literature.<sup>12-15</sup> The staging of protocol is mannered in a progressive way, meeting the developmental needs of preterm infant. The early intervention protocol follows a set pattern of exercises including kangaroo mother care, tactile stimulation non weight bearing position followed by weight bearing exercises then with functional exercises. Totally ten experts were selected for the validation process but only nine experts in field of paediatric & neuro physiotherapy gave consent to participate in the study. This validation study was approved by the Institutional Ethics Committee of Sri Ramachandra University, Chennai, Tamilnadu, India.

**Procedure of Validation:** The primary investigator requested 10 independent experts with minimum 10 years of experience in paediatric & neuro physiotherapy to participate in the study. As per recommendations by Lynn MR<sup>16,17</sup>, a minimum of five and a maximum of 10 experts are required for the validation process. Out of 10, nine experts agreed to participate and were diversely placed in Southern parts of India. All experts were practicing paediatric & neuro physiotherapy including three professors, two associate professors and four senior physiotherapists. The process of validation included rating of experts selected in a 5 point likert grading on two parameters namely relevance and ease of performance. The scale was scored as 1=strongly disagree, 2=mildly disagree, 3=neutral, 4=agree, 5=strongly agree. The score 4 and 5 were acceptable for calculation, if scored less than 3, experts were requested for suggestions. The key exercise components were listed in three stage manner with likert scale being measured for its relevance and ease of performance. The prepared content was sent through electronic media and basic instructions were given. Based on expert's inputs on early intervention protocol, the level of agreement, content validation index and kappa value was calculated.

## Results and Discussion

Based on the reports of nine experts, the Content Validity Index (CVI) is tabulated in [Tab-1]. The protocol has eight components namely general, tactile, kinesthetic/proprioceptive, vestibular, visual, auditory stimulations with handling & parent education.

**Table 1: Content Validity Index (CVI) and kappa (K\*) of early intervention protocol**

Contents of early intervention protocol	Relevance		Ease of Performance	
	CVI	Kappa	CVI	Kappa
<b>General</b>				
Kangaroo mother care	100	1.00	100	1.00
<b>Tactile stimulation</b>				
Swaddling	89	0.89	89	0.89
Infant massage therapy	100	1.00	89	0.89
Gentle Human Touch	100	1.00	100	1.00
<b>Kinesthetic/Proprioceptive stimulation</b>				
Range of motion exercises	100	1.00	100	1.00
Gentle longitudinal compression of extremities	100	1.00	78	0.76
Infant positioning	100	1.00	100	1.00
Facilitation of head control	100	1.00	100	1.00
Assisted rolling using upper and lower extremities	100	1.00	100	1.00
Assisted kicking/reciprocal movements of legs	100	1.00	100	1.00
Facilitating hand to midline and mouth and legs hands together activities	89	0.89	78	0.76
Encouraging the development of head righting	100	1.00	100	1.00
Reaching in prone/supine	100	1.00	100	1.00
Encouraging creeping/crawling patterns	100	1.00	100	1.00
<b>Vestibular Stimulation</b>				
Cradled rocking	100	1.00	89	0.89
Visual stimulation	100	1.00	100	1.00
Promotion of eye following, to strengthen the eye and neck muscles, to promote head movement	100	1.00	100	1.00
Using Black and white objects	100	1.00	78	0.76
<b>Auditory stimulation</b>				
Maternal voice	89	0.89	100	1.00
Handling & Parent education	89	0.89	100	1.00

The content validation index was calculated by dividing number of experts who scored 4 or 5 by total number of experts participated in the validation process of early intervention protocol. The cut off level for acceptance if >0.78 as in accordance to a study [18], thus seven out of nine agree for an exercise. This further explains that if level of agreement is greater than 78%, the exercise is considered with good agreement among experts and to be included in protocol. A modified kappa was calculated to confirm the relevance of early intervention protocol. The interpretation of kappa values were taken as: fair= 0.40 to 0.60, good= 0.60 to 0.74 and excellent= 0.75 to 1.00.

The 19 item early intervention protocol was examined by all experts with good agreement among them. In tactile stimulation, swaddling & infant massage therapy,

Kappa values were moderate in ease of performance.<sup>12</sup> In vestibular stimulation, cradled rocking score showed minimal difficulty in ease of performance.<sup>13-15</sup> The main finding of the present study is that almost all components exhibited excellent agreement. Thus the early intervention protocol was well appreciated by majority of experts and was considered to be the most integral part of early intervention to preterm infants.

**Limitation:** Experts were recruited only from the Southern parts of India for the validation process.

**Conclusion**

The early intervention protocol exhibited excellent content validity to its use in Indian population. The protocol is safe and can be administered to infants.

**Ethical Clearance:** Taken from Institutional ethical committee, Sri Ramachandra Institute of Higher Education & Research, Porur, Chennai.

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**Conflict of Interest:** Nil

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# Effect of Core Stability and Functional Mobility Exercises on Muscle Strength after Lumbar Spinal Cord Injury

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## Abstract

**Background:** Many studies suggest that when people are confined to wheelchair, central neuropathies such as spinal cord injury usually reduce strength of core muscles and corresponding functional abilities for standing and reaching. Studies that have aimed to compare different strategies to improve functional capacity or stability have produced controversial results. Furthermore such studies have focused solely on individual component. In contrast, the present study describes the effect of core stability as well as functional mobility exercises on muscle strength after lumbar spinal cord injury.

**Aim:** To analyze the effect of core stability and functional mobility exercises on muscle strength after lumbar spinal cord injury.

**Methodology:** 25 patients with lumbar spinal cord injury were recruited on a volunteer basis. Ethics approval was obtained from Institutional ethical committee, KIMSUDU. The purpose and procedure of the study was explained to each participant before giving their consent to participate in the study. Neurological levels and impairment scales were determined according to the American Spinal Injury Association (ASIA) standards. Descriptive statistics such as percentages, mean, and standard deviation were used for data analysis.

**Result:** The p-value for each component is <0.0001 and is extremely significant. For each variable of the study (muscle groups) the post assessment values were more than pre assessment values. The intervention used in this study produced significant improvement in core strength and lower extremity strength of participants after lumbar spinal cord injury.

**Conclusion:** Core stability and functional mobility exercises improve muscle strength in lumbar spinal cord injury patients.

**Keywords:** Lumbar spinal cord injury, core stability, functional mobility, physiotherapy.

## Introduction

The spine is an inherently unstable structure as the osteoligamentous lumbar spine buckles under small compressive loading.<sup>1</sup> Paralysis of the muscles below

the level of the injury can lead to limited and altered mobility, self care, and ability to participate in valued social activities.<sup>2</sup> Disabilities related to spinal cord injury vary according to the degree of damage, and the damaged spinal segments or nerve fibers.<sup>3</sup> Mechanism of the injury that can cause damage to the vertebrae with a resultant damage to the cord is usually a hyper flexion with rotation movement. Extension with rotation is less likely to cause damage to the cord.<sup>4</sup> Injury to the lumbar spine usually results in paraplegia or paraparesis.<sup>5,6</sup> Spinal cord injuries are typically divided into 2 categories: complete injuries and incomplete injuries. The international standards for neurological

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classification of spinal cord injury (ISNCSCI) defines a complete injury as having no sensory or motor function in the lowest sacral segments (S<sub>4</sub> and S<sub>5</sub>). An incomplete injury is classified as having no motor and/or sensory function below neurological level including sensory and/or motor function at S<sub>4</sub> and S<sub>5</sub>.<sup>7</sup>

Immediately following an acute injury to the spinal cord there is a stage of spinal shock. After the stage of spinal shock has passed the various neurological deficits starts manifesting which commonly consists of the following: motor and sensory deficits, spasticity usually increases during first six months after spinal injury and reaches a plateau by the end of first year.<sup>8</sup>

A critical role of spine musculature is to stiffen the spine in all potential modes of instability. Active control of spinal stability is achieved through the regulation of force in surrounding muscles. Trunk extensors, flexors, and lateral flexors provide spinal stability during every dynamic movement. So, there is an important need to have balanced muscular control.<sup>9</sup> Proper timing and coordinated efforts of these muscles are important for spinal stability.<sup>10</sup>

Core stability describes the ability to control the position and movement of the central portion of the body to allow optimum production, transfer and control of force and motion to the terminal segments in the integrated activities.<sup>11</sup> Functional capacity has been studied as one important aspect of activity of daily living. Different functional training method have been assessed for their effectiveness in improving functional capacity;<sup>12,13</sup> however, no definitive conclusions have been reached with regard to the type of functional training that is most effective.<sup>13</sup> Some studies have found that strength training can increase functional capacity,<sup>14,15</sup> even with only modest gains<sup>16</sup> or gains in a few measures.<sup>17</sup> Nevertheless, most studies that have been conducted focuses only on singular elements i.e. few studies that have been conducted focuses only on core stability while other studies focuses only on functional mobility for improving functional capacity in patients with spinal cord injury. Studying the effectiveness of combination of two elements i.e. core stability and functional mobility exercises in lumbar spinal cord injury patients could provide different interpretation about the utility

of core stability and functional mobility exercises to improve strength and functional capacity.<sup>18</sup> Therefore, the purpose of this study is to evaluate the effectiveness of core stability and functional mobility exercises on muscle strength in lumbar spinal cord injury patients.

## Material and Methodology

This study aimed to evaluate the effect of core stability and functional mobility exercises on muscle strength after lumbar spinal cord injury. This was an experimental study. The study was conducted in Krishna institute of medical sciences 'Deemed to be' University, Karad. 25 patients with lumbar spinal cord injury were recruited on a volunteer basis. Sample size was calculated with the help of formula  $N=4SD^2/(x \times \epsilon)^2$ . Ethics approval was obtained from Institutional ethical committee. The participants were recruited according to the inclusion and exclusion criteria. The criterion for inclusion in the study was 1. Patients with history of American spinal Injury impairment scale (AIS) grade C and D SCI. 2. Both male and female participants. The exclusion criterion from the study was neurological illness other than lumbar spinal cord lesion. A written consent was taken from each participant to voluntarily participate in the study. Each participant was explained about the purpose and procedures of the study. Once the informed consent was taken, detailed information was gathered, assessments were done with appropriate outcome measure and pre test was done. Depending on pre assessment evaluated strength, a six week core muscle strengthening exercise protocol was given and follow-up for progression was done after 2, 4 and 6 weeks. Later again post test was done and descriptive statistics such as percentages, mean, standard deviations and paired t test were used for data analysis and were recorded in order to derive the conclusion. All statistical analyses were performed with instat software.

## Statistical Analysis and Result

Descriptive statistics were performed for all variables (i.e., muscle strengths). Pre and post assessments of the selected participants were done. Arithmetic mean, standard deviations, paired t -test and p-value were calculated for each outcome measure.

**Table No. 1: Strength of muscle post intervention**

Sr.No.	Muscle Groups	Mean		SD		Paired t-value	p-value	Interference
		Pre	Post	Pre	Post			
1.	Hip flexors	2.280	4.440	0.8907	1.261	8.035	<0.0001	Extremely significant
2.	Hip extensors	2.480	3.920	1.112	1.288	4.793	<0.0001	
3.	Hip abductors	2.400	3.640	1.000	1.075	4.656	<0.0001	
4.	Hip adductors	2.480	3.920	0.8718	1.152	5.192	<0.0001	
5.	Knee flexors	3.200	4.560	0.8699	0.9129	5.283	<0.0001	
6.	Knee extensors	3.080	4.840	0.7024	0.9434	9.508	<0.0001	
7.	Ankle dorsiflexors	2.120	3.480	0.8327	0.9626	6.834	<0.0001	
8.	Ankle plantar flexors	2.680	3.800	0.4761	0.7071	7.716	<0.0001	
9.	Great toe extensors	2.160	3.520	0.8505	1.085	5.911	<0.0001	
10.	Trunk flexors	1.680	3.200	0.6272	0.7638	14.905	<0.0001	
11.	Trunk extensors	1.560	3.200	0.5066	0.7638	14.421	<0.0001	
12.	Side flexors	1.880	3.560	0.5831	0.6000	15.087	<0.0001	
13.	Trunk rotators	1.640	3.160	0.5686	0.6245	14.905	<0.0001	

The post assessment values of each study variable (muscle groups) are more than the pre assessment values. The mean difference of pre assessment values is -1.508. The mean difference of post assessment values is -0.172

**Table No. 2: Strength of lower extremity muscles and core muscles of body in male subjects.**

Males	Mean	SD	Paired t-value	p-value	Interference
Pre	2.098	0.2762	15.489	<0.0001	Extremely significant
Post	3.331	0.4612			

The post assessment values of mean and SD of overall core and lower extremity strength of male participants are more than the pre assessment values. The mean difference is -1.234.

**Table No. 3: strength of lower extremity muscles and core muscles of body in female subjects.**

Females	Mean	SD	Paired t-value	p-value	Interference
Pre	1.852	0.2969	6.891	<0.0001	Extremely significant
Post	3.409	0.6149			

The post assessment values of mean and SD of overall core and lower extremity strength of female participants are more than the pre assessment values. The mean difference is -1.558.

**Discussion**

This study aimed to analyze the effect of core stability and functional mobility exercises on muscle

strength after lumbar spinal cord injury. Core stability is the ability of lumbopelvic hip complex to prevent buckling and to return to equilibrium after perturbation.<sup>19</sup> Functional mobility is the manner in which people are able to move around in the environment in order to participate in the activities of daily living.<sup>20</sup> Weakness is the most obvious impairment that inhibits people with SCI from performing motor tasks.<sup>21</sup>



In this study 25 patients were recruited according to the inclusion and exclusion criteria, in which 13 were male participants and 12 were female participants. Manual muscle test was performed on each subject for thirteen muscle groups (hip flexors, hip extensors, hip abductors, hip adductors, knee flexors, knee extensors, ankle dorsiflexors, ankle plantar flexors, great toe extensor, trunk flexors, trunk extensors, side flexors and trunk rotators) in standardized position.<sup>22</sup> Muscle strength was graded on a scale from zero to five using six weeks of interval.<sup>23</sup> We evaluated the pre test and post test assessment values for manual muscle testing in the selected participants.

Depending on the pre assessment values a six week core stability and functional mobility exercise protocol was given and follow up for progression was done after 2, 4, 6 weeks interval. In the initial phase of treatment galvanic current was given to trunk and lower extremity muscles with the frequency as tolerated and passive range of motion exercises to trunk and lower extremity muscles which initiated flicker of contractions.<sup>24</sup> Denervated muscles are incapable of contraction except by direct stimulation of the muscle fibers by suitable electrical means.<sup>25</sup> Once the initiation of contractions was achieved electrical stimulation with the help of faradic current to motor nerves of spine and lower extremity was used. Innervated muscles contract in response to a demand for activity provided the demand is sufficient.<sup>24</sup> Once the patient was able to do active contractions, active assisted range of motion exercises were initiated. Once the power of contraction has been regained, the muscles were strengthened progressively until maximum function was obtained.<sup>25</sup> Strengthening of trunk and lower extremity muscles was done with isometric strengthening program. A person requires a progressive resistance training program in which the load is appropriately and progressively increased. Such training is often best performed within the context of a functional skill, provided the principles of progressive resistance training can be maintained.<sup>26</sup> Varieties of method which were used for providing resistance are pulleys, free weights, weight cuffs and theraband.<sup>25</sup> Resistance training increases muscle strength by making muscles work against a weight or force.<sup>27</sup> Bed mobility exercises were used to improve functional mobility of the participants.<sup>25</sup> After all this procedure the post test assessment values were evaluated.

Richardson et al. proposed that lumbar stabilization exercise increased the stability of the spine and posture

while performing functional postures and movements.<sup>28</sup> Panjabi reported that lumbar stabilization exercise, a muscle strengthening exercise for the deep muscle group, plays an important role in providing dynamic stabilization in the segments stability, and useful for decrease in spinal functional disorder.<sup>29</sup> Specific transverse abdominal muscle strengthening along with the conventional treatment shows speedy recovery than the only conventional therapy when given at the acute and sub-acute stages of traumatic spinal cord injury.<sup>30</sup> The present study also found improvements in lower extremity muscle strength as well as functional capacity after performing core stability and functional mobility exercises. The post test results derived that the stabilization exercises used in this study produced significant improvement in muscle strength in the lumbar area thereby improving functional capacity and muscle strength in the lower extremity.

## Conclusion

Core stability and functional mobility exercises improve muscle strength in lumbar spinal cord injury patients.

**Ethical Clearance:** Obtained from Institutional Ethical Committee, KIMSUDU, Karad..

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**Conflict of Interest:** Nil.

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# Medicalization of Judicial Mode of Execution: A Critical Study in American Context

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## Abstract

Modes of judicial execution of death sentence have to be determined in light of various objective factors like prevailing atmosphere of the international opinion, international norms and standards, contemporary penological theories and ever progressing standards of human decency. Though it's essential to adapt the most civilized method of judicial execution, nevertheless, what is more important is how that civilized process of execution is carried out. History is witness to the fact that how medical professionals have made invaluable contributions to make the existing modes of execution more civilized, humane and efficient by playing the most pivotal role. Medicalization of the process of judicial execution through intravenous lethal injection is not novel. However, currently direct participation of physicians in the implementation of the death penalty through intravenous lethal injection has become an extremely controversial subject, initiating voluminous intellectual debate at global platforms. Hence, an appropriate contouring of such participation is increasingly coming under sharp scrutiny on ethical and legal grounds. The question arises, will the physicians not be guilty of gross professional misconduct by refusing to oversee the executions and taking care of the condemned persons in their last crucial hours, thereby neglecting their ethical responsibility to minimize the suffering and maximize the comfort. Physicians need to fulfill their role as caregivers by actively participating in the implementation and development of lethal injection as the most humane mode of judicial execution.

**Keywords:** Judicial execution, evolved standards, medicalization, physician, intravenous lethal injection.

## Introduction

*"The final cause of law is the welfare of society"*  
—Benjamin Cardozo<sup>1</sup>

Miles of distance have been crossed by man to transform the barbarian era to the current civilized society. Maturity, tolerance and understanding are all part and parcel of a civilization. History is witness to the fact that how medical professionals have helped in making the existing modes of execution more civilized, humane and efficient by playing the most pivotal role. To use a decapitating machine as a humane method of execution which later on was known as the guillotine, was first advocated and designed by Dr Joseph-Ignac Guillotine and Dr Antoine Louis, respectively. The electric chair, a method of execution that was considered 'more humane' for several years, was designed with the help of a dentist named Dr Alfred Southwick. To use gas chamber and even hanging as method of execution

was a valuable suggestion of Medical expertise only. It was Dr Stanley Deutsch, an anesthesiologist, who first conceived the idea of intravenous induction of general anesthesia through a lethal injection. In Texas in 1982, the first 'clinical trial' of the lethal injection was carried out on a 40-year-old African-American man as he was injected with anesthetic agents in the presence of two doctors. As a result, his death occurred within few minutes.<sup>2</sup>

America is one of the few countries to use Lethal Injection as a method of judicial execution. In this research paper we would be analyzing the participation of physicians in the implementation of the death penalty through lethal injection. And currently this is an extremely controversial subject, initiating voluminous intellectual debate at global platforms.<sup>3</sup> Social consensus on pressing issues like; whether physicians should be present at executions? Whether physicians should

supervise the execution process? Whether they should inject the lethal injections or just pronounce and certify death? is imperative in order to draft adequate legislation to ensure the most appropriate involvement of physicians in the entire execution process.<sup>4</sup>

The choice regarding participation of physicians in the entire execution process by intravenous lethal injections is made harder by the presence of distinct circumstances and undeniable arguments existing both for and against their participation in the said executions. In this research paper, scholar would critically examine the relevant ethical and legal arguments that bear on this decision.

**Physician's participation in mode of execution (intravenous lethal injection) of death sentence with special reference to America:** In United States of America, various acts currently applicable to medical practice make physicians liable for professional misconduct for participating in the execution process despite the fact that most death penalty statutes overtly not only provide for such participation but even require them to do so.<sup>5</sup> Although the method of judicial execution are becoming more and more medicalized, however, the negative effect of the threat of such sanctions and restrictions keeps on increasing. Now, it has become mandatory for the states to cure such statutory ambiguities, if physicians are required to contribute their part in the judicial executions.<sup>6</sup> Combination of both, permissive death penalty legislations allowing the participation of physicians in the execution process along with the medical practice acts protecting them from any kind of disciplinary action for such participation are required to resolve this disparity. These kinds of legislations will not only protect the medical profession as a whole but will also take care of the needs of condemned persons and the public, in best possible manner.<sup>7</sup>

**Arguments for and Against Physician Participation in Executions:** Significant arguments raised by the subject of physician's participation in the execution are analyzed here and clarity is sought through rational and pragmatic support on these issues.

**Ethical Arguments against Physician Participation:** Doctors being the healers, hence their active participation in the judicial execution process is completely irreconcilable with their basic ethical code, is the chief contention of the opponents of such participation of the physicians. Public strongly believe

and think that it's the inherent duty of the medical profession to use its skills and tools only and only for the betterment of the public health.<sup>8</sup> However, usage of such curative skills to act as the harbinger of death is completely in contravention of medicine's first and foremost goal, moreover it clearly violates a physician's fiduciary duty to serve the patient's interest in the best possible manner.<sup>9</sup>

In modern as well as ancient medical ethics, a substantial support exists for such a stand and position. Over 2000 years old, the Hippocratic Oath, still exists as the most potent weapon and repeatedly cited foundation of professional ideals for practicing physicians. Any action taken by the physician with intent of causing any direct or indirect harm or death is broadly condemned by the overt language of the oath. The relevant text reads as, "I will prescribe regimen for the good of my patients according to my ability and my judgment and never do harm to anyone. To please no one will I prescribe a deadly drug, nor give advice which may cause his death."<sup>10</sup>

The participation of physicians in some instances may help possibly reduce pain, but there exist many countervailing arguments as well. Firstly, the purpose of medical involvement through a physician should not be to reduce pain or suffering, but to help save life and humanity. Secondly, the presence of a physician also serves to give an aura of medical legality to the whole procedure of death penalty.<sup>11</sup> Thirdly, in a broader perspective, the physician is taking over some of the responsibility for executing the punishment, makes the physician handmaiden of the state as an executioner. The benefit for possible reduction of pain by the physician who is in fact acting under the control of the state, rather lawfully does harm.

**Ethical Arguments for Physician Participation:** The ethical ideal which should be aspired by physicians is; "The task of medicine is to cure sometimes, to relieve often, to comfort always."<sup>12</sup> Deepest obligation of physicians is to take utmost care of the interest and wishes of their patients. Although the preservation of life remains the supreme maxim of medical profession, however, as always, it's neither the chief ethical value nor in the best interest of the patients. Therefore, at times the preservation of life must give way to other goals of medical profession like the cure of extreme sufferings. This is the reasonable logic that backs the ethical approval to withhold and withdraw life-sustaining treatment in

order to relieve pain and suffering.<sup>13</sup> As a result, doing so does accelerate and questionably even results in death. However, the medical condition of some patient's is such that the only alternative in their best interest is to welcome death rather than to wait for a slowly deteriorating life of agony. By and large, the Double Effect Doctrine is sanctioned by both, medical ethics as well as contemporary legal theory, which contemplates that measures carried on for beneficial purposes, like minimizing the sufferings, may be allowed morally even if they foreseeably lead to death.<sup>14</sup>

Now considering this reality, vagueness still exists as to whether the physician participation in judicial execution is contrary to the doctor's ethical obligations imposed by the Hippocratic Oath or the interest of the patient. As is categorically stated by AMA that a physicians being components of a profession which is fully committed to save life whenever there exists hope of doing so, hence must forbid themselves from participating in any kind of judicial execution.<sup>15</sup> However, the situation is entirely different in case of a judicial execution, wherein the patient (convict) is surely going to die; hence, there exists no such hope of life. After exhaustion of last appeal by the convict, an execution date is assigned by the Court and it's only after that physicians are supposed to act in the actual execution process.

Physicians can not only ensure that the drugs are injected in the correct order but also prescribe and arrange a lethal pharmacological procedure which is in tune with the unique medical condition of the condemned, thus wiping out all possibilities of any unfortunate incident that could occur during the lethal injection procedure, like; the condemned may regain consciousness and undergo the unimaginable trauma of conscious asphyxiation.<sup>16</sup> The condemned will also not suffer the humiliation and pain as a result of multiple needle pricks by incompetent medical technicians as the physicians can insert the catheters correctly after locating the appropriate veins. Physician participation negates any irreversible brain damage condition by closely monitoring the vital signs during the entire procedure, thereby guaranteeing death.

**Legal Arguments against Physician Participation:** In some states medical practice acts may get violated by the participation of physicians in judicial execution process, is one of the chief legal arguments of the opponents. Various grounds are

established for physicians by the medical practice acts; to be either disciplined or de-licensed. "Dishonorable" or "unprofessional" conduct is time and again listed as a ground for professional sanction by these acts. Moreover, several medical practice acts incorporate actions, which are against the ethical norms existing within the profession, into their definitions of "unprofessional" or "dishonorable" conduct.<sup>17</sup> It's quite possible that various state medical boards may take disciplinary action against physicians for such judicial execution participation, as several medical lobbying groups have stood in opposition to such participation, including the AMA. Although, no such disciplinary action for defying these ethical norms has been undertaken by the state boards till date, however, the possibility still remains.

**Legal Arguments for Physician Participation:** Despite the fact that physician participation is strictly prohibited by several medical practice acts, the capital punishment statutes of most states either permit or call for some sort of such physician participation. It's worth mentioning that such physician participation is allowed by the federal execution protocol, however, the same is not called for by the protocol. Apparently, it seems that there exists a latent legislative disagreement between the capital punishment statutes and medical practice acts.<sup>18</sup> Established rules of interpretation and construction of statutes state and suggest that the medical practice acts should be superseded by the capital punishment statutes for two reasons.

Firstly, the rule of "last in time" is usually followed by the courts in case of conflicting statutes. In case of a conflict between two statutes, whether actual or perceived, the last enacted statute is allowed to override the one enacted earlier with respect to the conflicting provisions only, for the obvious and commonly accepted logic of being more accurate reflection and description of the prevailing will of people through the legislature. The ruling should definitely be in favour of the death penalty statutes being more recent in time as compared to the medical practice acts.<sup>19</sup>

Secondly, as per another rule of statutory construction, the statute which is specific in nature (deals directly with the subject matter) must prevail over the general one (does not deal with the subject matter directly), as the specific statutes provide more accurate and clear guidelines for the appropriate course of legal action. With regard to the present conflict, since the capital punishment statutes explicitly deal with the

issue by directly addressing the same, which the medical practice acts fail to do, hence the capital punishment statutes are bound to prevail over their corresponding medical acts.

Moreover, physician participation in judicial executions is possibly required by the American Constitution. Eighth Amendment to the Constitution has put an absolute bar on inflicting cruel and unusual punishments. The Supreme Court of America, in 1972, categorically declared and held certain executions unconstitutional on the basis of involved procedures and processes constituting unusual and cruel punishments.<sup>20</sup> On the other hand, in 1976, in Florida, Georgia, and Texas, in a series of cases, the Court upheld the imposition of capital punishment as constitutional, because these states had incorporated more humane modes of execution as contrary to the precious ones which comprised of cruel and unusual procedures. Now the obvious question arises, what constitutes unusual and cruel punishment? Is it the absence of supervision by physician that makes the execution method cruel and unusual?

Specifically in this context, for the Eighth Amendment purposes, the Court in *Trop v. Dulles* noted that what constitutes unusual and cruel punishment is entirely based on the ever evolving standards of human decency which ultimately mark the progress of a maturing society.<sup>21</sup>

### Conclusion

Taken as a whole, key ethical and legal arguments supporting and opposing the participation of trained physicians in intravenous lethal injection judicial executions; point towards a clear single conclusion that deliberations favoring the participation strongly overshadow the ones against it. By now, we are clear as to how the ethical arguments are wrongly based on mistaken belief as to the ethical role of physicians and the kind of mutual trust between the medical profession and public at large. In fact, physicians will be guilty of gross professional misconduct by refusing to oversee the executions and taking care of the condemned prisoners in their last crucial hours, thereby neglecting their ethical responsibility to minimize the suffering and maximize the comfort. Moreover, the legal questions raised by the medical practice acts are adequately invalidated by potential deliberations of Eighth Amendment and the legal rules of statutory construction.

Physicians need to fulfill their role as caregivers by actively participating in the implementation and development of lethal injection as the most humane mode of judicial execution. Additionally, prevailing ambiguity in medical statutes as to the physician participation must be removed by the competent legislatures, thereby, explicitly allowing physicians to supervise the whole execution procedure. Such rulings will not only benefit the convicts but the society at large. Supervision of judicial executions by competent medical professionals will not only ensure that the botched executions are minimized as much as possible but also protect the human rights of dying convicts by maintaining the standards of decency.

**Ethical Clearance:** Not Required

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# A Cross Sectional Study to Evaluate Tree Plantation and Gardening as an Intergenerational Bonding Activity Amongst Geriatric Population

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## Abstract

**Background:** Life expectancy among the elderly has been improving for many decades all over world, the emotional and mental wellbeing of the geriatric people is at stake because of the younger people migrating to the urban areas or even abroad for work, and older people staying alone at their homes.

Few days can be spent by older–younger people together to plant trees. And this intergenerational bonding activity can give a sense of satisfaction and mental wellbeing to the older adults.

### Objectives:

1. To find out how older people spend time with younger generations
2. To evaluate if older people are interested in gardening and planting trees as an intergenerational activity.

**Method:** We conducted a survey on 120 older people in the community attached to our college, we enquired about the different means by which the older people spend time with the younger generations and if they will be interested in gardening or planting trees together with the younger generations.

**Results:** There were a total of 120 participants, 60 males and 60 females. Mean age was  $68.49 \pm 6.83$  years. Majority of them interacted with the younger generations daily (55.83%). Chit chatting, managing business and telling stories to children were the common things done together. Majority (70%) felt that they spent enough time with the younger people, while few were not spending time at all with their younger generations (5.83%). 79 participants never planted a single tree (65.83%). 107 participants felt that planting trees is necessary (89.17%) while 104 participants (86.67%) would like to do gardening or planting trees with their younger generations.

**Keywords:** *Intergenerational Activities, Geriatric Mental Health, Tree Plantation.*

## Introduction

Life expectancy among the elderly has been improving for many decades the reason being advancement of health sector and overall improvement in per capita income of the people all over world,<sup>[1]</sup> and there is evidence that the physical health of the elderly has also been improving with these advancement.<sup>[2-4]</sup>

The emotional and mental wellbeing of the geriatric people is at stake because of the increasing urbanization,

and younger people migrating to the urban areas or even abroad for work, and older people staying alone at their hometowns.

In the global Sustainable Development Goals<sup>[5]</sup>, goal 13 is Climate Action, “take urgent action to combat climate change and its impacts”. It’s a responsibility which is equally shared by the governments and all the people living on the earth. All the efforts how much ever minimal they may be should be counted as minute steps towards environmental betterment.

Planting and growing trees is one of the major responsibilities we have today on us.<sup>[6]</sup> All people should come together to help build our green zones inside and nearby cities and villages. Older people have much time left with them, younger people have energy. If all these generations spend some time together, then planting and growing trees can be easily done. People can maintain small gardens at home, every home can have a small nursery of its own where they can grow saplings of the common regional trees, even fruit trees like Mango, Papaya, Custard Apple, Guava. Weekends and few days in the vacations can be spent by older – younger people of the house together to plant these trees near to our houses, residential areas or near to cities. Planting trees have a large potential to conserve energy in urban areas.<sup>[7]</sup>

When the younger people who live in cities come to visit their parents in the villages, if they spend time together in planting these trees, it will be memories to cherish for both the generations. When the children are away, older parents can remember them while taking care of these trees, when the old people are dead, the children can remember them while eating fruits from these trees. And most importantly every tree that is planted and grown will be a one-step ahead on the path of environmental betterment.

We had conducted this study to see what things older people do with the younger generations and whether they will be interested in planting trees.

#### Literature review:

**AL Park et al<sup>[8]</sup>** studied the impact of intergenerational activities on general wellbeing of older adults. They suggested that geriatric people who are involved in intergenerational activities of any form are healthy both physically and mentally as compared to those people who are left to live alone. They concluded that the geriatric people should be involved in daily activities in home or in society to improve their overall wellbeing.

**CN Reisig et al<sup>[9]</sup>** studied the perception of geriatric people of wellbeing after intergenerational experiences with youth, they also concluded that the intergenerational activities are important for geriatric physical and mental health.

**Faer M et al<sup>[10]</sup>** conducted a large project on intergenerational activities between the adolescents,

young adults and older adults. They reported that not only the older people but also the adolescents and young adults are benefited from these intergenerational activities and they recommended different social and community activities to be planned and executed on a regular basis. Their project brought together different age-distinct, high risk, ethnically similar populations in an intergenerational, reciprocal support mechanism that addressed those negative factors that affect high-risk behaviour and decisional processes in adolescents and physical and mental functioning in the elderly.

Many authors have raised a concern about the mental and physical wellbeing of geriatric people. <sup>[11-13]</sup> Some of them suggested the importance of intergenerational activities in improving the overall health of the geriatric people.<sup>[14-17]</sup>

#### Objectives:

2. To find out how older people spend time with younger generations
3. To evaluate if older people are interested in gardening and planting trees as an intergenerational activity.

#### Method

We conducted a survey on 120 in the community attached to our parent medical college, where we enquired about the different means by which the older people spend time with the younger generations and if they will be interested in gardening or planting trees together with the younger generations.

Ethical Clearance for the institutional ethics committee has been taken to carry out this study.

#### Inclusion Criteria:

1. Old age people of both sexes and age more than 60 years
2. Residents of medical college and hospital area for more than 6 months

#### Exclusion Criteria:

1. Unmarried people
2. Those who are not willing to participate

**Sample Size:** According to a study conducted by GK Ingle et al<sup>[18]</sup> the proportion of old age people more than 60 years will be 7.7%,

So,  $p = 7.7\%$

Using formula for sample size (n) calculation,

$$n = 4 \times p \times q / e^2$$

Where,  $p = 7.7\% = 0.077$

$$q = 1 - p = 0.923$$

Taking e, absolute error of 5%,  $e = 0.05$

$$\text{So, } n = 4 \times 0.077 \times 0.923 / 0.05 \times 0.05$$

$$n = 113.71 \approx 114$$

A minimum of 113 patients will be included in the study, rounding it up to 120 patients.

**Sample size = n = 120**

**Sampling Technique:** Convenience Sampling

**Statistical method:** A simple questionnaire was prepared and a pilot study was conducted with 20 geriatric participants, the questionnaire along with the results were put forth the institutional research cell to validate the questionnaire. The validated questionnaire in google form format was used to collect the data from the geriatric people in the nearby community. Data was entered in Microsoft excel, qualitative data is shown in numbers and percentages and quantitative data in mean and SD. Charts and graphs are used to show the results.

### Results

There were a total of 120 study participants, 60 males and 60 females. Mean age was  $68.49 \pm 6.83$  years.

Majority of them interacted with the younger

generations daily (55.83%) followed by 3 to 4 days a week (30%).

**Table 1: Frequency of quality time spent with the younger generations**

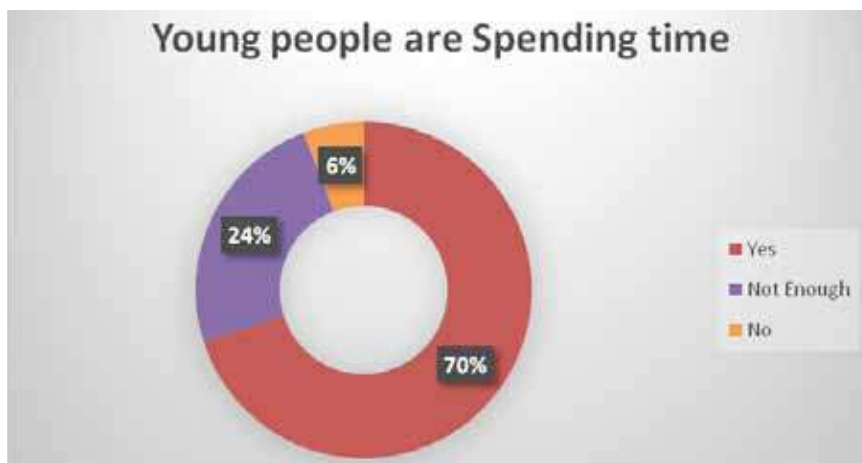
Frequency of quality time spent	Number	%
Daily	67	55.83%
3 to 4 days a week	36	30.00%
1 to 2 days a week	9	7.50%
Once or twice a month or Less	8	6.67%
Total	120	100%

General chit chat (56.67%), managing family business and farms (35%) and telling stories to grandchildren (32.50%), doing Pooja – Bhajans (10%) were the common things done by the participants with their younger generations.

**Table 2: Common intergenerational activities done together**

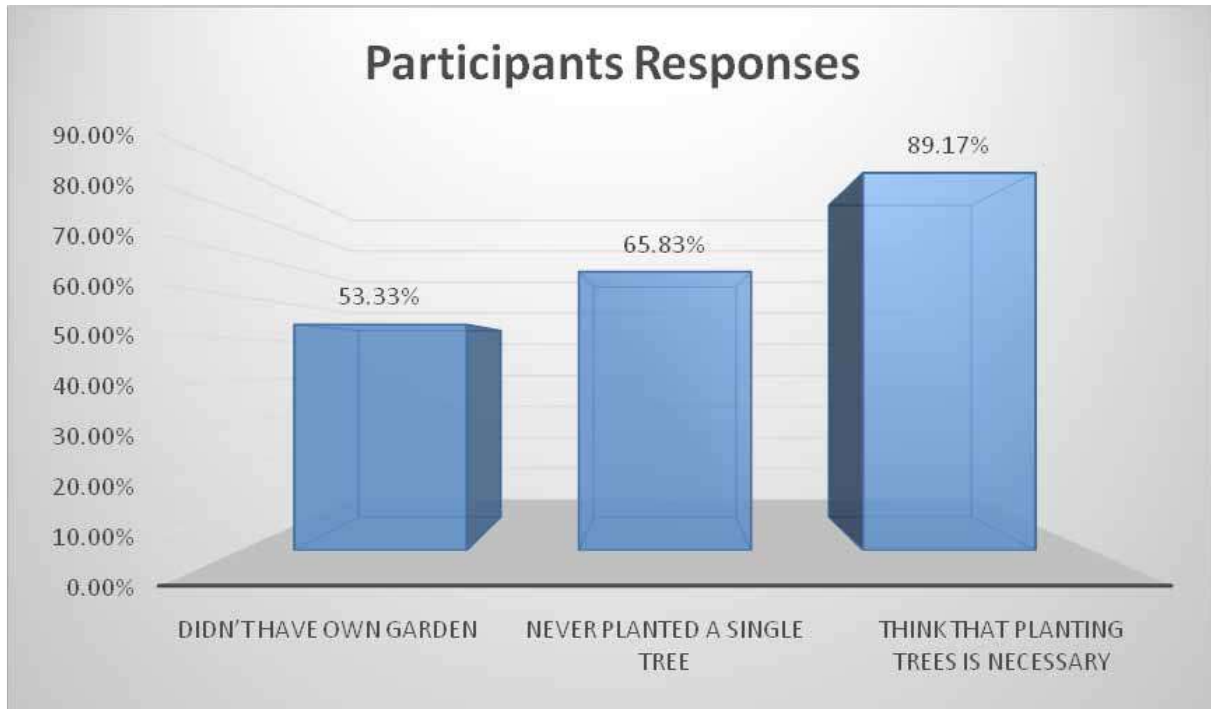
Common activities done together	Number	%
General chit chat	68	56.67
Managing family business/Farm	42	35.00
Telling stories to grandchildren	39	32.50
Pooja - Bhajan	12	10.00
Going for a walk	8	6.67
Gardening	4	3.33
Others	9	7.50

Majority (70%) felt that they spent enough time with the younger people, some felt that it was not enough (24.17%) while few were not spending time at all with their younger generations (5.83%).



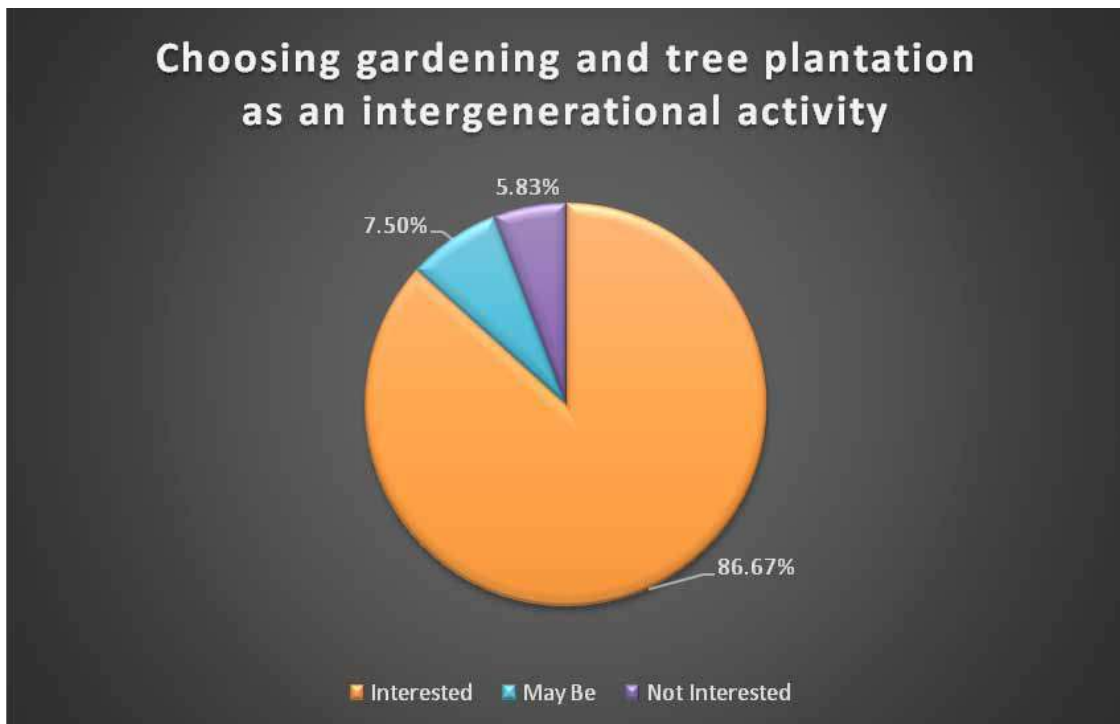
**Fig 1: Opinion about younger people spending time with older people**

64 participants didn't have their own garden (53.33%), 79 participants never planted a single tree (65.83%). 107 participants felt that planting trees is necessary (89.17%)



**Fig 2: Participants response regarding gardening & tree plantation**

104 participants (86.67%) would like to do gardening or planting trees with their younger generations, 9 responded that they might do it (7.50%) while rest 7 showed no any interest (5.83%) in doing gardening or planting trees as an intergenerational activity. Upon one month follow up, we found that 16 families (13.33%) actually did the activity.



**Fig 3: Choosing gardening and tree plantation as an intergenerational activity**

## Discussion

Various intergenerational activities have different impact on the people. We may look to attitudinal and behavioural measures for indicators of intergenerational community solidarity. Attitudes of youth towards elders are heterogeneous and may be positively or negatively affected by familial and nonfamilial intergenerational contact.<sup>[19,20]</sup>

**Y Fujiwara et al<sup>[21]</sup>**, in their study launched a new intervention study called REPRINTS in which senior volunteers were engaged in an activity of reading picture books to children. At the follow-up, social network scores (frequency of contact with grandchildren and others around the neighbourhood) and self-rated health was improved for majority of the individuals who did this activity most intensively as compared to those who did not. They concluded that this specific intergenerational activity helped in improving the mental and physical health of the older adults.

**AL Park et al<sup>[8]</sup>** studied the impact of intergenerational activities on general wellbeing of older adults. They recommended intergenerational activities for better health of the elderly.

**CN Reisig et al<sup>[9]</sup>** studied the perception of geriatric people of wellbeing after intergenerational experiences with youth while **Faer M et al<sup>[10]</sup>** conducted a large project on intergenerational activities, both of them recommended there should be intergenerational activities to maintain the health and wellbeing of people, both young and old.

We found out that majority of the participants interacted with the younger generations daily (55.83%) followed by 3 to 4 days a week (30%). General chat (56.67%), managing family business and farms (35%) and telling stories to grandchildren (32.50%), doing pooja – Bhajans (10%) were the common things done by the participants with their younger generations.

With increased urbanization and globalization, there is a reduced contact and also a marked reduction in the intergenerational bonding activities due to the migration of younger people for jobs in other cities.<sup>[22]</sup>

Whatever time these older people get to spend with their younger generations, should be spent in memorable productive activities. What else can be more productive than planting trees together? The older generations can utilize their time in growing and nurturing saplings and

trees at and around home, the younger generations can contribute their energy to plant these saplings in nearby areas.

We found out that 64 participants didn't have their own garden (53.33%), 79 participants never planted a single tree (65.83%). 107 participants felt that planting trees is necessary (89.17%). This indicates that with a little motivation and dedication these people can get involved in gardening and planting trees, which is the most important thing in today's era.<sup>[23]</sup>

## Conclusion

Our study concludes that there are deficiencies in the intergenerational bonding activities. Various innovative and fruitful intergenerational activities should be developed, acted upon and followed to improve the physical, mental and social wellbeing of people from all the generations including old age people. Gardening and planting trees is one of such activity which people find important and are ready to follow.

**Limitations:** Being a time bound study, follow up was not possible to check how many participants are actually involved in gardening and tree plantation as an intergenerational activity. A prospective study should be done to evaluate the impact and acceptance of this activity for intergenerational bonding.

**Conflict of Interests:** None

**Source of Funding:** Self

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# Misconceptions and Traditional Treatment Practices Regarding Childhood Epilepsy in Central Gujarat of India: A Community Perspective

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## Abstract

**Background and Purpose:** There are various misconception are present in society about variety of diseases. This study was undertaken to determine the current misconception prevailing in society, community regarding people with epilepsy (PWE) and traditional treatment practices.

**Aims:** To determine the misconception and traditional treatment practices regarding epilepsy present in society

**Method:** Researcher collected data from 54 parents of epileptic patients who visited the outpatient clinic of selected hospital of Gujarat. The data were collected by using questionnaire.

**Results:** Over all it was observed that still people have various misconception towards epilepsy. The social acceptance of epileptic patient is also major challenge in some of the society.

**Conclusions:** A suitable educational intervention programs has to plan to prevent social stigma about epilepsy. Awareness is required among community people that epilepsy can be treated by using antiepileptic drug and other medial measures. People believe medication has poor recovery rate so some time traditional practices having good result in recovery.

**Keywords:** *Childhood epilepsy, traditional treatment, misconception, central Gujarat, Social stigma.*

## Introduction

**Background:** There are many causes of epilepsy which are misunderstood. The life style of today's children is quiet different from past children. People believe that epilepsy can be treated by practice of black magic. Various misconceptions are present in society regarding treatment and recovery of epilepsy. Few people consider epilepsy as sins committed by one's forefathers. It is further assumed that people are controlled by supernatural forces which unable to control their bodily functions and that the condition is transferable through bodily contact of sputum that comes out of a person's mouth during attack of seizures.<sup>1</sup>

The Result of a research study found that the Quality of life (QOL) in children with epilepsy is affected in terms

of physical control, poor self-esteem, and less energy levels. Cognitive functions, social communication and other activities are less affected.<sup>2</sup>

A study concluded that CWE(child with epilepsy) have poor quality of life as he is not able to control on his own body during episode of seizure. Researcher also suggested comprehensive care needs to go beyond the attempt of controlling seizures.<sup>3</sup>

Many people in developing countries still concern that epilepsy is a disease which can spread from one person to another organism(like communicable disease) by direct contact or via urine, saliva, stomach gas, and feces excreted during a epileptic seizure. This tendency has played a major role in people living with epilepsy being ostracized, stigmatized, and misunderstood.<sup>4</sup>

There are some reasons for accepting traditional practices. Indian villages are still in developing stage so it is difficult to get modern medicine from a small village. Another problem is traveling and transportation to reach neurologist which is expensive. Further, financial and economical condition of family. The traditional healers may also be preferred because they are easily approachable and some time they do not charge for treatment. This local practitioner does not require publicity because patients will come based on recommendations from other people who have been treated by traditional healers.<sup>5</sup>

Epilepsy is a group of neurological or brain disorders which is recognized by epileptic seizures. Epileptic seizures are episodes that can vary according to length of episode. During long episode (>5min) child vigorous shaking. These episodes can result in physical injuries, including occasionally broken bones.

Epilepsy is considered as neurological disorder, which affect physical, social, cognitive and emotional aspects of one's life. Epilepsy is characterized by recurrent seizures, which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized). Sometime patient become unconscious during episode. The person feels lack of control of bowel or bladder function.

There are 50 million people living with epilepsy worldwide, and most of them reside in developing countries. About 10 million persons with epilepsy are there in India.<sup>6</sup>

The average incidence of epilepsy each year in the India is estimated at 48 for every 100,000 child. Prevalence is the number of people with epilepsy, using prevalence numbers, ranges from 1.3 million to 2.8 million ( 5 to 8.4 for every 1,000 people). Its prevalence is about 0.3% in our population. The prevalence is higher in the rural (1.9%) compared to urban population (0.6%).<sup>6</sup>

Epilepsy is very complicated situation for a client. During episode person is dependent on other. The date, time and frequency of episode is unpredictable. It is common neurological disorder worldwide. . Epilepsy directly affects around 50 million people, the majority of them (80-85%) stay in poor or developing countries. People with Epilepsy (PWE) and their families often face a very common aspect of epilepsy which is known as Epilepsy Stigma (ES). ES is considered to be one of

the most important factors that have a negative influence on PWE. It is a commonly encountered global issue among PWE in all cultures.<sup>7</sup>

**Need for Study:** In this scientific era, we are unfortunate that, still people believe in misunderstandings, discrimination and social stigma surrounding a person with epilepsy. The Researcher observed that educated people know very little about epilepsy. The society is faithful towards prejudice and stigma towards patients with epilepsy. Various types of misconception are present about causes and treatment of epilepsy. Each community has their own belief. Majority of misconception are found in rural people. It is also observed that traditional healers play a very strong influence on rural community, and they may play a huge role in reducing the stigma of epilepsy in the community

#### **Research Objectives:**

1. To determine the current misconception regarding epilepsy prevailing in society
2. To find out frequency of various traditional treatment practices for epilepsy

#### **Material and Method**

**Research Approach:** Quantitative

**Research Design:** Descriptive survey design

Setting: Out Patient Department (OPD) of selected hospitals of Central Gujarat

**Population:** The accessible population for study is the parents of epileptic child from OPD of selected hospitals of Central Gujarat.

**Sampling Procedure:** Non probability convenient sampling

**Sample Size:** Total number of parents were 54. Out of this 10 were female.

**Source of Data:** Data were collected from parents of epileptic child from OPD of selected hospitals.

**Delimitation:** The study was delimited to parents of epileptic children's those available in OPD of hospitals.

**Study Result:** Over all 54 parents undergone in study. Each parent has their own view about epilepsy. The interesting fact is that no parents accepted that epilepsy can be treated with antiepileptic drug. All



parents favor that traditional belief and practices helps in recovery of epileptic client. The study result divides into 2 sections. Section-I is about parent perception for

social stigma and section-II is about traditional practices used for treatment of epilepsy.

**Section-I:**

**Table 1: Perception about epilepsy stigma N=54**

Statements	Yes	No
1. People suffering from epilepsy are mentally challenged	43	11
2. Epilepsy is a revenge of past sin	48	6
3. Epilepsy can never be recovered.	51	3
4. Epilepsy can be controlled by black magic	50	4
5. Children with epilepsy are dull	47	7
6. Epilepsy spreads through touching or coughing	30	24
7. Life of a person with epilepsy is miserable	45	9
8. Marriage is a cure for epilepsy	28	26
9. Antiepileptic drug create side effect	53	1
10. Epilepsy makes people dependent on others.	50	4
11. Person with epilepsy become dies in next 5 years.	10	44
12. People with epilepsy are violent or crazy	35	19
13. Epilepsy is a curse or wrath of God	41	13
14. Epileptic child is paralytic.	12	42
15. Epilepsy makes people unfit for marriage.	39	15

The above table reflected that 99% of parents agreed that antiepileptic drug create adverse reaction. The majority of parents (82%) said that epileptic patient will not die within 5 years after epilepsy. 83% parent believed that Life of a person with epilepsy is miserable.

**Some of the other common stigmas towards epilepsy are:**

Myth 1: The child should not attend school if he had epilepsy.

Myth 2: There is separate school for epilepsy children

Myth 3: All epileptic attacks occur with convulsions.

Myth 4: Women with epilepsy cannot bear normal children

**Section-II:**

**Table 2: Traditional treatment practices- Epilepsy N=54**

Traditional practices		Yes		No	
		Frequency	Percentage	Frequency	Percentage
1	Motivate child to smell old shoes	45	84%	9	16%
2	Slapping the child at the time of episode	40	75%	14	25%
3	Application of mustard oil on eyes	28	52%	26	48%
4	Referring child immediately to temple/traditional healer	38	71%	16	29%
5	Making child to drink cows urine	14	26%	40	74%

Traditional practices		Yes		No	
		Frequency	Percentage	Frequency	Percentage
6	To please the God, sacred threads(Janeu) with lockets and idols are also worn,	20	37%	34	63%
7	Burning body part by sharp object	30	56%	24	44%
8	Practices such as tattooing and burning with leather objects	18	34%	36	66%
9	Restrain the child during episode	32	60%	22	40%
10	Shaking and arousing the child	36	67%	18	33%
11	Making the children to wear bangles of different metals	10	19%	44	81%
12	Use Ash Gourd (Petha)	25	47%	29	53%
13	Putting spoon in child's mouth	35	65%	19	35%
14	Making the child to hold a bunch of iron keys	30	56%	24	44%
15	Apply onion & garlic mixture on body	28	52%	26	48%
16	Pouring cold water on child's body	39	73%	15	27%
17	Provide Basil (tulsi juice) after seizure	23	43%	31	57%
18	Applying eucalyptus oil on child's body	27	50%	27	50%
19	Use Hing (Asafoetida) and sendha namak(rock salt) on body	22	41%	32	59%
20	Sucking the secretions from child's nose	12	23%	42	77%

The above table shows that most of parents (84%) agree that epileptic child should motivate to smell old shoes during epileptic attack. 73 % realized that Pouring cold water on child's body treat epilepsy.

Conclusion- Over all study concludes that a positive approach is required for preventing social stigma towards epilepsy. Investigator recommends that Epileptic Stigma (ES) is dissemination of accurate knowledge about epilepsy is the most important way to fight. This knowledge should be addressed to all individuals including the patients, health caretakers, families and friends of PWE, educators and the public at large. The association like Indian Epilepsy Association and epilepsy foundation can contribute to change the perception into the mind of common man.

Discussion-Study result reveal that majority of people still believe in traditional treatment and home remedies. Epilepsy is not a communicable disease. Epilepsy is a preventable and treatable condition, but still it remains a major public health problem due to high stigma, socioeconomic inequity among population, huge treatment gap, and the poor epilepsy healthcare delivery system in India. The psychosocial and economical aspects of epilepsy impact the patient and family more crucial. It is clearly mentioned that epilepsy is a complex public health problem which requires integrated multidisciplinary approach for treatment and team work. The time has been passed and rather than

focusing on pilot projects, a sustainable, cost effective, and comprehensive public health response is required to address the challenge of epilepsy in India. Neurologists, public health professionals, psychiatrists, psychiatric social worker, psychiatric nurse, and program managers need to join hands for prevention, improved care, and rehabilitation of PWE in India.

Gopalkrishna Gururaj and team conducted a study on topic "Epilepsy in India : Impact, burden, and need for a multisectoral public health response" in 2015. The study result concluded that there is no significant change in the perception, stigma, and discrimination of epilepsy across the country, despite improvement in educational and social parameters over the time. The huge treatment gap and poor quality of life is the big barrier to achieve the objective of treatment. Researcher strongly proved that a multidisciplinary response is required to address the burden, treatment and impact of epilepsy which calls for an integrated and multipronged approach for epilepsy care, prevention, and rehabilitation. Health care delivery, capacity building, mobilizing public support and increasing public awareness will be the vital sign of such an integrated approach in a public health model.<sup>8</sup>

At the end of study researcher will create awareness among rural people regarding prevention and mode of treatment of epilepsy through mass media, one to one interaction and family counseling.

**Ethical Clearance:** It is obtained from CHARUSAT ethical committee.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

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# Development of Job Design Indicators for Generation Y Nurses at Tertiary Level Hospitals under Ministry of Public Health in Thailand

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## Abstract

**Background:** Job design is an essential and integral part of human resource management that its effect in motivation Generation Y nurses to enhance and improve their performance. Job design is very important for nurses and the productivity of nursing organizations, while job design indicators remain unclear.

**Aim:** To develop job design indicators in addition to assessing and validating job design indicators for Generation Y nurses at tertiary level hospitals.

**Method:** The sample of this study was 360 Generation Y nurses in nursing units at tertiary level hospitals under Ministry of Public Health in Thailand. The scale development process applied the steps of scale development by DeVillis<sup>1</sup> as follows: 1) definition of operational terms; 2) creation of questions from the definition of terms; formation of 16 indicators of three components; 3) content validity testing by five experts with a CVI of 0.91; 4) determination of the internal consistency reliability with thirty Generation Y nurses in nursing units with a Cronbach's Alpha Coefficient of 0.85 and 5) testing of the construct validity by using confirmatory factor analysis.

**Results:** The research instrument for measuring job design for Generation Y nurses in nursing units at tertiary hospitals under Ministry of Public Health in Thailand consists of three components with 16 indicators: 1) job characteristics (factor loading .67) was composed of five indicators, 2) social interactions (factor loading .98) was composed of six indicators, and 3) growth and learning (factor loading .65) was composed of five indicators. The confirmatory factor analysis model of job design for Generation Y nurses in nursing units at tertiary hospitals was congruent with the empirical data (CMIN/df = 1.24, RMR=0.02, GFI=0.97, AGFI=0.94, RMSEA= 0.03, CFI=0.99).

**Conclusion:** The developed instrument should be used to measure job design for Generation Y nurses in nursing units and for policy formulation in redesigning jobs at tertiary hospitals under Ministry of Public Health in Thailand.

**Keywords:** Job design, Indicator, Generation Y nurses, Tertiary hospitals.

## Introduction

The 20-year Thai national strategy on public health includes strategies for action on the four issues: prevention promotion & protection excellence; service excellence; people excellence and governance excellence.<sup>2,3</sup> In addition to requirements for meeting service users' needs and the skills of professional nurses

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who are service providers and personnel structure changes, particularly among Generation Y professional nurses. Thus, job design is a challenge for administrators in building motivation and improving performance to enable personnel with generation differences especially nurses who have work attitudes aimed at achieving nursing organizational goals by allocating work suitable for personnel skills and needs.<sup>4,5</sup>

Therefore, organization job design is important and part of human resource management. Noe et al.<sup>5</sup> stated that current job design needs to adjust with the generation of personnel working in the organization to build motivation to work successfully by designing jobs based on job characteristics, to create social interactions among personnel and to build growth and learning at work. According to previous studies, nursing job design has been found to lack clarity of models and development of indicators consistent with nursing work system contexts. The characteristics of Generation Y nurses who need to provide holistic care with a higher ratio of patients than standard specifications due to staff shortages<sup>5, 6</sup>.

Currently the number of Generation Y nurses in tertiary hospitals under Ministry of Public Health in Thailand increased to 62.50 percent.<sup>7</sup> Generation Y nurses provide clinical care and have key roles in determining future nursing unit administrative directions in place of the old generation. Effective job design indicators for self-assessments by personnel will provide guidelines for managers to encourage employee interest in working while increasing job satisfaction thereby leading to high levels of nurses' performance and productivity.<sup>8</sup> Therefore the aim of this study to determine job design indicators for Generation Y nurses in the nursing organizational contexts.

**Research Objectives:** To develop job design indicators for Generation Y nurses at tertiary hospitals under Thailand's Ministry of Public Health.

## Method

**Selection and Description of Participants:** The population used in this research was Generation Y nurses in nursing units at 33 tertiary level hospitals. The sample size was set by calculating with the formula of Cochran<sup>9</sup> which determined the population representation at a 95 percent confidence level and a tolerance level of 0.05 percent to ensure complete information. The researchers then adjusted the size of the group according to the

formula of Gupta and colleagues<sup>10</sup> by calculating a dropout rate of 10 percent. Therefore, sample for this study was 360 Generation Y nurses with cluster and simple sampling.

**Scale Development:** The researcher developed and tested the quality of job design indicators for Generation Y nurses at tertiary level hospitals based on the concept of Noe, et al.,<sup>5</sup> and DeVellis's method<sup>1</sup> in eight steps of research tool development as follows:

- 1. Identifying the concepts of the variables:** The concept of Noe, et al.,<sup>5</sup> was used in selecting job design concepts that could be used in the research to build understanding about job design in nursing units.
- 2. Defining the concepts:** The individual components of job design in nursing units which were defined as follows: (1) job characteristics; (2) social interactions; and (3) growth and learning.
- 3. Designing a scale:** In designing a scale for considering each indicator of job design, a measurement scale was designed in the form of 5-point Likert scales ranging from "most real" to "least real".
- 4. Seeking item review:** Each item was reviewed by two nursing instructors with expertise in nursing administration and experience in academic work involving job design and three nursing administrators with expertise in the management of the nursing systems of Generation Y professional nursing working at tertiary hospitals. Thus the content validity index (CVI) was analyzed.
- 5. Conducting preliminary trials:** The research tried the items with 30 Generation Y nurses at tertiary hospitals. The data obtained were used to calculate the reliability of the indicators by using Cronbach's Alpha Coefficient to obtain internal consistency of the overall scales, individual component reliability, item-total correlations, item-item correlations and alpha-if-item deleted reliability coefficients.
- 6. Performing field tests:** As previously stated the sample in this study was composed of 360 Generation Y nurses in nursing units at tertiary hospitals based on the scale development concept of DeVellis.<sup>1</sup>
- 7. Conducting construct validity studies:** The data analysis was conducted by performing exploratory

factor analysis and confirmatory factor analysis.

- 8. Evaluating scale reliability:** The collected data were analyzed for reliability with Cronbach’s Alpha Coefficient.

**Statistical Analysis:** All statistical analysis was undertaken by using statistics computer programs. The types of statistical analysis were as follows: 1) descriptive statistic were used to determine mean and standard for individual items; 2) exploratory factor analysis was used to organize the components of job design and 3) confirmatory factor analysis was performed to test for the goodness of fit of the structural model of the factors and weights were assigned to construct the indicators and empirical data were used to determine the weights of the main variables used in constructing the indicators.

**Results**

Three hundred and sixty Generation Y nurses at tertiary hospitals responded with self-administered

questionnaires. Most of the participants were females (96.90%) and more than a half were aged 23-26 years (68.30%). Most had graduated with bachelor degrees (100%), had experience working in patient wards for one year and up (28.60%) and had had experience on the boards of directors at the nursing unit and nursing organization levels such as directors on nursing practice (99.40%), nursing quality assurance (64.40%), academics (31.90%) and special activities (11.10%). All of the participants had passed training in nursing practice (100%), nursing quality (100%) academics (60.60%) and special activities (8.60%).

The results of the exploratory factor analysis for indicators of job design returned to 16 indicators (KMO=.894, p<.001) of three components. Each of the components consisted of the following: 1) job characteristics (five indicators), 2) social interactions (six indicators), and 3) growth and learning (five indicators). These three components explained 56.45 percent of the observed variance (see Table 1).

**Table 1: Eigen Values, Percentage of Variance and Number of Indicators of Each Component of Job Design**

Component Name	Eigen Value	Percentage of Variance	Cumulative Percentage	Number of Indicators
1. Growth and Learning	6.17	36.30	19.62	5
2. Job Characteristics	2.18	12.80	38.33	5
3. Social Interactions	1.25	7.35	56.45	6

According to the mean scores for the job design indicators about most of the work performed, promoting organizational success had the highest score ( $\bar{X}$ = 4.69, SD=0.53) but the lowest score was work performed with a clear career path ( $\bar{X}$  = 3.38, SD=0.75). And the factor loading of each component, job characteristics, social

interactions and growth and learning were found factor loading within a range of .71-.77; .53-.72 and .64-.78 respectively. The growth and learning indicator, “You have developed yourself in line with plans for individual development performance,” had the highest factor loading value (factor loading=.78) (see Table 2).

**Table 2: Mean standard deviation and factor loadings of job design indicators for Generation Y nurses at tertiary hospitals under Ministry of Public Healthin Thailand**

No.	Indicators	Mean	SD	Factor Loading
<b>Job characteristic</b>				<b>0.67</b>
1.	The work you perform requires knowledge about health science and the nursing profession.	4.53	.57	.73
2.	The work you perform requires basic and special nursing skills.	4.57	.56	.75
3.	The work you perform corresponds with the law and professional nursing standards.	4.63	.54	.74
4.	The work you perform contributes to promoting organizational success.	4.69	.53	.77
5.	The work you perform has impact on the safety and lives of patients and their families.	4.48	.59	.71

No.	Indicators	Mean	SD	Factor Loading
<b>Social interaction</b>				<b>0.98</b>
6.	The work you perform requires nursing activity performance self-evaluation on every shift.	4.47	.58	.53
7.	The types of work you perform requires teamwork.	4.64	.55	.71
8.	The work you perform as a team goes well.	4.37	.62	.72
9.	The head nurse helps when you have problems performing work.	4.31	.67	.65
10.	Your colleagues help one another.	4.37	.62	.68
11.	The work you perform involves changes in information and knowledge for improvement.	4.43	.60	.58
<b>Growth and Learning</b>				<b>0.65</b>
12.	You participate in work scheduling on your own.	3.89	.91	.64
13.	The work you perform has a clear career path.	3.38	.75	.75
14.	You have made plans for developing your competencies and proficiency.	4.03	.64	.76
15.	You have developed yourself in line with plans for individual development performance.	3.98	.67	.78
16.	You have had opportunities to study work both inside and outside your unit.	3.82	.85	.73

The results of the confirmatory factor analysis for the indicators found that the job design model to be consistent with the evidence-based data as a perfect fit by considering chi-square statistics equal to .07 CMIN/df= 1.24, RMR=0.02, GFI= 0.97, AGFI = 0.94, RMSEA

=0.03, CFI = 0.99. The results of the factor scores found the three most important components to be social interactions, followed by job characteristics and growth and learning (see Table 3).

**Table 3: Statistics from the analysis of relationship between the variables of job design component models for Generation Y nurses at tertiary hospitals under Ministry of Public Health in Thailand**

Component	Component Factor	Factor Loading	R <sup>2</sup>
Social Interactions	6	0.98	.97
Job Characteristics	5	0.67	.46
Growth and Learning	5	0.65	.42

CMIN/df = 1.24, RMR=0 .02, GFI= 0.97, AGFI=0 .94, RMSEA= 0.03, CFI=0 .99

The data was tested by determining the internal consistency of 16 job design indicators for Generation Y nurses at tertiary hospitals and Cronbach’s Alpha Coefficient for the entire set after construct validity analysis was 0.85. Cronbach’s Alpha Coefficient for individual components was within a range of 0.81 – 0.87, while item analysis and inter-item correlation had values of 0.33 – 0.66. The corrected item–total correlation was within a range of 0.80 – 0.88.

### Discussion

This study of the development of job design indicators to build motivation for Generation Y nurses involved the following three components: job characteristics, social interactions, and growth and learning. Each components

has five, six and five indicators, respectively, for a total of 16 indicators. The results of this development of indicators correspond with the concept of Noe, et al.,<sup>5</sup> The motivational job design approach was composed of the following three components: 1) job characteristics with indicators involving skill/task variety, task significance, task identity, autonomy and feedback for a total of eight indicators; 2) social interactions with indicators involving positive working relationships with colleagues, teamwork and mutual assistance for a total of one indicator and 3) growth and learning with indicators involving the job allowing opportunities for learning and growth in competencies and proficiency (indicator) for a total of 11 indicators. The study of Al-Maabadi Rn, Aalem & Baddar<sup>12</sup> who studied the

relationships between job design and the satisfaction of 500 professional nurses working at university hospitals and hospitals under the Ministry of Public Health, involved 14 indicators. Furthermore the study of Morgeson & Humphrey,<sup>13</sup> who developed the Work Design Questionnaire (WDQ), offered the following four components: 1) task characteristics; 2) knowledge characteristics; 3) social characteristics and 4) work contexts with a total of 77 indicators. However the aforementioned study differed from the findings of a study by Teryima & Abubakar<sup>14</sup> who studied the impact of job design attributes on performance attainment in business organizations in a survey of deposit money banks in Nigeria that measured the job design component, job characteristics for a total of 11 indicators.

The job design indicators for Generation Y nurses at tertiary hospitals have acceptable levels of content trust and reliability. The results of the structural validity testing found that both components could explain the total variance of 56.45 percent. Social interactions, job characteristics and growth and learning were able to describe 97, 46 and 42 percent, respectively. As the previous studies the development of job design indicators involve measurements business and education<sup>4, 5, 13, 14</sup> which in nursing involves measurements concerned with job characteristics and does not cover Generation Y nurses who have to interact with personnel and the internal and external environments of nursing units, including perceptions about career advancement and learning in order to achieve competencies deemed adequate and fitting for service provision; thus this study was a first job design tool which modified the job design concept of Noe, et al.,<sup>5</sup> used in the roles of Generation Y nurses at tertiary hospitals.

### **Conclusion and Implementation**

Job design indicators of Generation Y nurses have structural accuracy accurate and consistent with the job design concept of Noe, et al.,<sup>5</sup> focuses on the factor loading of each component from the highest to the lowest, namely social interactions, job characteristics, and growth and learning consequently. This study reveals new knowledge of job design indicators for Generation Y nurses the head nurse of nursing units and nursing administrators should be imply job design assessment consistent with nursing unit contexts and have the job design polices of Generation Y professional nurses at tertiary hospitals.

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**Conflict of Interest:** The authors have no conflicts of interest.

**Ethical Clearance:** The Ethical Committee of Christian University of Thailand approved the research project (Registration No. N. 24/2561) on June 26, 2018 and the permission were obtained from the ethics committee on research involving human subjects at the selected tertiary hospitals where the research data were collected. The protected samples were obtained as personal information and ethical concerns which included informed-consent and maintaining confidentiality. They had the right to cancel participation in the study any time without any impact on participants.

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# Why is Education Important to Prevent Cognitive Impairment? A Cross-Sectional Study in Jakarta Indonesia

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## Abstract

**Background:** Cognitive impairment may lead to dementia, which can affect the elderly quality of life. Improving awareness and prevention of dementia risk factors become very essential to prevent cognitive impairment, and one of the effort is through.

**Objective:** This study aimed at observing the relationship between elderly characteristics as dementia risk factors with cognitive impairment incidence.

**Method:** Descriptive study with a cross-sectional approach was used. The population was elderly who resided in Special Capital Region of Jakarta, Indonesia. A sample of 341 elderlies, aged 60 years old or above was selected and screened through multistage random sampling. Chi-Square and Fisher's Exact tests used to analyze the data.

**Results:** The results of dementia screening using CDT found as much as 91.8 %elderly were suffered from cognitive impairments. There was a significant correlation between sex and educational background with cognitive impairment( $p=0.003$  and  $p=0.005$ ).

**Conclusions:** Educational background can affect individual's cognitive level. Elderly is expected to keep stimulating their cognitive, socializing, and maintaining their physical exercise.

**Keywords:** *Cognitive impairment, education, elderly, prevention, risk factor dementia*

## Introduction

The number of older people in Special Capital Region of Jakarta has been raising from 5.13% of a total 9.6 million of population during 2010, and is expected to keep raising to 16.39% of the total 11.5 million of population in 2035. Meanwhile, life expectancy in Jakarta in 2010—2015 is 71.6 years, and it will keep raising to 73.9 years in 2030—2035.<sup>1</sup> This data show that the raising of population is directly proportional with increasing age.

One of main common issues for older people, which also become the main cause of high demand in nursing care, around the globe with the prevalence of fifty million people is dementia or cognitive impairment.<sup>2</sup> The prevalence of dementia incidence in Indonesia

during 2015 has reached 1.2 million people. This data are predicted to keep increasing up to 1.9 million people in 2030 and almost hit four million people in 2050.<sup>3,4</sup>

Dementia or cognitive impairment is associated with lower life expectancy, and it is considered to be a terminal disease with mortality as the consequence of the main functional. This issue demonstrates on the increasing demand on palliative care for elderly with severe dementia.<sup>5</sup> Cognitive impairment can also affect the elderly's quality of life.<sup>6</sup> Prevention and caring strategy become crucial in decreasing nursing care demand and increasing health status as well as quality of life of the elderly.<sup>7,8</sup> which are common problems among the elderly people, account for a wide range of aging disorders. Group reminiscence can be used as a profitable therapeutic method for preventing cognitive-

behavioral disorders in older adults. Therefore, we aimed to investigate the effect of group reminiscence on the cognitive status of elderly people. **METHOD** This study was a non-blinded randomized controlled trial. We enrolled 100 elderly people who were under the support of Ilam Welfare Organization, western Iran in 2013. Balanced block randomization method was used to randomize the participants into intervention and control groups. Elderly people in the intervention group participated in a group reminiscence program consisted of two one-hour sessions per week for 8 consecutive weeks. Data were collected using Mini Mental State Examination (MMSE).

Factors in cognitive impairment prevention must be known in addition to dementia risk factors. One of the factor, which corresponds to cognitive performance, is a long-term formal education.<sup>5</sup> Low level of education is a strong predictor to the cause of dementia in the future.<sup>9</sup> Intervention, and care will vastly improve living and dying for individuals with dementia and their families, and in doing so, will transform the future for society. Dementia is the greatest global challenge for health and social care in the 21st century. It occurs mainly in people older than 65 years, so increases in numbers and costs are driven, worldwide, by increased longevity resulting from the welcome reduction in people dying prematurely. The Lancet Commission on Dementia Prevention, Intervention, and Care met to consolidate the huge strides that have been made and the emerging knowledge as to what we should do to prevent and manage dementia. Globally, about 47 million people were living with dementia in 2015, and this number is projected to triple by 2050. Dementia affects the individuals with the condition, who gradually lose their abilities, as well as their relatives and other supporters, who have to cope with seeing a family member or friend become ill and decline, while responding to their needs, such as increasing dependency and changes in behaviour. Additionally, it affects the wider society because people with dementia also require health and social care. The 2015 global cost of dementia was estimated to be US\$818 billion, and this figure will continue to increase as the number of people with dementia rises. Nearly 85% of costs are related to family and social, rather than medical, care. It might be that new medical care in the future, including public health measures, could replace and possibly reduce some of this cost. Dementia is by no means an inevitable consequence of reaching retirement age, or even of entering the ninth Key messages 1 The

number of people with dementia is increasing globally. Although incidence in some countries has decreased. **2 Be ambitious about prevention** We recommend active treatment of hypertension in middle aged (45-65 years). The ability of individuals in understanding and processing information can influence their health literacy in which it corresponds to literacy function and cognitive. However, health literacy concept is still wide and complex, which needs to be understood to decide on health caring, prevention, and health promotion in maintaining and improving the quality of life.<sup>10</sup>

According to some researches there are positive correlation between health literacy proficiency and cognitive function in older adult, yet the longitudinal relationship between level of education and cognitive impairment in Jakarta still remains unobserved. Therefore, this research attempted to observe the relationship between levels of education with cognitive impairment and how to prevent it.

## **Material and Method**

This study was a cross-sectional research conducted in five main regions of Jakarta, Indonesia, using a multistage random sampling. 341 subjects were selected through Rule of Thumbs, while there was a 10% of subject dropouts from the total of estimated sample. The inclusion criteria for the subjects were aged 60 years old or more, living with their family, and signing the informed consent. Subjects were excluded under the following circumstances: lack of communication skill, being critically ill or in bedrest condition, having impaired hearing, and unwilling to participate.

The protocol of this study was approved by the Ethics Committee of Faculty of Nursing, Universitas Indonesia, written in the approval letter number 46/UN2. F12. D/HKP.02.04/2018. The subjects were informed beforehand about the objectives and method of the study, and the written and signed informed consent was obtained from their caregivers.

The survey was conducted in residence of participants. Computer program was used for data entry and analysis. The demographic information was obtained from subjects and caregivers, including age, sex, education, history of smoking habit, social activity, and doing exercise were summarized using frequencies (percentages).

Tests and scales including Clock Drawing Test

(CDT) was used as dementia screening tests for elderly. CDT consists of 4 commands to draw a circular clock with numbers and hands completely.

**Funding:**

**Table 1. Elderlies characteristics distribution in Jakarta (N=341)**

Characteristic(s)	Frequency	Percent(%)
<b>Age</b>		
60 – 65 years old	156	45.7
≥ 66 years old	185	54.3
<b>Sex</b>		
Male	105	30.8
Female	236	69.2
<b>Educational Background</b>		
Poor	297	87.1
High	44	12.9
<b>Social Activity Involvement</b>		
Yes	251	73.6
No	90	26.4
<b>Physical Exercise</b>		
Yes	91	26.7
No	250	73.3
<b>Smoking Habit</b>		
Yes	38	11.1
No	303	88.9

A total of 341 elderlies who reside with their families participated in this research. Most of the elderlies are above 66 years old (54.3 %), female (69.2 %), are have only completed elementary schooling (87.1 %), did not doing routine physical exercise (73.3%), smoking habit (11.1 %), and are not involve in social activities (26.4 %). The demographic characteristic of respondents were showed in Table 1.

Community-based cross-sectional study was conducted to analyze relationship between elderly’s characteristic with cognitive impairment. Of the 354 subjects in the dataset, 326 subjects were identified as cognitive impairment. More detailed information about cognitive impairment can be seen in table 2.

**Table 2. Elderlies distribution based on the incidence of cognitive impairment in Jakarta(N=341)**

Cognitive Impairment	Frequency	Percent (%)
Yes	313	91.8
No	28	8.2

**Table 3. The correlation of elderlies characteristics and cognitive impairment**

Variable(s)	Cognitive Impairment				Total		P value	OR (95% CI)
	Yes		No		N	%		
	N	%	N	%				
<b>Age</b>								
60 – 65 years old	144	92.3	12	7.7	156	100	0,903	0.880 (0.403-1.922)*
≥ 66 years old*	169	91.4	16	8.6	185	100		
<b>Sex</b>								
Male	89	84.8	16	15.2	105	100	0.003	3.356 (1.526-7.377)*
Female*	224	94.9	12	5.1	236	100		
<b>Educational Background</b>								
Poor*	278	93.6	19	6.4	297	100	0,005 <sup>a</sup>	3.762 (1.580-8.958)*
High	35	79.5	9	20.5	44	100		
<b>Social Activity</b>								
Yes	230	91.6	21	8.4	251	100	1.000	1.083 (0.444-2.640)*
No*	83	92.2	7	7.8	90	100		
<b>Physical Exercise</b>								
Yes	82	90.1	9	9.9	91	100	0,647	1,334 (0.581-3.067)*
No*	231	92.4	19	7.6	250	100		
<b>Smoking Habit</b>								
Yes*	32	84.2	6	15.8	38	100	0.075 <sup>a</sup>	0.418 (0.158-1.106)*
No	281	92.7	22	7.3	303	100		

<sup>a</sup> fishers Exact

The statistical test with CDT's screening tool shows the p-value for gender is 0.003, which means there is a significant correlation between gender and cognitive impairment. The analysis of the correlation between educational background and cognitive impairment shows that the proportion of elderlies with poor education have increased cognitive impairment compared to those who are well-educated. The result of the statistical test shows p-value= 0.005, which means there is a significant correlation between educational background and cognitive impairment.

The findings showed that 313 (91.8%) elderly had cognitive impairment. The impairment took form of changes in cognition, such as perception, counting ability, memory, verbal, executive function or problem-solving ability, and daily activity independency. This finding affected the needs of special caring for elderly.<sup>5</sup>Cognitive function also has a meaningful relationship with the quality of life of elderly.<sup>6</sup>

There are factors affecting cognitive function, which can be modified and left unmodified. For the modified factors, this study had proven that there was an insignificant relationship between smoking habits, social activity, and physical exercise with cognitive function. However the elderly with smoking habits have chances of cognitive impairment 0.4 times higher. Moreover, elderly who do not regularly socialize has a higher chance of cognitive impairment and 1.3 times higher chances of cognitive impairment for elderly who do not do physical exercise regularly. The finding in smoking habits with cognitive impairment is supported by previous research with the same topic of dementia.<sup>11</sup>Meanwhile, other researches show a meaningful relationship between physical exercise and social activity with cognitive impairment.<sup>12,13</sup>

Other factors, such as age and sex, cannot be modified. Moreover, this study has proven that there is a meaningless relationship between age and cognitive impairment. A theory says the aging process, which affects cognitive function, can be physiologic or pathologic in which a deep observation in physical changes, central nerve system, intelligence, memory, and psychologic changes corresponding to cognitive function and aging process.<sup>5</sup>In conclusion, age is not absolutely affecting cognitive function pathologically.

Other data show that the number of female elderly who experience cognitive impairment is 224 elderlies,

yet the number of male subjects is 89 elderlies. This data show female elderly outnumber the male subjects as the result of female higher life expectancy than male elderly.<sup>14</sup>This study explained the meaningful relationship between sex and cognitive impairment ( $p=0.003$ ). Sex types can affect cognitive function because of biological mechanisms such as genetic, different hormones, different brain cells, and external factors, like economic, social, as well as cultural factors.<sup>15</sup>This study is supported by previous research, which explains that female elderly have a chance of 1.158 times to get dementia higher than male elderly.<sup>11</sup>

Other than risk factors of dementia there is also a factor in preventing cognitive impairment. A factor, which continuously affects cognitive performance on the elderly is formal education.<sup>5</sup> Education is a process of learning, training, and educating to enhance knowledge and aptitude as well as to get experience in educating something.<sup>16</sup> Education aims to improve attitude and behavior, which include cognitive and affective aspects of individuals or group.<sup>17</sup>

Low levels of education can be a dominant predictor for the elderly in getting dementia or cognitive impairment.<sup>9</sup>intervention, and care will vastly improve living and dying for individuals with dementia and their families, and in doing so, will transform the future for society. Dementia is the greatest global challenge for health and social care in the 21st century. It occurs mainly in people older than 65 years, so increases in numbers and costs are driven, worldwide, by increased longevity resulting from the welcome reduction in people dying prematurely. The Lancet Commission on Dementia Prevention, Intervention, and Care met to consolidate the huge strides that have been made and the emerging knowledge as to what we should do to prevent and manage dementia. Globally, about 47 million people were living with dementia in 2015, and this number is projected to triple by 2050. Dementia affects the individuals with the condition, who gradually lose their abilities, as well as their relatives and other supporters, who have to cope with seeing a family member or friend become ill and decline, while responding to their needs, such as increasing dependency and changes in behaviour. Additionally, it affects the wider society because people with dementia also require health and social care. The 2015 global cost of dementia was estimated to be US\$818 billion, and this figure will continue to increase as the number of people with dementia rises. Nearly 85% of costs are related to family and social, rather than

medical, care. It might be that new medical care in the future, including public health measures, could replace and possibly reduce some of this cost. Dementia is by no means an inevitable consequence of reaching retirement age, or even of entering the ninth Key messages 1 The number of people with dementia is increasing globally Although incidence in some countries has decreased. 2 Be ambitious about prevention We recommend active treatment of hypertension in middle aged (45-65 years. The data showed a meaningful relationship between levels of education with cognitive impairment for *p-value* 0.005. This is supported by a previous study with the same topic, which showed *p-value* 0.012, that the elderly with a low level of education is 10.831 times higher in getting dementia.<sup>11</sup> Other researches also described education as a risk factor that had a meaningful relationship with cognitive function ( $p=0.017$ ). The number of elderly who suffers from cognitive impairment reached 75% of elderlies.<sup>18</sup>

A concept of cognitive reserve is assumed to be a healing factor in decreasing the risk of dementia as well as cognitive impairment.<sup>19</sup> Cognitive reserve is defined as the mind's resistance to damage the nerve or neuro-pathologic.<sup>20</sup> Cognitive activities can stimulate cognitive reserve and buffer effect in preventing quick cognitive impairment.<sup>21</sup> individual caregivers, health care professionals and on the use of resources. Existing therapeutic interventions can only help control or reduce symptoms, and slow the disease's progression. Identifying protective factors or effective prevention strategies would result in considerable benefits. Participation in cognitive leisure activities has been implicated as a possible prevention strategy. OBJECTIVE The objective of the review was to establish best practice in relation to cognitive leisure activities in preventing dementia among older adults. INCLUSION CRITERIA Randomised controlled trials (RCTs) Cognitive stimulation can delay or even prevent impairment as a result of the aging process, Alzheimer-dementia, or MCI.<sup>22</sup> Besides the WHO has recommended cognitive stimulation for older people, whether they already have cognitive impairment or have not yet.<sup>23</sup>

Many studies have proven the link between the level of education with dementia. Exposure to modifiable risk factors such as education levels starting from childhood to old age can reduce the occurrence of cognitive impairment. It can also strengthen the capacity of individuals and populations to be able to make healthier life decisions, adopt healthier lifestyles, and improve

health status.<sup>13</sup> This is supported by research there is correlation between information support, appreciation, and emotional support with the activities of elderly hypertension.<sup>24</sup>

## Conclusion

Risk factors for cognitive disorders such as age, sex, education, social activities, sports, and smoking should be a concern for the elderly and their accompanying family. For its members to stay active and productive by continuing to do cognitive stimulation, social activities, and exercise according to ability. For families who still have children to make their children pursue the highest level of education, both formal and informal.

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# Breast Cancer: Self-Concept and Quality of Life for Patients in Wahidin Sudiro Husodo Hospital Makassar City, Indonesia

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## Abstract

Breast cancer (*carcinoma mammae*) is a malignant neoplasm derived from the parenchyma group. Purpose of this study to analyze relationships self-concept with quality of life in breast cancer patients at wahidin central public hospital sudirohusodo Makassar. This study used an study design *observational analytic* with approach *cross sectional*. The population in this study were breast cancer patients at the general hospital center. Wahidin Sudirohusodo Makassar amounted to 174 people the sample was drawn by *purposive sampling technique*, a sample of 32 people. Data collection is done using a questionnaire. The results showed that self-concept was significantly associated with quality of life ( $p= 0.022$ ). There is a relationship between self-concept and quality of life based on marital status ( $p= 0.022$ ). There is a relationship between self-concept and quality of life working as civil servants (PNS) ( $p= 0.053$ ). Conclusion: self-concept is related to quality of life based on marital status and employment in breast cancer patients. It is expected that the results of this study can be taken into consideration in increasing bio.psoio and spiritual nursing care services so that it can help clients choose adaptive coping.

**Keywords:** *Self-concept, quality of life, Breast Cancer.*

## Introduction

Breast cancer is a disease that occurs due to excessive growth or uncontrolled development of cells or breast tissue<sup>1</sup>. Risk factors that can cause breast cancer include reproductive factors, endocrine factors, diet and genetics or family history. Breast cancer is one of the health problems of women in Indonesia (also in the world), breast cancer is also influenced by an increase in life expectancy, lifestyle which is detrimental to health, environmental conditions. Cancer is a disease that is very feared by the community because of the high mortality rate. Cancer prevalence throughout the world continues to increase, both in western countries and

Asian countries. The Report *World Cancer* estimates that the incidence of cancer will increase to 15 million new cases by 2020<sup>3</sup>.

WHO data (*World Health Organization*) shows that there are 458,000 annual deaths due to breast cancer in women<sup>7</sup>. The number of breast cancer sufferers in the United States and several other developed countries ranks first in non-communicable diseases<sup>17</sup>. Cases of breast cancer in the United States recorded nearly 200,000 women diagnosed each year there are more than 40,000 die from this disease<sup>4</sup>. Basic Health Research Results (Riskesdas) in 2013 and data in hospitals in Indonesia showed that breast cancer cases were the highest, 1.4 per 1000 residents or around 330,000 people. Cancer is the seventh cause of death in Indonesia. Breast cancer and uterine cancer<sup>14</sup>.

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Based on data obtained from the Hospital Information System (SIRS) in 2007, breast cancer ranked first in hospitalized patients in all hospitals in Indonesia (16.85%), followed by cervical cancer (11.78%)<sup>18</sup>. Data on breast cancer patients at the Central General Hospital.



Dr. Wahidin Sudiro Husodo in 2015 The number of breast cancer patients was 161 people from January to December and in 2016 there were 174 breast cancer patients from January to December.

Breast cancer occurs due to disruption of the cell growth system in the breast tissue. There are several factors that become the risk of breast cancer, namely a family history of breast cancer, early menstruation, advanced menopause, hormone replacement therapy, radiation, alcohol consumption<sup>18</sup>. According to Hartati, (2008). The results of the study can be seen that more than half (53.4%) of breast cancer patients have negative self-concept and some other studies show negative self-concept of up to 87.9%. Therefore it is recommended that the implementation of educational and psychological programs to reduce the consequences of poor quality of life. Family support is very important for self-concept of breast cancer sufferers because the family is the closest person to the respondent so that any form of illness suffered by family members or breast cancer that can affect self-concept, will always be accepted by the family will give the best for family members. If an individual gets moderate to low social support, individuals will experience negative experiences, reduce self-confidence and not be able to control changes in their environment such as feeling ignored<sup>27</sup>. Cancer patients also extend self-actualization and support from the government<sup>28</sup>.

Based on this study the quality of life of patients with breast cancer undergoing chemotherapy in the Chemotherapy Room at AM Parikesit Tenggarong Hospital was obtained from the estimated interval on quality of life believed that 95% of the median value 59.30 was in the range of 58.69-67.07 with a value the highest quality of life is 51.00. The suffering experienced by a cancer sufferer is understood as a process of personal maturation. There is a personal change towards the positive that cancer sufferers experience in their struggle for survival<sup>23</sup>.

Based on the description above the researcher is interested in conducting research to find out the relationship between self-concept and quality of life in breast cancer patients with guidelines on self-concept of breast cancer patients including body image, self-ideal, self-esteem, role appearance, and self-identity later on quality Breast cancer patients include physical aspects, social aspects, psychological aspects, and environmental aspects.

## Material and Method

Type of research used in this study was *observational analytic* with design *cross sectional*. This study aims to determine the relationship between self-concept and quality of life in breast cancer patients in the Polyclinic of the Central Hospital General Dr. Wahidin Sudirohusodo Makassar.

This research was conducted at the Central General Hospital. Wahidin Sudirohusodo Makassar. The location of this researcher was chosen because it included type A hospitals which were estimated to be able to meet the desired sample size. The number of samples in this study were 32 breast cancer patients from 174 population data. The data used were primary data, namely data obtained directly at the location of the study with the questionnaire method by distributing questions in writing in the form of questionnaires directly given to respondents. Data obtained at the polyclinic of the Dr. Central General Hospital Wahidin Sudirohusodo Makassar regarding the number of patients with breast cancer as a whole.

**Findings:** Results of this study were carried out at the Polyclinic Center General Hospital Dr. Wahidin Sudirohusodo Makassar from June 5 2017 to June 8, 2017 with a total of 32 respondents. The research method used in this study was *observational analytic* with design *cross sectional*. The results of data processing that has been done is presented as follows

Knowing yourself is very important in an effort to develop yourself, meaning that it is impossible for personal development to occur without first recognizing weaknesses and excellence in him. This means that the individual has the ability to determine what is best in itself in order to improve the quality of his life<sup>8,9,10</sup>.

The results of this study also showed that there was a significant relationship between the self-concept of former lepers through personal communication in the Makassar area. The formation of self-concept through interpersonal communication is the way a person views himself through interaction with others. Even self-concept tends to give a picture and assessment of oneself based on the relationship with the people around him. This tendency is indicated by the ability to think and judge someone either himself or someone else or give the perception of others by trying to give an assessment<sup>23</sup>

**Table 1. Relations Self Concept Quality of Life in Patients with Breast Cancer at Polyclinic General Hospital Center Dr. Wahidin Sudirohusodo Makassar**

Self Concept	Life quality						ρ
	Good		Less		Amount		
	n	%	n	%	N	%	
Positive	17	70.8	2	25.0	19	59.4	0.022
Negative	7	29.2	6	75.0	13	40.6	
Total	24	75.0	8	25.0	32	100.0	

**Table 2: Relationship Self Concept Quality of Life in Patients With Breast Cancer Based Marital Status at Polyclinic of General Hospital Center Dr. Wahidin Sudirohusodo Makassar**

Marital status	Self Concept	Quality of life						ρ
		Good		Less		Total		
		n	%	n	%	n	%	
Married	Positive	17	53.1	2	6.2	19	59.4	0.022
	Negative	7	21.9	6	18.8	13	40.6	
	Total	24	75.0	8	25.0	32	100.0	

**Table 3: Relationship of Self Concepts with Quality of Life in Breast Cancer Patients Based on Occupation at Polyclinic of General Hospital Center Wahidin Sudirohusodo Makassar**

Work	Self Concepts	Quality of Life						ρ
		Good		Less		Total		
		n	%	n	%	n	%	
Wokers	Positive	4	57.1	0	0	4	47.1	0.053
	Negative	1	14.3	2	28.6	3	42.9	
	Total	5	71.4	2	28.6	7	100.0	
Entrepreneur	Positive	2	50.0	0	0	2	50.0	0.248
	Negative	1	25.0	1	25.0	2	50.0	
	Total	3	75.0	1	25.0	4	100.0	
Hourse Wives	Positive	11	52.4	2	9.5	13	61.9	0.248
	Negative	5	23.8	3	14.3	8	38.1	
	Total	16	76.2	5	23.8	21	100.0	

This is in accordance with the theory of explaining that self-concept is a very decisive factor in interpersonal relationships, because each person will behave according to the self-concept of a positive person will tend to develop positive attitudes about himself, such as good self-confidence and the ability to see and judge positively. Individuals with positive self-concepts tend to be able to cause good behavioral adjustments to the social environment<sup>12</sup>.

The results of the show that self-confidence is one component of self-concept which will increase when patients can ensure that their shortcomings will not provide any obstacles in their work. In addition,

in providing advanced communication can increase a person’s confidence<sup>18</sup>.

**Discussion**

**Relationship between self-concept and quality of life based on marital status:** From the results of this study indicate that self-concept has a relationship between quality of life and marital status, where breast cancer patients need family support they get also keeps them motivated to live their daily lives from her husband or children in the treatment and rehabilitation of her illness.

This is in accordance with the theory put forward by Nofitri (2010), that married individuals have a higher quality of life compared to individuals who are not married, divorced or widowed as a result of the spouse's death. can be one of the reasons they endure treatment routinely, because the presence of a partner during treatment will also help them feel they can get full support and enthusiasm until the role of the husband at this time also greatly affects them<sup>16,19,20,21</sup>.

This was strengthened by research by Ketut NM (2013) with the relationship of the characteristics and attitudes of women of fertile age couples with Pap Smear examination at Sukawati II health center. Denpasar stated that there is a link between marital status and the incidence of breast cancer because in married women there will be reproductive activity during pregnancy or hormone lactation. It is known that breast differentiation is protective to be ineffective. In addition the lactation process will continue to work until the time the process will decrease and decrease by itself. So that if the mother does not understand how the process of breastfeeding properly and correctly will result in the dam of milk and emptying of the alveoli ducts that are not perfect and this can be one of the risk factors for breast cancer<sup>11,12,15</sup>.

According to Kusmiran (2012) stated that there is a link between marital status and the incidence of breast cancer because in married women there will be reproductive activity during pregnancy or hormone lactation. It is known that breast differentiation is protective to be ineffective. In addition the lactation process will continue to work until the time the process will decrease and decrease by itself. So that if the mother does not understand how the process of breastfeeding properly and correctly will result in the dam of milk and emptying of the alveoli ducts that are not perfect and this can be one of the risk factors for breast cancer<sup>6,7</sup>.

Family support is very important for self-concept of breast cancer sufferers because the family is the closest person to the respondent so that any form of illness suffered by family members or breast cancer that can affect self-concept, will always be accepted by the family will give the best for family members. If an individual gets moderate to low social support, individuals will experience negative experiences, reduce self-confidence and not be able to control changes in their environment such as feeling ignored<sup>27</sup>.

### **The relationship between self-concept and**

**quality of life based on work status:** Based on the results of the characteristics of the respondents seen from the work the highest proportion were respondents who were employed by civil servants where there was a relationship between self-concept and quality of life in respondents who worked as civil servants with a specific value ( $p = 0.053$ ). The results of the research above show that workers with civil servants have a quality of life with good self-concept because they have the ease of getting information about the illness, how to treat their illness and have health insurance that makes it easier for the client self-examination and the higher the level of one's education will be more anticipatory so that the handling of the disease can be done<sup>3</sup>.

This also relates to acceptance of themselves. Women who work have a different pattern of thinking than women who don't work because women who work have higher independence than women who don't work, women who work don't have to depend on men in terms of income.

That independence can influence one's self-concept. A woman who has a job to be trained to be more independent will bring confidence and positive self-concept.

This is reinforced by research According<sup>5,2</sup> shows that, women who work have higher self-acceptance than women who do not work tend to be more numerous and this shows a connection with their quality of life, especially in accepting themselves when they are first diagnosed with breast cancer until the treatment they have to undergo all this time undergoing routine as well as the side effects they have had during chemotherapy<sup>22,23,25,29</sup>.

## **Conclusion**

**Based on the research results it can be concluded that:**

- a. Self-concept is related to quality of life in breast cancer patients in the polyclinic of the Center General Hospital. Wahidin Sudirohusodo Makassar.
- b. Self-concept is related to quality of life in breast cancer patients in the polyclinic of the Center General Hospital. Wahidin Sudirohusodo Makassar based on marital status.
- c. Self-concept is related to quality of life in breast cancer patients in the polyclinic of the Center General Hospital. Wahidin Sudirohusodo Makassar

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# Risk Communication in the Air Pollution

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## Abstract

**Background:** Air pollution is the leading cause of death, cognitive impairment, and work productivity so that it inhibits domestic investment and economic growth. Emissions of transportation activities, fuel use household and industry are the biggest sources of pollutants that require a strategy and action plan holistically, to deal with the environmental crisis that is the cause decrease in air quality in Indonesia.

**Material and Method:** Literature review sources come from an online journal database published by PubMed, Proquest, Google Scholar, and other sources such as the report on air pollution. Data of all documents collected manually and systematically.

**Findings and Discussion:** Communicating air pollution is very important as a warning of its effects and also carries out risk management and prioritizes and mitigates risks in public and environmental health decision-making spaces. a review of published studies spanning impact on your health suggests that strategies for preventing the effects of air pollution. However the evidence is base on the studies that are methodologically weak and have little or no underlying theory.

**Conclusion:** The paper concludes with a call for more regions studies to evaluate the role of risk management strategy (with or without improved technologies) to reduce air pollution and burden disease in developing countries as well as interventions that n draw more strongly on existing risk environment theory and practice.

**Keywords:** *Air Pollution, Health Impact, Risk Communication.*

## Introduction

Pollution and its harmful effects on people is health the environment, and the planet have been neglected both by governments and the international development community. Pollution is the largest environmental cause of disease and death in the world today, responsible for an estimated 9 million premature deaths in 2015. 92% of all pollution-related mortality is seen in low-income and middle-income countries. A new *Lancet* Commission on

pollution and health aims to confront and overturn this urgent predicament. The substantial health and economic costs of pollution globally can no longer be ignored<sup>1</sup>.

Approximately half the past decade, awareness about air pollution exposure and its significance for human health has increased. With growing attention on vulnerable populations, increasing environmental diseases caused by pollution according to 2015 data announce that pollution is the cause 9 million premature deaths or nearly 16% causes death in the world<sup>2</sup>. The impact of climate change, exposure, and vulnerability to extreme heat will continue to increase from 1990 onward region, 157 million people were affected by the wave in 2017, compared to the previous year and with an average person experiencing an additional 1-4 days of heat waves per year in the same period<sup>3</sup>.

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For the national economy there are 153 billion hours of work lost in 2017 due to heat. There has been an increase of more than 62 billion per hour since 2000. The direct effects of climate change are expanding in 2017, found a total of 712 extreme weather events which resulted in economic losses of US \$ 326 billion, almost three times the total loss in 2016<sup>4</sup> and choice of, energy technology-*ie*, fuel-stove combinations-and energy-related behaviours. Therefore, whilst health constitutes the largest consequence of solid-fuel use, large-scale intervention programmes will require links to many other sectors, such as energy, rural development, and finance. Complete transitions to electricity or petroleum-based fuels, such as natural gas and kerosene, will certainly provide substantial health gains.<sup>5,6</sup> (Although kerosene has several hazards, such as increased risk of poisoning or burns these hazards have not been quantified systematically, and are probably smaller than the benefits of kerosene from reducing pollution..

Air pollution is damage to components air due to air density and emissions tall one by industrial activities or transportation activities which disturbs the ecological balance and negative effect in human life<sup>5</sup>. Motor vehicles produce emissions whose concentration depends on the year of the vehicle and type of fuel used. Vehicles that are manufactured with longer manufacturing will emit higher emissions compared to new vehicles. in addition, vehicles that use gasoline will produce different types of emissions from diesel-fueled vehicles<sup>6</sup>.

Risk communication includes the range of communication capacities required through the preparedness, response and recovery phases of a serious public health, risk communication is recognised as the multi-directional communication. However populations so that they can take informed decisions to protect themselves and their loved ones. The goals of risk communication are to share information vital, minimizing harm to self and others, and o change beliefs or to change behavior<sup>7,8</sup> Risk communication is a form of exchange of information and perspectives or views, along with factors, factors relating to risk among risk reviewers, risk managers, consumers and other interested parties. We adopt the definition of risk communication<sup>9</sup>.

The extensive list demonstrates the variety of goals and objectives that can be associated with risk communication programs. Increasing trust and credibility may be one major objective, but certainly is not the sole objective of risk communication. But many objectives,

such as behavioral changes or fair participation, rely on a minimum of trust among the communicators in order to be effective.<sup>10</sup>

Many of the global environmental problems that we are now facing have their precedence and causes in the cities and urban areas we live in. Lessons in understanding urban risk are now emerging – urban hazards and risk are predominantly human-induced, and exacerbate natural events. Various economic, social, and economic aspects compound the risks that urban residents face. Urban lifestyles and resource consumptions can be directly or indirectly attributed to the many environmental consequences that we are seeing – both within the city, as well as the entire hinterland or urban watershed that it is located in<sup>11</sup>.

Some risk communication problem derive from mistaken beliefs about scientific research on the nature of how risk are assessed and managed and on risk communication itself. scientific information for example can not be expected to resolve all important risk issue<sup>12</sup>.

## Materials and Method

The author conducted a review of accessible literature published over the last 30 years our main objective was to provide evidence of the role chemical component of air pollution of adverse health effects in humans. We commenced a PubMed database search using the “risk communication”, “air pollution”, “environmental health”, “risk assessment “health issue” “climate change”. The Literature was also from other scientific databases including ProQuest and science direct online database search. The article was selected upon by author based on relevance and usefulness.

## Findings and Discussion

**Problem of risk communication:** Two major types problem in risk communication problem deriving from instutional and political system for which little can be done. several kinds of legal considerations,including statutory, mandates, liability and informed consent influences the options available to risk management<sup>12</sup>.

Communication with citicent about risk can increase their desire to participate in or otherwise influences decisions about the control of those risks, threby making risk management even more cumbersome. The interest of citizens an their motivation to participate in the politycal process can introduce difficult chalenges

when that implementation of risk control measures is necessarily decentralized and local preferences.

Risk communication is successful to the extent that it raises the level of understanding of relevant issues or actions and satisfies those involved that they are adequately informed within the limits of available knowledge. Risk communication can also be used as a form of prevention. The first form of prevention is precautionary communication that is communication made to people who don't care and don't want to listen to risk. The second is outrage management, which is

communication that is done to reduce anger or worry about a condition that is actually not too dangerous<sup>7,13</sup>.

Furthermore, in a climate of general distrust toward social organizations, it is helpful to accept countervailing powers and public control and to provide public access to all relevant information. On the basis of these structural opportunities for public involvement and control, specific communication programs can be designed that include elements of successful persuasion. How can one make a message attractive provided that the information given is accurate, complete, and honest?

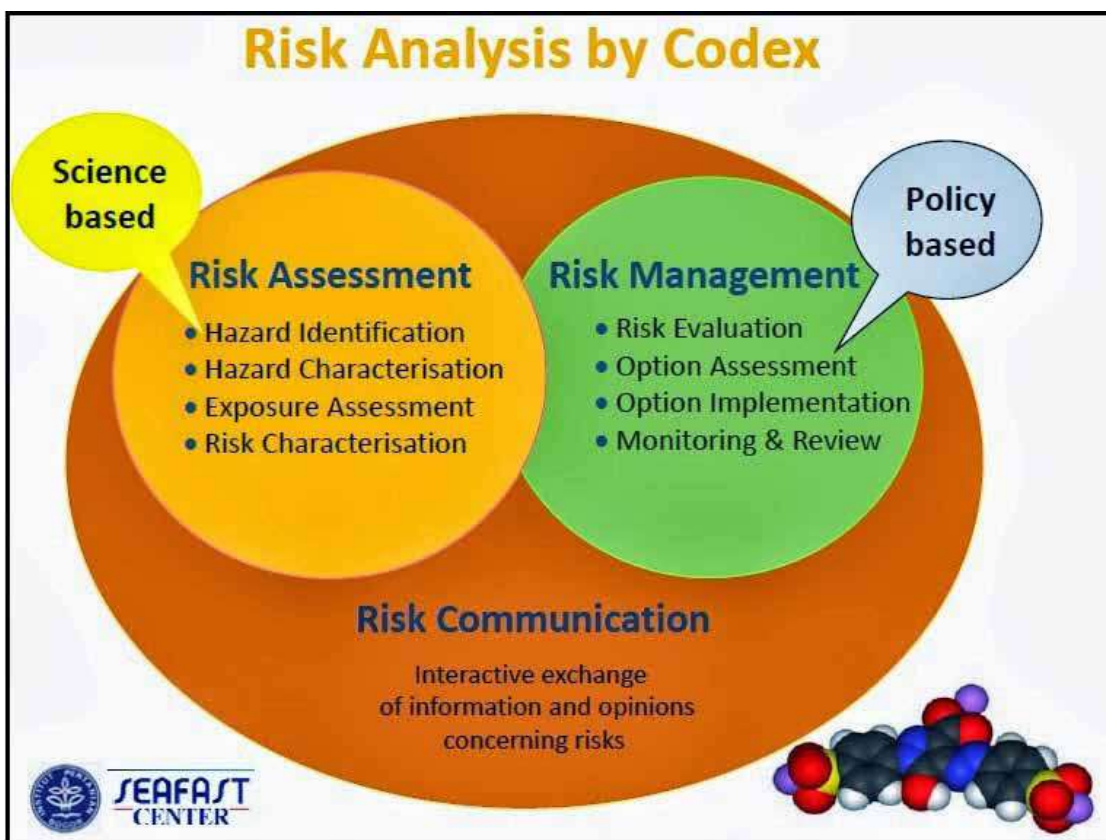
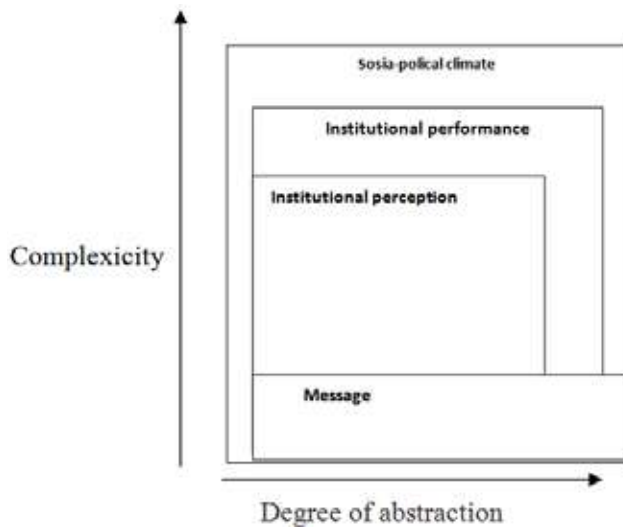


Figure 1 : Risk assessment or chemical contamination.

**Trust in information:** Political science and risk communication scholars have identified a number of factors that relate to trust, including confidence in the government's preparedness, honesty, willingness to disclose information, dedication and caring. Personal experience informs perceptions of trust and which organizations the public deems trustworthy. These factors can be divided into three broad categories: (1) Public perceptions of the government; (2) Personal experience and (3) Trustworthy organizations.

**Risk analysis and action planning:** Risk assessment consisting of hazard analysis and vulnerability analysis is a basic instrument of DRM that is used to study the factors of disaster risk and provides the basis for planning and implementing measures to reduce risks and impacts of disasters. Action Planning is the follow-up process that engages with the local stakeholders and leads to actionable plans that are based on the assessed risk and focus to reduce it, and that are more dependent on local aspirations and capacities than external support<sup>14</sup>.



**Figure 2 : The five levels of analyzing trust :** illustrates the cumulative nature of these five levels. The figure is simple illustration of the interrelations among the five levels . Each level is embedded in the next higher level.

Finally, implementation management is the key process that translates the plans into ground reality, and needs to be founded on principles that are in tandem with those of action planning so as to ensure implementation that is true to the essence of local plans and is sustainable beyond project durations. This chapter will focus on the concepts of risk analysis (RA), action planning, and implementation management from the point of view of urban disaster risk. RA is used here to refer to a method of determining the quantitative or qualitative degree of risk. The terms “risk analysis,” “action planning” and “implementation management” have the underlying concept of “participative approaches.” This means that the affected target population is involved in the various stages of all of these processes.<sup>15</sup>

**International Impacts on Local and Regional Air Pollution:** Many types of air pollutants have been observed. including primary pollutants that are emitted directly like soot particles from a diesel vehicle, dust blowing in the wind from the desert or degraded agricultural land, mercury from coal-fired power plants, pesticides from agricultural operations, and nitrogen oxides from motor vehicles. They also include secondary pollutants that are made in the atmosphere by chemical reactions<sup>16</sup>

Increasing vehicle speed will result in lower emissions of carbon monoxide and hydrocarbons per vehicle-mile, while oxide emissions from nitrogen will

increase per vehicle-mile as speed increases. Because the three types of pollutants above are completely undesirable there is no general rule regarding the best speed from an air quality perspective. The same thing has been proven in modeling Padang City’s air quality. In another study of the comparison of several models to calculate pollutant concentrations, CO concentrations were obtained proportional to the increase in traffic volume and decrease in vehicle speed<sup>17,18</sup>.

**Health Benefits from Air Pollution:** The traditional understanding of environmental policy, reflected in the language of the U.S. Clean Air Act, holds that the marginal health benefits associated with abatement become smaller as the air becomes cleaner. Recent research results, which suggest that the C-R function for PM2.5 may in fact be supralinear at levels of air pollution prevalent in low and middle-income countries such as China and India, suggest that the traditional understanding of policy may be incorrect. A supralinear C-R function, if correct, would imply that the percentage reduction in mortality per unit of abatement would be lower at the higher air pollution levels currently found in India and China than in the United States. This implies then that considerable improvements in air quality will be required to achieve substantial reductions disease burden. However the marginal benefits associated with pollution control policies depend also upon the size of the exposed population, baseline death rates, and the value attached to reductions in mortality risks. Therefore, even incremental improvements could confer important public health benefits. This is the view embodied in the World Health Organization’s (WHO) world air quality guidelines, which include interim targets in addition to the much lower air quality guideline itself<sup>16,19</sup>.

**Contemporary environmental issues and climate change:** Climate change is one of the natural phenomena that has occurred for a long time, however, this issue will be of concern to the global community with the IPCC study which states that global warming will occur closely with human activities since the mid-20th century<sup>20</sup>.

Global warming has become an indisputable fact about current livelihoods. Environmental problems make us vulnerable to disasters and tragedies, we are in a planetary emergency with problems that are piled high around us unless we take these issues seriously and need immediate attention Impact of air pollution on human health<sup>21</sup>.



Known health effects in the population are divided into two categories: mortality and morbidity. The number of people who are exposed to chemical contaminants in the air at low levels, far greater than the number of exposed at high enough levels to produce a clear response. Subsequent low levels of exposure are often repeated over a period of years, and the frequency of chronic diseases that are also present in the exposed population. For example any small increase in the incidence of heart disease or lung cancer caused by exposure to certain chemicals will be difficult to detect, because this disease is present at high levels in the exposed population<sup>22</sup>.

### Conclusion

In conclusion, as the atmospheric environment is a complex system. There are many factors affecting the quality of the atmospheric environment and the relationship between them is complicated. Therefore air pollution forecasting based on the area and different pollutants should choose different forecasting risk analysis. Moreover there is one best approach to make the most accurate forecast.

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# HIV/AIDS Awareness of People Who Work at Barbershops and Beauty Salons at Al-Nasiriya City in Iraq

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## Abstract

**Context:** Barbers and beauty salons are cosmetic staff undertaking skin piercing practices involving reusable sharp instruments, which present risks for transmission of HIV and alternative blood-borne pathogens.

**Aim:** Assess the level of awareness on HIV/AIDS and its risk factors, attitude towards HIV/AIDS and to spot high risk behaviors related to HIV/AIDS among a person who uses Barbershops and beauty salons at Nasiriya City in Iraq.

**Methodology:** A cross sectional study was conducted to assess knowledge attitude and practice with respect to the transmission and prevention of HIV/AIDS among barbers and beauty salons in Nasiriya city in Iraq.

**Results:** A total of 107 Barbers and Beauty salons participated in the age groups were 16% below 20 years, 42% 21-30 years, 27% 31-40 years, 13% 41-50 years and 2% above 50 years (Barbershops) and followed by Beauty salons were in the age group of 5% below 20 years, 58% 21-30 years, 32% 31-40 years and 5% 41 to 50 years. Among the participants, 82% were male and 18% were female.

**Conclusions:** Participants have a good knowledge regarding HIV/AIDS. Health strategies such as support supervision and training are needed to facilitate effective preventive measures against HIV disease among beauty salon and barbers workers.

**Keywords:** HIV/AIDS; Awareness; Barbers and Beauty Salons; Nasiriya City.

## Introduction

HIV/AIDS could be a major medical, public health still as a grave socioeconomic challenge to the world. HIV disease continues to be a serious global public

health issue. Inadequate Knowledge, negative Attitudes and risky practices are major obstacles to prevent the spread of HIV.<sup>[1]</sup> Skin is one of the natural, barriers for pathogens to enter and used as protecting the organ. Its integrity is responsible for prevention of infection like HIV/AIDS.<sup>[2]</sup> Barber's shop could be a source of infections agents each blood-borne and different infestation and the sure way to prevent this can be through instrument sterilization after every customer.<sup>[3]</sup> The zone of the Middle East is foremost among the regions within the world with the rapidly growing epidemic of HIV. During this situation, serious and powerlessness are rise because the epidemic is on the increase with proof showing significantly elevating HIV prevalence, new HIV infections, and AIDS-related deaths (Dalia).<sup>[4]</sup>

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A study from Nasiriyaon the knowledge and practice of sterilization of instruments by barbers showed that 93.9% weren't aware of the necessity and method of sterilization.<sup>[5]</sup> This means that almost all the consumers were in danger of contracting these deadly however preventable diseases. Certainly, infection acquired from barbing saloon sometimes results in serious complication because individuals infected with these diseases are not aware until laboratory investigation reveals it. Report from previous research finding revealed that the infectious diseases have high prevalence rate and are being rapidly transmitted to people in non sexual routes such as barbering as well as sexual routes in both developed developing countries with prevalence rates are as follows: HIV 2.2% to 28%, HBV 6.826%, and HCV 2.2 to 4.8%.<sup>[6]</sup> The objective of this study were to evaluate the extent of awareness on HIV/AIDS and its risk factors, angle towards HIV/AIDS and to spot high risk behaviors related to HIV/AIDS among someone World Health Organization uses Barbershops and wonder salons at Nasiriya city in Iraq.

**Materials and Method**

A cross-sectional study, approach been carried out to find the awareness of HIV/AIDS and its risk factors. Approach concerning HIV/AIDS and to classify high-

risk activities related to HIV/AIDS between a person who uses Barbershops and Beauty salons at Nasiriya city in Iraq. The data will be collected from 107 Barbers and Beauty salons participated in the age group 20-60 years. It was carried out over 4 months a time period starting from first March till June 2019 after verbal approval was taken from each person participated in the study. It includes research approach, research design, and population. Study settings, sample size and sampling technique, development, and description of tools, data collection method, and plan for data analysis. The collected information is organized, tabulated, analyzed and interpreted using descriptive and inferential statistics. The data were analyzed by using Statistical Package for Social Science (SPSS) version 20 with both descriptive and inferential statistics. The results were expressed as mean and standard deviation. The data were analyzed by analysis of variance (ANOVA). A probability level (p-value) of less than 0.05 was considered statistically significant.

**Results**

The study involved samples (n=107) who fulfilled the inclusion criteria. The source of previous knowledge of HIV/AIDS is shown in Fig. 1.

**Table 1: Knowledge concerning HIV/AIDS in the study population**

Knowledge	Study Population N=107		Barbershops (N=88)	Beauty Salons (N=19)	Mean ± SD	'p' value
<b>Blood related transmission</b>						
HIV can be transmitted from mother to child	Yes	104	86	18	52±48.08	0.000 (S)
	No	3	2	1	1.5±0.71	
HIV can be transmitted by sharing a needle or a syringe	Yes	105	87	18	52.5±48.79	
	No	2	1	1	-	
HIV can be transmitted by blood transfusion	Yes	105	88	18	53±49.5	
	No	2	1	1	-	
<b>Sex related transmission</b>						
HIV can be transmitted by intercourse	Yes	101	86	15	50.5±50.2	0.000 (S)
	No	6	2	4	3±1.41	
HIV can be prevented by properly using condoms during sexual intercourse	Yes	106	87	19	53±48.08	
	No	1	1	0	0.5±0.71	
HIV transmission can be prevented by pre-marital blood testing	Yes	107	88	19	53.5±48.79	
	No	-	0	0	0	
<b>Other modes of transmission</b>						

Knowledge	Study Population N=107		Barbershops (N=88)	Beauty Salons (N=19)	Mean ± SD	'p' value
	Yes	No				
Definition of AIDS	Yes	91	76	15	45.5±43.13	0.000 (S)
	No	16	12	4	8±5.66	
Is AIDS a serious disease?	Yes	90	74	16	45±41.01	
	No	17	14	3	8.5±7.88	
Is AIDS a contagious disease?	Yes	99	81	18	49.5±44.55	
	No	8	7	1	4±4.24	
HIV cannot be transmitted by shaking hands	Yes	93	78	15	46.5±44.55	
	No	14	10	4	7±4.24	
HIV cannot be transmitted by eating and drinking from the same plate or cup of an infected person	Yes	102	87	15	51±50.91	
	No	5	1	4	2.5±2.12	
HIV cannot be transmitted by wearing the same clothing as a person infected with HIV	Yes	105	87	18	52.5±48.79	
	No	2	1	1	-	
HIV cannot be transmitted by sharing the toilet with a person infected with HIV	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
HIV transmission cannot be transmitted by bite	Yes	103	86	17	51.5±48.79	
	No	4	2	2	-	
A person with AIDS may not show any symptoms for several years	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	

\*p>0.05 level of non-significant; p<0.05 level of significant.

**Table 2: Attitude concerning HIV/AIDS in the study population**

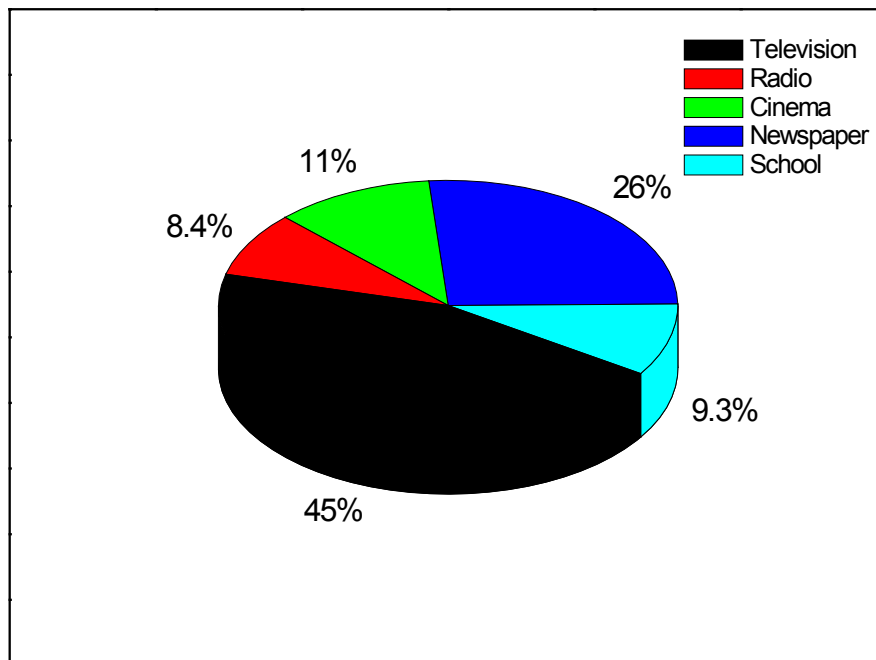
Attitude	Study population N=107		Barbershops (N=88)	Beauty salons (N=19)	Mean ± SD	'p' value
	Yes	No				
If you know that one of your clients infected with the disease did shaving to him?	Yes	103	85	18	51.5±47.38	0.000 (S)
	No	4	3	1	2±1.14	
Do you think that the disease is transmitted to you as soon as you shake hands with him?	Yes	106	87	19	53±43.08	
	No	1	1	0	-	
Would you like to help HIV-positive customer if he need them?	Yes	106	88	18	53±49.5	
	No	1	0	1	-	
Do you think there is a need to isolate person infected with the disease?	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Do you think that the media has an impact on the definition of the disease and ways of prevention?	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Do you think the person with AIDS is a pariah in society?	Yes	105	87	18	52.5±48.79	
	No	2	1	1	-	
Do you think that someone with AIDS can infect others for the rest of their lives?	Yes	106	87	19	53±48.08	
	No	1	1	0	-	
Do you think it is possible to know if a person is infected with AIDS by its appearance?	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Do you think that HIV can be prevented by not sharing the needle?	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Do you think HIV transmission can be avoided through a single partner?	Yes	103	86	17	51.5±48.79	
	No	4	2	2	-	

\*p>0.05 level of non-significant; p<0.05 level of significant.

**Table 3: Practices concerning HIV/AIDS in the study population**

Practices	Study population N=107		Barbershops (N=88)	Beauty salons (N=19)	Mean ± SD	'p' value
	Yes	No				
Handle with pruning tools (needles and other sharp cutting tools) and dispose of them as soon as they are used	Yes	98	82	16	49±46.67	0.000 (S)
	No	9	6	3	4.5±2.12	
Wash hands before and after any operation	Yes	106	87	19	53±48.08	
	No	1	1	0	-	
Washing tools and sterilization between customer and another	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Use protective barriers such as gloves when dealing directly with blood	Yes	105	87	18	52.5±48.79	
	No	2	1	1	-	
Safe disposal of contaminated waste	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Disinfection and sterilization of contaminated instruments and equipment?	Yes	106	87	19	53±48.08	
	No	1	1	0	-	
Do you ask your client before dealing with him whether he has a contagious disease?	Yes	89	78	11	44.5±47.38	
	No	18	10	8	-	
Do you have readings, follow-up and readings about AIDS?	Yes	107	88	19	53.5±48.79	
	No	-	0	0	-	
Do you raise awareness of costumer about AIDS?	Yes	100	83	17	50±46.67	
	No	7	5	2	-	
Have you ever done tests to make sure you are safe from a transitional disease?	Yes	95	84	11	47.5±51.62	
	No	12	4	8	-	

\*p>0.05 level of non-significant; p<0.05 level of significant.



**Fig. 1: Source of HIV information.**

## Discussion

**Knowledge about HIV/AIDS:** Knowledge observed that all respondents represent by blood-related transmission, sex-related transmission and other modes of transmission in barbershops and beauty salons (Table 1). Most of the peoples in both (97.5%) have a good level of knowledge.<sup>[7]</sup> More than 97% of peoples know HIV might be spread via transmitted from mother to child [52±48.08]<sup>[8]</sup>, transmitted by sharing a needle or a syringe [52.5±48.79]<sup>[9]</sup> and transmitted by blood transfusion [53±49.5; p=0.000]. A similar result was reported by Kiran *et al*<sup>[10]</sup> study in whom, 94.12% were aware regarding contaminated needles and syringes, 95.09% on blood transfusion. 3% of peoples have a negative response to the knowledge of HIV/AIDS [1.5±0.71]. 94% of peoples have a positive response about HIV/AIDS knowledge could be transmitted by sexual intercourse [50.5±50.2]. 99% believed the use of a condom can stop HIV spread through sexual intercourse [53±48.08] and 100% of respondents by transmission can be prevented by pre-marital blood testing [53.5±48.79; p=0.000].<sup>[11]</sup> In other modes of transmission, 87% [46.5±44.55] thought HIV through cannot be transmitted by shaking hands, 95% thought HIV through cannot be transmitted by eating and drinking from the same plate or cup of an infected person [51±50.91]. 96% assumed one can get HIV through mosquito bite [51.5±48.79; p=0.000].<sup>[12]</sup>

**Attitude towards HIV/AIDS:** The majority of 96% of respondents confirmed a positive attitude concerning HIV/AIDS<sup>[13]</sup> and 4% has a negative attitude know that one of your clients infected with the disease did shaving to him (Table 2). 99% of peoples have a positive attitude about the disease is transmitted to you as soon as you shake hands with him, HIV can be prevented by not sharing the needle and HIV transmission can be avoided through a single partner.<sup>[14]</sup> Most people have a positive attitude towards HIV know that they think there is a need to isolate a person infected with the disease. The media has an impact on the definition of the disease and ways of prevention. The minority 3% of peoples have negative attitudes towards HIV/AIDS.

**Practices regarding HIV/AIDS:** Table 3 shows that the majority 92% of all the peoples had practice towards HIV/AIDS and handle with pruning tools (needles and other sharp cutting tools) and dispose of them as soon as they are used [49±46.67].<sup>[15]</sup> 99% of peoples had wash hands before and after any operation with practice towards HIV/AIDS [53±48.08]. The

testing practice positive response (100%) had washing tools and sterilization between the customer and another [53.5±48.79]. 98% of the peoples have used protective barriers such as gloves when dealing directly with blood [52.5±48.79]. 82% [44.5±47.38] of peoples had you ask your client before dealing with him whether he has a contagious disease with practices regarding HIV/AIDS.<sup>[16]</sup> 89% of peoples had tests to make sure you are safe from a transitional disease [47.5±51.62; p=0.000] and 11% [4.5±2.12] of peoples have negative test practice towards HIV/AIDS.<sup>[17]</sup> Most of the peoples (95%) have practice towards HIV/AIDS and 5% of peoples have not to practice. Practices regarding HIV/AIDS. The present study is conducted to find out the awareness, attitude, and practice of HIV/AIDS among the peoples who use Barbershops and Beauty salons at Nasiriya city in Iraq. Among the 107 people were studied in the age group of 20–60 years. 88 (82%) males were used in Barbershops and 19 (18%) females were used in Beauty salons.

## Conclusion

The study revealed that the knowledge, attitude, and prevention of HIV/AIDS among, Barbers and Beauty salons. Participants have good knowledge about HIV/AIDS. There are significant gender and urban-rural differentials in Nasiriya in terms of knowledge, attitude, and practices in HIV/AIDS. Continuous such surveys at regular intervals would further help to assess the level of awareness and attitude towards HIV/AIDS for designing future educative programs also there should be rules and regulations from the ministry of health regarding the sterilization and disposal of sharp equipment in barbershops. It is suggested that focusing on interventions programs which helps them in understanding the disease.

**Conflicts of Interest:** There are no conflicts of interest

**Source of Funding:** Nil.

**Declaration:** We declared that this article is an original work and has not been sent to any other journal for publication.

**Ethical Clearance:** Have taken the consent of the patients

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# Pneumonia among Under-Five Children in Indonesia: A Situational Analysis

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## Abstract

Pneumonia is the biggest cause of mortality among under-five children in the world, including Indonesia. However, counter actions in Indonesia is taking form of limited studies that observed pneumonia comprehensively. This review aimed to obtain a comprehensive view of Pneumonia among children under-five in Indonesia. The review applied Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Databases were PubMed, CINAHL, Medline, and SINTA to overview risk factors of Childhood Pneumonia in Indonesia. Other databases were official websites of Indonesia government and International health organization websites to search Pneumonia programs, guidelines, and statistical data. Various datasets from different sources are integrated in to the findings. The review found the coverage of the new case findings of pneumonia children under-fives was low. Limited report and valid data of childhood pneumonia. Many factors identified as risk factors of Childhood Pneumonia. Pneumonia control guidelines have been developed by the Indonesian Ministry of health. However, programs' implementation report and the involvement of social component is minimal. Enhancing civil society roles, comprehensive approaches, and inter-professional collaboration in childhood pneumonia programs would be impacted in preventing pneumonia among under-five children.

**Keywords:** *Cases, programs, pneumonia, risk factors, under-five children.*

## Introduction

Children under-five years are part of a population that is of a considerably higher risk of developing severe diseases, including Pneumonia. Pneumonia is the main cause of mortality among under-five children in the world, including in Indonesia<sup>(1,2)</sup>. Pneumonia is caused by a bacterial, viral, or fungal infection that affects lungs, particularly the alveoli. The alveoli are small sacs in the lungs that, in the event of infection,

fill with pus or fluid resulting in difficulties in breathing, painful breathing, and limited oxygen intake—all of which may lead to death<sup>(1)</sup>. In Indonesia the definition of pneumonia is similar to the WHO definition. Pneumonia is categorized as an Acute Respiratory Infection (ARI). ARIs are the most cited causes of visit to Public Health Centers (40%-60%) and hospitals (15%-30%) among Indonesian children.

The high mortality rate caused by pneumonia in the world encouraged international institutions such as WHO, UNICEF, and Save the Children to develop guidelines that focus on prevention, protection, and treatment of pneumonia<sup>(2-5)</sup>. Since 1984 the Ministry of Health of the Republic of Indonesia has developed programs that focus on family-based promotion and prevention, and the strengthening of pneumonia management, including diagnosis and treatment<sup>(5)</sup>. The *Integrated Management of Childhood Illness* (IMCI) exists to guide screenings

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for childhood pneumonia. Hence, program report and monitoring are limited. Despite prevention efforts, pneumonia prevalence remains high in Indonesia with 20 out of 34 provinces having a prevalence higher than the national average.

Limited studies in Indonesia have presented childhood Pneumonia from many different aspects and analyzed them comprehensively. The aim this review was to provide a comprehensive view of Pneumonia among under-five children situations in Indonesia, including the relevant data, risk factors, programs, and policies.

### Materials and Method

This review applied Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines <sup>(6)</sup>. This approach is suitable to achieve the aims of this study that needs a clear question and uses systematic processes the data processes are integrated into the findings in a final report. The steps of this PRISMA include identification of the relevant data bases and other sources, screening, assessing eligibility, and deciding studies that include in analysis. The steps were determining the literature topic which is prevalence of Pneumonia, surveillance data and reports, health surveys, country policies and guidelines, and gaps in the implementation.

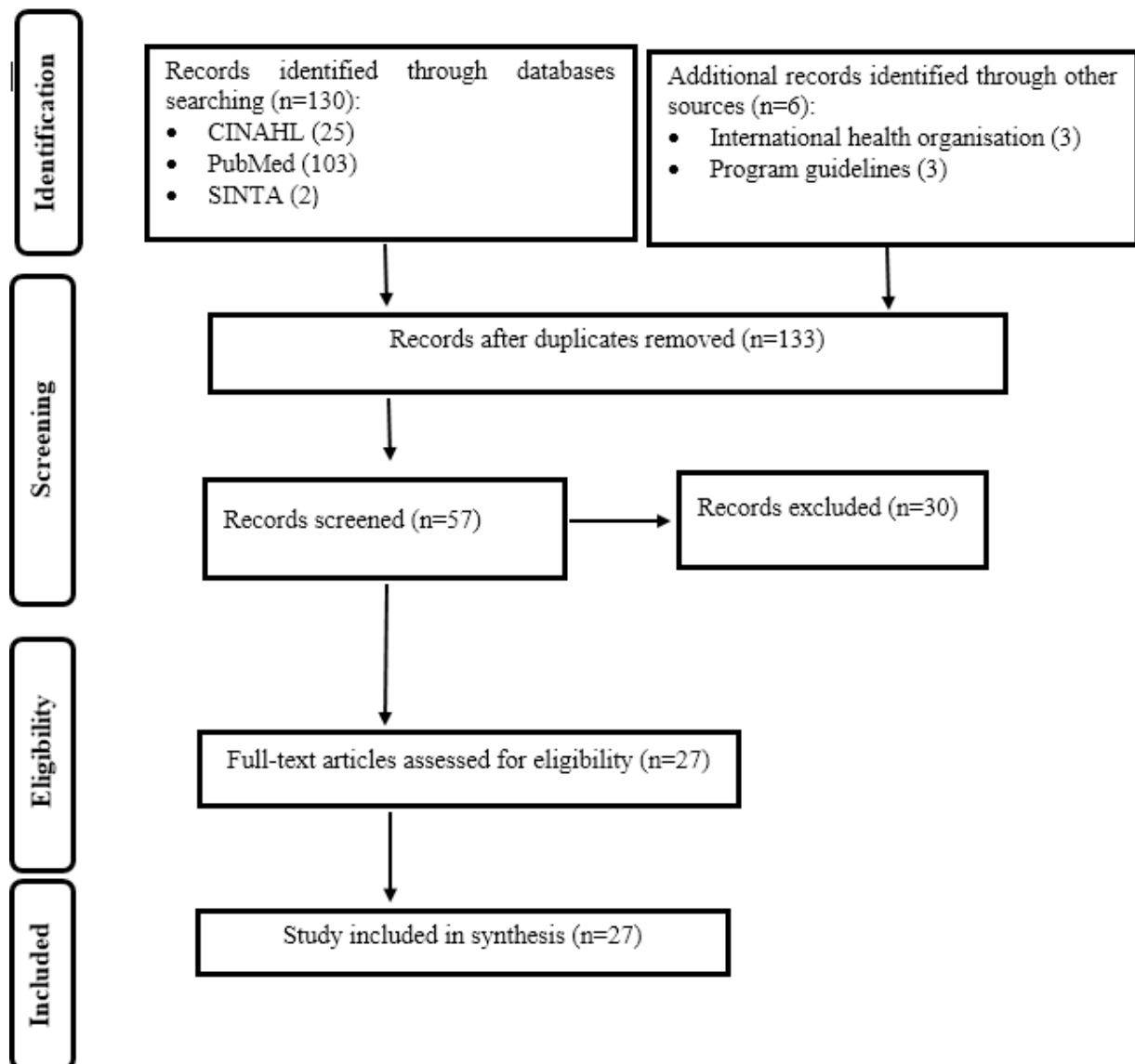


Figure 1: PRISMA flow diagram

The online sources were the Ministry of Health office, local district government reports and data, hospital reports, policy and programs in the local government the National Statistical Bureau, and various databases including PubMed, CINAHL, Medline, and SINTA. Lastly, organizing and analyzing Indonesian literature and comparing the findings with other countries' studies' findings and International guidelines. This review covers information on mortality and morbidity, risks factors, and programs of the Indonesian ministry of health in dealing with and controlling pneumonia.

## Results

**Mortality and Morbidity of Pneumonia in Indonesia:** Pneumonia is also the second leading cause of under-five children mortality after diarrhoea (15.5%) in Indonesia. Pneumonia case rates have increased from 2007 to 2013 (2.1%, to 2.7%). 20 out of 34 provinces in Indonesia had higher pneumonia prevalence compared to the national prevalence, including Aceh, Bangka Belitung, and East Nusa Tenggara. The East Nusa Tenggara (ENT) province has the highest incidence and prevalence of pneumonia in Indonesia (38.5%). The pneumonia prevalence in ENT was twice that of the national prevalence. However, ENT had a very low percentage of coverage of new cases findings in certain districts, including the Sumba Barat district the coverage fluctuated. It was 18% in 2011, slightly increased to 19.2% and 19.3% in 2012 and 2013, and significantly decreased to 4.94% in 2015. None of the reports found established a cause of the changing coverage rates. While the national coverage target of Acute Respiratory Infection Prevention and Control (P2-ISPA) program in 2016 was 90% of number under-five children<sup>(5)</sup>.

**Risk factors of Pneumonia:** Studies identified risk factors of childhood Pneumonia including nutritional status, exclusive breastfeeding, environmental factors, poverty, access to health services, and health knowledge.

- a. **Nutritional status:** A study in Indonesia confirmed that under-fives with poor nutritional status have a 6.52 greater chance of contracting pneumonia compared to under-fives with good nutritional status<sup>(7)</sup>. Another study in Indonesia found that nutritional status is also influenced by parenting, social, and culture, for example children only eat rice<sup>(8)</sup>. Sufficient nutrition supply hinders under-fives from infection disease especially pneumonia.
- b. **Exclusive Breastfeeding:** A study in Indonesia

revealed that breastfeeding decreased pneumonia cases among under-fives<sup>(7)</sup>. In addition, length and duration of exclusive breastfeeding correspond to pneumonia cases among infants<sup>(9)</sup>.

- c. **Environmental factors:** Environment is considered as a pneumonia factor among under-fives. This includes indoor<sup>(10)</sup> and outdoor air pollution<sup>(11)</sup>, cigarette smoke exposure<sup>(12, 13)</sup>, overcrowding<sup>(14)</sup> and bad sanitation<sup>(15)</sup>.
- d. **Conditions of poverty:** Poverty does not always mean the lack of income to afford sufficient quantity and quality of food, leading to malnutrition and inability to access health services that prevent treatment for children; poverty-related situations like low education, lack of knowledge, improper housing and sanitation, lack of access to clean water, and crowded housing also increase the risk of child pneumonia<sup>(16-18)</sup>.
- e. **Access to health facilities:** Access to health facilities is a key factor in preventing and treating childhood pneumonia. Studies found that access to health facilities was a strong determinant of health seeking behavior. When health facilities are not easily accessible the parents or families are discouraged to bring sick children to hospitals or primary health care centers, thus resulting in delayed treatment<sup>(19)</sup>.
- f. **Knowledge, attitudes and practice toward pneumonia:** Knowledge, attitudes and practice surrounding childhood pneumonia affect the occurrence and severity of child pneumonia. The inability to detect the signs of pneumonia and inappropriate or harmful health practices may prevent proper health care seeking behaviour<sup>(20)</sup>, and mother's perception of pneumonia severity was associated with the seeking health care.

**Programs in Preventing and Controlling Pneumonia among Under-Five in Indonesia:** Pneumonia control guidelines in Indonesia have been developed since 1984 as part of the Infection Control program of ARIs. The latest revision was released in 2016<sup>(5)</sup>. The main content of the ARI control program in Indonesia focuses on two specific approaches of family and health service-strengthening.

The Indonesian pneumonia control program involves cross-sectoral collaboration among health services, regional health offices, communities, and NGOs. The roles of each component are described as 52 activities

outlined in the ARI guidebook<sup>(21)</sup>. The activities largely cover the roles of health services and regional health offices, while the involvement of societal components such as communities and NGOs is limited. The roles of communities and NGOs were very general compared to health services' and government officials' roles.

The Indonesian Ministry of Health (MoH) via the Directorate General of Disease Control and Environmental Health (P2PL) has published a module of Standard Management of Pneumonia since 2010<sup>(21, 22)</sup>. The module described in detail actions to prevent and treat pneumonia especially in the community and PHC services. They also have strengthened the Pneumonia guidelines by realising policies and regulations that legally authorized by the President of Indonesia or MoH. The legal policies and regulations were related to the responsibilities, roles and functions of health services, government, and society in prevention of Pneumonia and the risk factors. The Minimum Health Service Standards is regulated in the MoH regulation No. 43 released by 2016, Exclusive Breastfeeding is specified in the government regulation No. 33 released by 2012, and Community Empowerment and Participation in Health development is regulated in the MoH regulation No. 65 released by 2013 (others government policies and regulations attached). The Indonesian MoH have produced various policies and regulations that proven by legislative to protect health activities legally. However, those regulations have not been maximally socialized to society, resulting in limitations of society's participation in health development.

## **Discussion**

Pneumonia is the most leading cause of mortality among under-five children in the world, including Indonesia. The Indonesian government has intensified programs to decrease the pneumonia incidence in Indonesia since 2011<sup>(5)</sup>, but it has become evident that not all parts of Indonesia have been reached equally. The coverage of Pneumonia new cases was less than the national target. However there was not clear explanations about causes of this issue. This may be due to a lack of reporting and valid data either from PHCs or hospital on childhood pneumonia in Indonesia. Several actions were established to improve the reported data of pneumonia among under-fives, however the health data—especially the latest update of the health situation—were either difficult to access, inaccessible, or none were provided. There is a need for comprehensive data on childhood

pneumonia and accessible data.

This review found several risk factors of Pneumonia among under-five children such as nutritional status, breastfeeding, environment, poverty, accessibility, and knowledge. Children with poor nutrition had risk of many infection disease including Pneumonia. Low nutrition status engenders inflammatory response disorder, immune, and disturbs metabolism as well as expose flawed tissue for infection<sup>(23)</sup>. Social, economic and cultural factors contribute in their own way as well. Those aspects coexist in a diverse place like Indonesia, making it difficult to detach nutritional status from parenting and the aforementioned factors that play into it. Low breastfeeding rates contribute to pneumonia cases<sup>(9)</sup>. Breast milk contains immunoglobulin which protects infants from bacteria and viruses. Next the environmental factor has a huge effect on under-fives' health. Under-fives, frail and with imperfect immune systems, are at high risk of diseases like pneumonia.

Social economic status of the family is one environmental factor that has been consistently regarded as a significant predictor of child pneumonia. Available studies vary in defining low economic status or poverty, which potentially leads to finding biases. In many developing countries where a large amount of the population relies on subsistence agriculture or less formal livelihood, objective and reliable measures of income is not always available. Therefore, in addition to income the use other indicators including household possession, dwelling site or service areas could be better in measuring the conditions of poverty<sup>(24)</sup>.

Referring to the context of low-income countries where health facilities are often inadequate, studies suggested improved utilization of skilled community health workers as a means to increase access to health care—especially in the prevention and early treatment of child pneumonia. Empowerment and capacity building of community health personnel should be given consideration as well<sup>(19,25,26)</sup>. Meanwhile, comprehensive child health care such as monitoring of nutrition status, immunization, pre-natal care, and care for prevalent illness can play important roles in reducing hospitalization from pneumonia<sup>(27)</sup>.

The Indonesian government provides comprehensive guidelines to deal with childhood Pneumonia. However the guidelines had limited information about the involvement of other societal components such as health

professional organizations, universities or professional health schools, families, and health volunteers in pneumonia prevention programs. This may lead to limited roles and participation of society in preventing pneumonia and might also affect their awareness of the disease. As a result the study that assessed society's roles in preventing pneumonia is limited despite how societal components have the potential to assist the government in reducing pneumonia mortality and morbidity.

### Conclusion

The updated data related to mortality, prevalence and incidence of child pneumonia in Indonesia are limited. There is an urgent need for comprehensive and accessible data of pneumonia. Nutritional status, environmental factors, social and economic conditions, women's empowerment, knowledge, attitudes and practice toward pneumonia and access to health care are among key risk factors of pneumonia among under 5 years old children. Nevertheless, existing studies were predominantly clinical and quantitative in nature, thus more qualitative studies are needed especially in explaining non-clinical factors associated with the disease. Comprehensive approaches and inter-professional collaboration are needed in dealing with Pneumonia among under-five children in Indonesia.

**Conflict of Interest:** No conflict of interest in this study

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**Ethical Clearance:** Ethical Clearance taken from Universitas Padjadjaran Health Ethic Committee.

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# Health Risks of People Living Close Cipayung Depok Landfill Due to Hydrogen Sulfide Exposure: Respiratory Problems and Malodor Peceptions

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## Abstract

**Background:** Cipayung Landfill operating with open dumping system which exceeded its capacity. The waste which enters the landfill is 800 tons/day and the height of the waste heap reaches 30 meters.

**Objectives:** This study aims to analyze the risk level of H<sub>2</sub>S and to identify respiratory problems and malodor peceptions in people living around the landfill.

**Method:** This study uses the method of descriptive quantitative with analysis health risk approach. H<sub>2</sub>S sampling was carried out at 2 points around the Cipayung landfill closest to resident areas. The number of samples in the study is 100 people who are in Hamlet 07, Cipayung Urban Village. Data collected uses three parts questionnaire consist; general characteristic of respondents, respiratory problems, and malodor perceptions.

**Results:** The highest measurement result of H<sub>2</sub>S is 0.021mg/m<sup>3</sup> with RQ value calculation is 2.98 . Out of 100 respondents, 81% had suffered respiratory problems during living near the landfill the most frequent symptom of respiratory problems in the last 2 weeks was coughing (25%).All respondents (100%) smell foul of the landfill, with the majority saying that the smell disturbs daily activities (70%) and causes unhealthy effects (75%).

**Conclusion:** The RQ value >1 which means people living close to the landfill are at risk of non-carcinogenic effects in the next 30 years. Respiratory problems and malodor perceptions in people living close the landfill indicate that health effects have arisen from the potential hazards of H<sub>2</sub>S. Recommendation: It needs amelioration of processing system and other efforts by the stakeholders to decrease the risk of health and environment problems caused by H<sub>2</sub>S from Cipayung Landfill.

**Keywords:** *Environmental Risk, Landfill, Hydrogen Sulfide, Respiratory Problems, Malodor Perceptions.*

## Introduction

Landfill is the way to manage domestic and industrial wastes in many developed and developing

countries. If landfill not managed properly it can lead to environmental degradation by releasing various contaminants such as groundwater contaminations and odor emissions<sup>1</sup>. There are some bad things that are caused by landfills: Toxins, leachete, and greemhouse gasses. Toxic substances are derived from waste like televisions, and other electronic appliances which contain hazardous substances (mercury, arsenic, PVC), lama kelamaan dapat menyerap ke soil and groundwater, and become environmental hazards. Leachate is highly

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toxic that can pollute the land and ground water. And greenhouse gasses removes the oxygen and causes it to break down in an anaerobic process<sup>2</sup>.

Landfills in the decomposition process can produce harmful gases that can caused health problems. One of the gases produced at the landfill is H<sub>2</sub>S<sup>3</sup>. The respiratory tract and nervous system are the most sensitive organs when exposed to H<sub>2</sub>S exposure. H<sub>2</sub>S at high concentrations can cause someone to lose their ability to smell, so it is wrong to think that H<sub>2</sub>S is no longer available even though it still exists. This can increase the risk of exposure to air levels which can cause serious health effects<sup>4</sup>. Most health effects are respiratory disorders. Complaints of breathing can be coughing, coughing up phlegm, breathing sounds/wheezing, shortness of breath, breathing sound/wheezing accompanied by shortness of breath, chest pain, flu and coughing with flu<sup>5</sup>. Peoples living near the landfill are directly exposing to volatile H<sub>2</sub>S compounds. Long-term exposure to this compound is associated with potential health risks, such as respiratory irritation, cancer and even damage to the central nervous system<sup>6</sup>.

Cipayung Landfill which began operating in 1984, is located in Cipayung Village, Depok City. Cipayung Landfill is a waste collection place originating from 11 subdistricts in Depok City with an area of 10.8 hectares. The area of the Cipayung landfill is categorized as overload with the amount of garbage entering 800 tons per day and will continue to increase with the height of 30 meters of waste generated<sup>7</sup>. The air quality around Cipayung Landfill for H<sub>2</sub>S parameters is 0.14 mg/m<sup>3</sup> (converted to 0.1 ppm) which means it passes the odor threshold value based on the Decree of the Minister of Environment of the Republic of Indonesia Number 50 of 1996 which is 0.02 ppm<sup>8</sup>. Preliminary studies have been carried out by conducting observations and direct interviews with people who live close the Cipayung landfill. It is found that 15 people who have lived more than 15 years mentioned having experienced respiratory complaints such as coughing, chest pain, and most often is a sore throat due to the stench. from landfill. Based on observations obtained smells like rotten eggs smelled quite strong even from a distance of 1 km and smelled stronger when the wind blew.

Despite of the harmful effects caused by landfill there are not previous research on health and environmental impacts on the residents living closer to Cipayung landfill. Therefore this research was conducted to be able

to find out the health risks, respiratory problems and odor problems in people who live close the Cipayung landfill.

## Materials and Method

**Data sources and Study Population:** This study uses primary data derived from data collected using questionnaire and measurement of ambient H<sub>2</sub>S around Cipayung landfill. The population in this study were all residents of hamlet 07, Cipayung Urban Village, which is the closest settlement to the landfill. Based on the sample size, 100 people became the study samples. The inclusion criteria determined are people aged ≥ 18 years based on anthropometric uniformity.

**Measurements:** Measurements were made using a questionnaire divided into 3 parts, consisting of the characteristics of respondents (age, sex, length of stay, and distance of the house from the landfill as measured by researchers using the Google Maps), malodor perceptions, and respiratory problems. And measurement for level ambient of H<sub>2</sub>S using a spectrophotometer with the methylene blue method.

**Data Analysis:** Descriptive statistics generated for the questionnaire using SPSS Software Version 20.0. Risk level of H<sub>2</sub>S exposed obtained by calculations using the Louvard formula from the measurement results of ambient H<sub>2</sub>S concentration.

## Results and Discussions

**General Characteristic of People Living Close Landfill:** Table 1 shows that there were more female than male respondents in this study. In terms of age group the 18-45 years old range was the highest represented with 68%. Majority of duration of time living close the landfill was >20 years (61%). Most of the respondents live with a distance of <300 meters from the landfill which is 76%.

The existence of a landfill in an area can have an impact on the peoples who live around it<sup>9</sup>. Therefore the distance between the landfill site and the nearest residential area is a crucial thing. The majority of respondents in the study were respondents whose home distance from the landfill was less than 300 meters with the nearest distance of only 120 meters. This distance is not by the recommended distance between the landfill site and the residential area. Some recommendation about the distances; 1) Regulation of the Minister of Public



Works of the Republic of Indonesia the recommended distance is at least 1 kilometer<sup>10</sup>, 2) International Solid Waste Association the recommended minimum distance is 500 meters<sup>11</sup>, 3) Standards and Regulations of British Columbia in Canada recommend a distance of at least 300 meters<sup>12</sup>. The recommended distance is a consideration for the exposure of the community to pollution caused by the landfill (leachate pollution, air pollution, odor, disease vector spread). Previous research found that residential houses with short distances (<124.94 meters) with landfill have higher air pollutant yields compared to

those far away<sup>13</sup>. In line with the results from the study by Njoku showed that seventy eight percent of participants lived closer to the landfill site (100-500 meters) indicated serious contamination of air quality evident from bad odors linked to the landfill site<sup>14</sup>. Furthermore the results of a study conducted by Singga on scavengers at the Kupang Alak landfill found an association between the distance of the residence of the scavengers and health problems experienced by scavengers<sup>15</sup>.

**Table 1. General Characteristic of Respondents**

	Number	Percentage (%)	Min-Max	Mean
<b>Gender</b>				
Male	23	23	-	-
Female	77	77	-	-
<b>Total</b>	<b>100</b>	<b>100</b>		
<b>Age</b>				
18-45 years	68	68	19-74 years	41.26 years
> 45 years	32	32		
<b>Total</b>	<b>100</b>	<b>100</b>		
<b>Duration of time living close the landfill</b>				
9-20 years	39	39	9-74 years	28.62 years
> 20 years	61	61		
<b>Total</b>	<b>100</b>	<b>100</b>		
<b>Distances from landfill</b>				
< 300 meters	76	76	120-600 meters	275.0 meters
≥ 300 meters	24	24		
<b>Total</b>	<b>100</b>	<b>100</b>		

**Level and Risk Quotient of H<sub>2</sub>S Ambient in Around Cipayung Landfill:** H<sub>2</sub>S concentrations based on the results of measurements made at 2 points around the Cipayung landfill are 0.015 ppm (0.021 mg/m<sup>3</sup>) and 0.012 ppm (0.017 mg/m<sup>3</sup>). The H<sub>2</sub>S concentration exceeds the normal H<sub>2</sub>S concentration that comes from

natural sources that is 0.00011-0.00033 ppm<sup>4</sup>. The Risk Quotient (RQ) lifetime value calculated from the highest H<sub>2</sub>S concentration was 2.98. The RQ value >1 which means people living close to the Cipayung landfill are at risk of noncarcinogenic effects in the next 30 years.

**Table 2. Perception of malodor (smells like rotten eggs) coming from the landfill**

	Yes		No		Total	
	N	%	N	%	n	%
The smell disturbs daily activities	70	70	30	30	100	100
The smell has an unhealthy effect	75	75	25	25	100	100

Previous research by Faisya et al. regarding health risks due to H<sub>2</sub>S exposure to communities around the Sukawinatan Landfill Palembang showed that in the next 30 years duration of exposure respondents would have noncarcinogenic risk (RQ> 1) of 1.48<sup>16</sup>. The risk of health problems appears more quickly in the results of a study by Rifai et al. The noncarcinogenic RQ value for the next 5 years is 1.13 (RQ> 1)<sup>17</sup>.

**Malodor Perceptions of People Living Close Cipayung Landfill:** In this research, shows that most respondents perceived that the smell like rotten eggs disrupts daily activities which are about 70%. And then complained that the smell like rotten eggs caused an unhealthy effect that is equal to 75% (Table 2).

Cipayung landfill which has established for more than 35 years still operates with an open dumping system. Open dumping systems that are used can have bad impacts on both the environment and human health, including causing air contamination and odor pollutions<sup>18</sup>. This is worsened by the situation where the

landfill waste heap passed the maximum capacity, which reached 30 meters from the ground.

Based on the results of this study it was found that all respondents (100%) claimed to have smelled like rotten eggs originating from landfill, consider the odor to disturb with their daily activities are 70% and consider the odor to have an unhealthy effect on them by 75%. This is in line with the survey found that 75% strongly agree living close to a landfill raises concern for them, with the majority of reasons worrying, is due to health<sup>19</sup>. And then, previous research conducted by Sakawi et al. showed that 83.7% of respondents living close to landfill felt the bad odor had affected the tranquility and quality of life, and 80.5% of respondents agreed that the foul smell was associated with their health effects<sup>20</sup>.

The smell like rotten eggs (malodor) is most often smelled by people living close landfills during afternoon which is 56%, followed at evening which is 19%, almost all day is 15%, and morning is 10% (Figure 1).

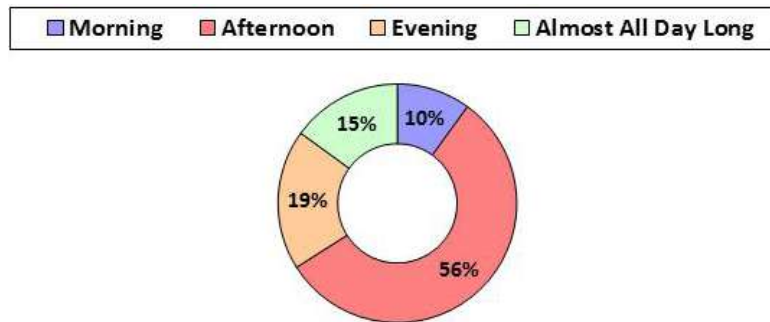


Figure 1. When it smells like rotten eggs (H<sub>2</sub>S)

**Respiratory Problems in People Living Close Cipayung Landfill:** Result of this study shows that majority stated that they had experienced respiratory problems during living near Cipayung Landfill (81%) (Figure 2). Symptoms of respiratory problems that are often complained of in the last 2 weeks are cough by 25% (figure 3).

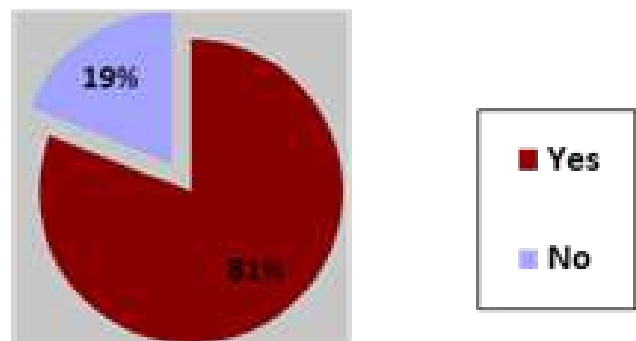
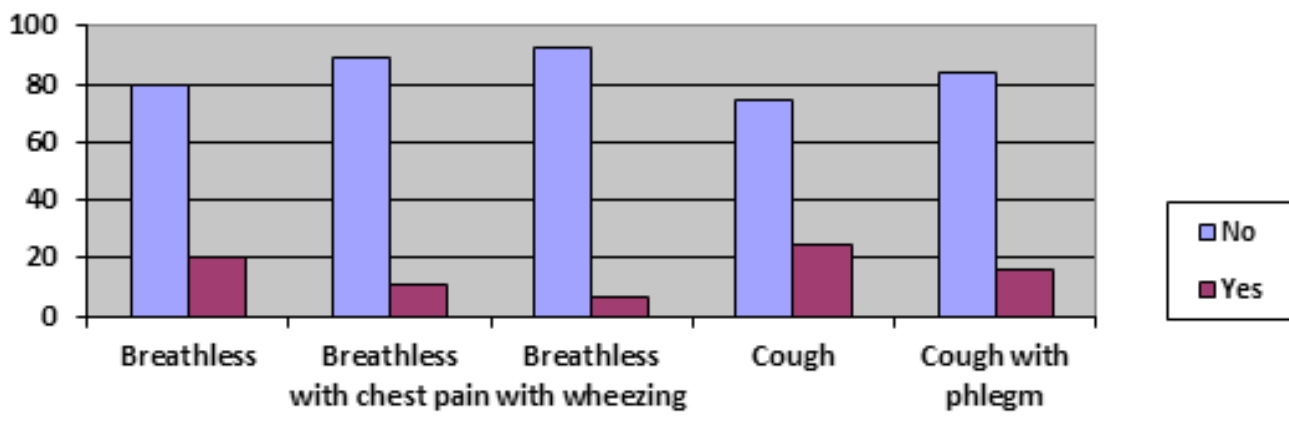


Figure 2. Have experienced respiratory problems (shortness of breath, chest pain, coughing, coughing with phlegm) during living close the Cipayung Landfill



**Figure 3. Respiratory problems that have been experienced in the last 2 weeks by peoples who live close the Cipayung landfill**

H<sub>2</sub>S can be smelled by humans at low concentrations in the air, ranging from 0,0005 to 0.3 ppm. Humans can be exposed to H<sub>2</sub>S mainly through inhalation and can be quickly absorbed by the lungs. If H<sub>2</sub>S is repeatedly or prolonged exposure can cause some symptoms of health problems such as irritation of the nose, throat and eyes, headaches, difficulty breathing in asthma patients, fatigue and loss of body balance<sup>4</sup>. The most common health effect caused by H<sub>2</sub>S exposure is respiratory disorders. Problems of breathing can be coughing, coughing up phlegm, breathing sounds or wheezing, shortness of breath, breathing sounds or wheezing accompanied by shortness of breath, chest pain, flu and cough accompanied by flu<sup>3,5</sup>.

Based on the results of this study, it was found that the majority of respondents (81%) stated that they had experienced breathing problems while living near the Cipayung landfill with symptoms including shortness of breath, coughing, coughing with phlegm, shortness of breath accompanied by chest pain, and breathing sounds. This result of study in line with the research conducted by Njoku the results showed that residents who live close to the landfill experience breathing disorder while living near the landfill<sup>14</sup>. Then the results of a cohort study also showed an association between living close to a landfill and damage to the respiratory system, and symptoms of respiratory disorders among residents living near landfills<sup>21</sup>. And then, a previous study by Putri conducted on workers at the Super Depo Sutorejo landfill showed that 76.2% of workers had experienced respiratory complaints while working at the landfill<sup>22</sup>.

### Conclusion

This study evaluates the health risks, respiratory problems and odor problems in people who live close the Cipayung Landfill. This study concludes that people who live close the Cipayung landfill have risk of noncarcinogenic health disorder within the next 30 years (RQ = 2.98). This study is an important and early effort to understand the issues related to respiratory problems and malodor that emanate from Cipayung landfill. With this research, it is expected that the responsible stakeholders can make a comprehensive effort, including repairs, supervision and monitoring to reduce the health and environmental impacts caused by H<sub>2</sub>S originating from the landfill.

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# Influenza Vaccine and The Frequency of Acute Respiratory Tract Infection of West Java's Pilgrims-Indonesia: Is there any Correlations Between? (An Analysis of Siskohatkes Indonesian Hajj Data 2018)

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## Abstract

**Background:** Acute Respiratory Tract Infection (ARTI) stand as infectious disease that cause the highest mortality globally<sup>(1)</sup>. In 2010, 150.523 Indonesian pilgrims diagnosed as ARTI, 53.027 diagnosed as influenza and 10.572 diagnosed as Pneumonia<sup>(2)</sup>. The Kingdom of Saudi Arabia (KSA) and Indonesian Ministry of Health has recommend Influenza Vaccination for Pilgrimage<sup>(3)</sup>. This study aim to find the correlation between influenza vaccination and the frequency of ARTI of West Java's Pilgrims 2018.

**Method:** A Cross-sectional study design of Siskohatkes data; an integrated Indonesian Hajj Application that computerize all health assesment of pilgrims in Hajj Mass Gathering. Total sample is 374 West Java's Pilgrims in 2018 with complete data recorded. Influenza vaccinationstatus, ARTI's events and covariates are extracted and combined from Impor pages, Vaccination section, Health Assesment Section 1,2,3 and Medical Record . This study applied multivariate cox regression analysis andthe correlation effect expressed by prevalence oddratio (POR) with p value 0.05 and 95% confident interval (CI).

**Result:** The prevalence of ARTI in West Java's Pilgrim-Indonesia at Hajj Mass Gathering 2018 is 71.85%. Pilgrims that take influenza vaccination is 34.32%. Cox regression test results of the correlation is POR 0.99 (0.61 -1.61) with p-value 0.98, which means the Pilgrims with influenza vaccination is at 0.99 risk of ARTI events compare to those without influenza vaccination after being controlled by Age, Education, and Diabetes.

**Conclusion:** This study revealed that influenza vaccination doesn't have protective effect to frequency of ARTI in West Java's Pilgrims 2018. There was effect modification by age (p-value 0,03<0,05). Implementing vaccination in high risk indications pilgrims e.g elderly and Diabetes may prevent higher frequency of ARTI.Appropriate informationabout the role of vaccination the risks of ARTI andit's alternative prevention to Pilgrims is needed.

**Keywords:** *Influenza Vaccine, Acute Respiratory Tract Infection, Indonesian Pilgrim, Hajj, Siskohatkes.*

## Introduction

ARTI syndrome is a complex clinical condition

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of varying etiology and severity which classified into Acute Upper Respiratory Infection (AURI) and Acute Lower Respiratory Infection (ALRI), depending on the main organ affected. AURI are generally mild symptoms categorized as Common Cold (CC) and Influenza Like Illnesses (ILI). Most of the fatalities and episodes of severe illness in ARTI are caused by ALRI, mainly due to Pneumonia and Severe Acute Respiratory Infection (SARI)<sup>(4)</sup>. Influenza also threatening because its rapid

transmission trigger unpredictable and recurring pandemics event with consequences on human health and impact on world economic conditions, so planning and preparedness is very important to mitigate the impact of the pandemic<sup>(5-6)</sup>. Factors that are assumed theoretically related to ARTI events are gender, age, education, occupation, comorbidities, influenza vaccination, clean living behavior (using masks and washing hands), smoking, direct contact, travel week, wave of departure and city of study<sup>(7)</sup>.

Hajj Mass Gathering has been associated with the risk of communicable disease, particularly respiratory infection that increased by long and arduous journey, severe crowding the weather and the stress of Hajj rituals<sup>(8-9)</sup>. Indonesia as the biggest muslims country, annually send their pilgrims to Kingdom of Saudi Arabia (KSA) to perform Hajj. In 2018 there was 2.371.675 pilgrims from all over the world, 203.351 within from Indonesia including 38.567 pilgrims from West Java<sup>(10)</sup>. These crowd definitely related to higher risk of ARTI of Pilgrims in Hajj Season.

Respiratory diseases found as the most common cause of outpatient department visits during the hajj, accounting for 41-60.8% of visits<sup>(11-12)</sup>. In Hajj 2017, a total of 289 influenza-related SARI cases, including 11 deaths, were reported in Makkah City. All cases of deaths occurred among international Hajjis with 44% cases from South East Asia<sup>(13)</sup>. In 2017, acute nasopharyngitis accounting for 19% visits of all outpatient Indonesian Pilgrims. In 2018, 5 diagnosis of ARTI become top 10 disease in Indonesian Pilgrims with Common Cold ranked no. 1<sup>(14)</sup>. Over 70 tons of medicine prepared by Indonesian Ministry of Health to serve their pilgrims, mostly consist drugs for ARTI<sup>(15)</sup>.

Influenza vaccination is a key element of a global strategy to minimize the risk of an influenza pandemic<sup>(16)</sup>. Recommended influenza vaccines for pilgrims are Trivalent Inactivated Vaccine (TIV) and Live attenuated Influenza Virus (LAIV). TIV derived from influenza A and B virus derivatives with the composition of virus A (H3N2), virus A (H1N1) and virus B. Indications of influenza vaccine in hajj pilgrims are: children aged 6 months to 18 years, elderly adults  $\geq$  50 years, sufferers of chronic diseases such as heart disease, chronic lung disease, diabetes, kidney dysfunction, hemoglobinopathy or immunosuppression, pregnant women trimester 2 or 3 during influenza season, people with high risk of exposure (congregation, health worker). The antibody

response obtained from the vaccine will occur after 2 weeks and this immune system lasts up to 2 years<sup>(17)</sup>.

The KSA has recommended influenza vaccines for those at risk since 2005, but this has not been a requirement for entry into the country and pilgrims who use them are still low<sup>(18-20)</sup>. In Indonesia, influenza vaccination became a recommendation for Hajj, but unsubsidized by the government. Not every Indonesian pilgrims take the vaccination. These health and economic burden of ARTI, its potential risk to become a pandemic, awareness of emerging disease disaster (SARS, MERS-CoV) needs to be considered. This study is highly recommended to revealed those facts in Indonesia.

## Method

A Cross-sectional design using data from Siskohatkes (Sistem Komputerisasi Haji Terpadu Kesehatan) 2018, conducted from July to September 2019 with permission from West Java Provincial Health Office and the Hajj Health Center – Indonesian Ministry of Health. The confidentiality and Informed consent was guaranteed. West Java Province was chosen because it sent the most pilgrims from Indonesia in 2018 and represent the characteristics of Indonesian pilgrims. Study population are amounted to 38,567 peoples<sup>(10)</sup>. The sample was pilgrims from West Java Province 2018 with influenza vaccination that experienced or not experienced ARTI, selected by non-consecutive sampling technique, randomly probability proportional to size (Lemeshow formula) and carried out in 27 Clusters (regency-city) of West Java. At 90% power, alpha value 5%, resulting of 372 participants.

The inclusion criteria: West Java's Hajj pilgrims of JKS embarkation of Hajj season 2018 with complete data recorded in Siskohatkes and having medical contact of ARTI while in Saudi Arabia. Pilgrims who don't meet health requirements, provision of influenza vaccination  $\leq$  10 days before departure to hajj, experienced ARTI according to ICD 10<sup>th</sup> diagnosis code with any severity degree of ARTI at  $\leq$  14 days after influenza vaccination, registered as tanazul pilgrims or Hajj safari participants will be excluded<sup>(21)</sup>.

The dependent variable is frequency of ARTI; define as every pilgrim whom experienced ARTI (with syndrom of signs fever, cough, cold, sorethroat, myalgia, malaise) in  $\geq$  14 days after vaccination diagnosed by the doctor as J00-J06, J09-J18, J20-J22, and J40 based on ICD 10<sup>th</sup>. The independent variable is influenza vaccination.

Covariates are age (>54 years old and ≤54 years old), sex, education (University, Senior High School and ≤Junior High School), occupation classified as Formal Worker (BUMN/BUMD employees, PNS, TNI, Polri), Informal Worker (Traders, private employees, farmers) or Not Worker (Housewife, retired, students), Obesity (BMI ≥30), Diabetes Mellitus (DM), Heart Disease, Chronic Obstructive Pulmonary Disease (COPD), Chronic Kidney Disease (CKD). The diagnosis standard of covariates are based on the consensus of the Executive Board of the Association of Indonesian Internal Medicine Experts (PB-PAPDI), related guidelines and World Health Organization (WHO).

Data downloaded from Siskohatkes by entering portion number of each sample. Identity of Pilgrims, Diagnosis and history of ARTI, Influenza Vaccination status and covariates taken from Impor page, Health Assessment Section 1,2,3, Vaccination Section and Medical Record. Those data were combined, cleaned, edited and coded. Data analysis was performed using the Stata program (v.13, StataCorp). The correlation between dependent and independent variables using multivariate Cox regression analysis. Interpretation of effect is expressed by POR, p value <0.05 and Confidence Interval of 95%.

## Results

Table 1 showed characteristic of study samples. The proportion of Pilgrims suffering ARTI was 71.85%, while Pilgrims not suffering ARTI was 28.15%. The proportion of Pilgrims taking Influenza Vaccination was 34.32%, while Pilgrims not taking Influenza Vaccination was 65.68%. Total samples became 373 since one pilgrim passed away. COPD and CKD variables being omitted because sample with those diagnosis were less than 4 Pilgrims and can't be continued in analysis.

**Table 1. Univariate Analysis of Influenza Vaccination and ARTI frequency in West Java's Pilgrims 2018**

Variable	Frequency n = 373	Proportion (%)
<b>ARTI</b>		
Yes	268	71.85
No	105	28.15
<b>Influenza Vaccine</b>		
Yes	128	34.32
No	245	65.68
<b>Age</b>		
> average (54 years)	180	48.26
≤ average (54 years)	193	51.74
<b>Sex</b>		
Male	147	39.41
Female	226	60.59
<b>Education</b>		
University	119	31.9
Senior High School	86	23.06
≤ Junior High School	168	45.04
<b>Occupation</b>		
Formal Workers	84	22.52
Informal Workers	136	36.46
Not Work	153	41.02
<b>Obesity</b>		
Yes (BMI ≥30)	56	15.01
No (BMI <30)	317	84.99
<b>Diabetes Mellitus</b>		
Yes	41	10.99
No	332	89.01
<b>Heart Disease</b>		
Yes	78	20.91
No	295	79.09
<b>COPD</b>		
Yes	4	1.07
No	369	98.93
<b>CKD</b>		
Yes	3	0.8
No	370	99.2

**Table 2. Bivariate Analysis of Influenza Vaccination and ARTI frequency in West Java’s Pilgrims 2018**

Variable	ARTI Not ARTI				POR	95% CI	P-value
	n=373	%	n=373	%			
<b>Influenza Vaccine</b>							
No	91	71.09	37	28.91	0.96	0.70 - 1.31	0.81
Yes	177	72.24	68	27.76			
<b>Age</b>							
> average (54 years)	136	75.56	44	24.44	1.21	0.93 - 1.56	0.12
≤ average (54 years)	132	68.39	61	31.61			
<b>Sex</b>							
Male	104	70.75	43	29.25	0.94	0.72 - 1.24	0.7
Female	164	72.57	62	27.43			
<b>Education</b>							
University	82	68.91	37	31.09			
Senior High School	65	75.58	21	24.42	1.39	0.74 - 2.61	0.29
≤ Junior High School	121	72.02	47	27.98	1.16	0.69 - 1.94	0.56
<b>Occupation</b>							
Formal Workers	62	73.81	22	26.19			
Informal Workers	95	69.85	41	30.15	0.82	0.44 - 1.51	0.52
Not Work	111	72.55	42	27.45	0.93	0.51 - 1.71	0.83
<b>Obesity</b>							
Yes (BMI ≥30)	35	62.5	21	37.5	0.65	0.39 - 1.06	0.09
No (BMI <30)	233	73.5	84	26.5			
<b>DM</b>							
Yes	31	75.61	10	24.39	1.21	0.61 - 2.38	0.57
No	237	71.39	95	28.61			
<b>Heart Disease</b>							
Yes	57	73.08	21	26.92	1.06	0.68 - 1.66	0.78
No	211	71.53	84	28.47			
<b>COPD</b>							
Yes	2	50	2	50	0.39	0.05 - 2.74	0.32
No	266	72.09	103	27.91			
<b>CKD</b>							
Yes	3	100	0	0	-	-	-
No	265	71.62	105	28.38			

Table 2 showed that influenza vaccine’s variable POR value 0.96 with p-value 0.81 > 0.05 (95% CI 0.70 - 1.31) which means the incidence of ARTI in pilgrims who is not taking vaccination is 0.96 at risk than those taking vaccination. There are no protective effect and no

significant relationship between influenza vaccination and the frequency of ARTI in West Java Pilgrims. The POR and p-value of CKD cannot be assessed because the samples were too low (only 3 pilgrims).



**Table 3. Multivariate Analysis of Influenza Vaccination and ARTI frequency in West Java's Pilgrims 2018**

Variable	POR	95% CI	P-value
Influenza Vaccine	0.99	0.61 -1.61	0.98
Age (> 54 y.o)	1.38	0.85 - 2.24	0.18
Education (Senior High School)	1.01	0.76 - 1.32	0.94
Diabetes Melitus	1.18	0.55 - 2.52	0.66

Table 3 showed the final multivariate model to assess correlation between influenza vaccination and ARTI frequency by controlling other covariates with Cox Regression test. The result of POR is 0,99 (95% CI 0.61-1.61), which means that the Pilgrims that not having influenza vaccination is at risk ARTI incidences in Hajj as much as 0,99 compare to those whose having influenza vaccination after being controlled by the variable Age (more than 54 y.o), Education (Senior High School) and DM.

### Discussion

This cross-sectional study evaluated that there were no protective effect of Influenza Vaccination with ARTI frequency in West Java's Pilgrim 2018 after being controlled by Age (more than 45 years old), Education degrees (Senior High School) and Diabetes Mellitus, according to result of final model in multivariate analysis POR 0.99 (95% CI 0.61-1.61) p value <0.05. The result is in line with research in Iran and Malaysia that found that effectiveness of Influenza vaccines in their pilgrims is contradictory<sup>(22-24)</sup>.

Our study showed that influenza vaccines might be useful for elderly (age  $\geq$  54 y.o) and DM. Both variables are confounding by indication for influenza vaccination. The immune system that naturally decreases in the elderly and immunosuppressed conditions in people with DM causes those pilgrims more susceptible to infection. TIV in elderly result significant reduction in all cause mortality and pneumonia related mortality as well as hospitalization rate. It reduce complications, less hospitalizations and reduced mortality in DM patient<sup>(13,25)</sup>.

The level of education is assumed to be related with ARTI prevention understanding, commitment of influenza vaccination and healthy behaviour. Future research with wider population and economic review is recommend.

### Conclusions

There is no protective effect of influenza vaccination and ARTI frequency in this study. We found effect modification between those variables after stratified by age based on Homogeneity test p value  $0,03 < 0,05$ . Implementing influenza vaccination for high risk indication pilgrims in combine with other strategy will optimize prevention of ARTI in Hajj season. Vaccine's cost might be a problem for vaccine fulfillment. It is very important for Pilgrims to get appropriate information about health strategy preventing ARTI in Hajj.

**Ethical Considerations:** This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Indonesia University (Ket-716/UN2. F10. D11/PPM.00.02/2019).

**Competing Interests:** The authors declared that no competing interests exist.

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# The Increasing Obedience and Changes in Blood Pressure Through Family Empowerment Model in Elderly People with Hypertension

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## Abstract

**Background:** The implementation of program to handle hypertension requires support from all sides, especially family. Optimization of family empowerment depends on the model that serves as a reference for nursing services, assisting families and patients.

**Purpose:** This research aims to analyze the effect of family empowerment model on obedience and changes in blood pressure in elderly people with hypertension.

**Method:** This research used a pre-experimental design with a one group pretest-posttest design approach with 21 elderly people diagnosed with hypertension, selected by purposive sampling. The research instrument for the obedience used a diet obedience questionnaire of 19 questions using a Likert scale of as always = 4, often = 3, sometimes = 2, never = 1. The blood pressure used observation sheets and tensimeter.

**Results:** The results of the Paired T Test showed an increasing diet obedience after the intervention with P value = 0.007 ( $p < 0.05$ ), while a decreasing in systolic blood pressure with P value = 0.005 ( $p < 0.05$ ), and diastolic blood pressure with P value = 0.023 ( $p < 0.05$ ). can be improved by family empowerment.

**Keywords:** *Elderly, Hypertension, Obedience, Blood Pressure, Family Empowerment.*

## Introduction

The prevalence of hypertension globally, according to the World Health Organization (WHO) is around 22% for the population aged  $\geq 18$  in 2014, estimated to increase to 29.2% by 2025. The prevalence of national hypertension in 2013 is 28.1%, increases by 3.58% in 2018 (from 28.1% to 31.68%). In South Sulawesi the

number of hypertension sufferers in 2013 was 25.8% and increased by 8.3% in 2018 (from 25.8% to 34.15%)<sup>1</sup>.

In general the treatment of hypertension can be divided to two approaches, namely pharmacological and non-pharmacological approaches. The efforts developed in the non-pharmacological approach to hypertension include lifestyle modification, weight loss, regular physical/exercise exercises, smoking cessation, increasing the fruit and vegetable intake, alcohol reduction, sodium intake control and potassium supplements<sup>2</sup>.

The implementation of program to deal with hypertension requires support from all sides, especially the family role. The Ministry of Health has a program that sets the operational strategy for health development through Healthy Indonesia Program with the Family

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Approach (PIS-PK) to increase health promotion and community empowerment, in this case family empowerment<sup>3</sup>. Families are the smallest part of society which plays a role in improving the health of their families<sup>4</sup>.

Family empowerment is an effort to increase knowledge, awareness and desires of the family to improve health status. Optimization of family empowerment depends on a model that will serve as a reference for nursing services. A model will produce a positive impact if the model can be developed according to the needs of providers and users of health services, such as nurses, communities and families. The family empowerment model which is often used is health education, counseling, and assistance to families and patients<sup>5</sup>.

Health education is the provision of information to improve knowledge and abilities through learning techniques or instructions to influence human behavior<sup>5</sup> and providing health education can help families in controlling blood pressure<sup>6</sup>. Assistance is giving help to raise awareness about the importance of health and problem solving, and assistance provided to families to prepare menus or foods for hypertensive diet.

For this reason, this research will analyze the effect of family empowerment model in increasing obedience and blood pressure improvement in hypertensive elderly patients.

### Method

This research used a pre-experimental design with one group of pretest-posttest design. The research was conducted in March to May, 2019 in Parangbanoa Village, involving 21 respondents using purposive sampling with inclusion criteria: 1. families who have elderly people with hypertension with systolic blood pressure between 140-179 mmHg, diastolic 90-119

mmHg, 2. The age of elderly people were  $\geq 60$  years, 3. no taking antihypertensive medicine, and 4. willing to be a respondent.

This research used diet obedience questionnaires of 19 questions in Likert scale with answers 1 = never, 2 = sometimes, 3 = often, 4 = always and observation sheets for blood pressure measurements. The activities were conducted in the first week (pretest) and the eighth week (posttest). The intervention was conducted for 4 weeks. Data analysis to determine the effect of family empowerment model on obedience and changes in blood pressure were using paired T test with  $P < 0.05$ .

### Results

**Table 1: Distribution of Frequency Characteristics of Elderly People with Hypertension**

Variable	Frequency	Percentage (%)
<b>Age</b>		
60-62	11	52,4
63-65	3	14,3
66-68	1	4,8
69-71	3	14,3
72-74	3	14,3
<b>Gender</b>		
Male	3	14,3
Female	18	85,7
<b>Duration</b>		
$\leq 1$ tahun	12	57,1
$> 1$ tahun	9	42,9
<b>Family History</b>		
No	8	38,1
Yes	13	61,9

Based on table 1, most of the respondents were 60-62 years old (52.4%) and most of them were women (85.7%). Based on the duration of suffering, most of them had hypertension  $\leq 1$  year (57.1%) and had a family history of hypertension (61.9%).

**Table 2: Effects of the Family Empowerment Model on Obedience and Changes in Blood Pressure**

Variable of Obedience	Pre Intervention		Post Intervention		P Value
	Mean	SD	Mean	SD	
Obedience	48,86	4,163	50,90	4,369	0,007
<b>Variable of Blood Pressure</b>					
Systolic Blood Pressure	151,43	9,500	144,29	12,479	0,005
Diastolic Blood Pressure	93,10	4,323	89,76	5,585	0,023

The results of the Paired T Test on obedience were obtained such as P value = 0.007 ( $p < 0.05$ ), systolic blood pressure was obtained as P value = 0.005 ( $p < 0.05$ ) and diastolic blood pressure was P = 0.023 ( $p < 0.05$ ). The results showed that there was an influence of family empowerment models on obedience and changes in blood pressure in elderly people with hypertension.

## Discussion

Research has shown an increasing diet obedience and changes in blood pressure after intervention in family empowerment models implementation due to the role and support of the family of the elderly people, including education and assistance for the implementation of a healthy lifestyle by improving diet, doing physical activity diligently, adequate rest and being able to manage stress.

Theoretically the food eaten affects the stability of blood pressure. Nutrient content such as fat and sodium have a close relationship with hypertension. The implementation of a regular diet can normalize hypertension, such as by reducing foods with high salt, fatty foods, eating high fiber foods and doing sports activities <sup>7</sup>.

Gusmira's research (2012) stated that treatment and diet are needed to control blood pressure, and patients need to understand that as much as hypertension cannot be cured, it can be controlled by changing lifestyle and obedience to diet (low diets salt, caffeine, saturated fat)<sup>8</sup>.

Family support is important to determine the beliefs, health values, treatment and care programs. Support from health personnel is also needed to increase the level of obedience<sup>9</sup>.

This is in line with the research conducted by Arista Novian (2013) which shows a relationship between hypertension diet obedience and family roles where the P value was (0.008) < of the alpha value (0.05) the family can be a support system for assistance<sup>10</sup>.

The results of Fitri's research, Dachriyanus (2016) stated that the family support has a very strong relationship with obedience and there is a unidirectional relationship; the higher the family support is the higher obedience will be<sup>11</sup>.

Educational empowerment is provided to clients with a client-focused empowerment approach or collaborative care where health care providers and

patients make joint decisions<sup>12</sup>. Family knowledge, both cognitive and behavioral in improving health status, overcoming health problems, and helping the recovery process, form family empowerment. The outcome expected is for the family to be independent and skilled in caring for the hypertensive family members.

The mechanism causing changes in the family, which has a positive effect on every family-focused treatment as well as suitable promotive actions with cultural status of the community, influences nursing actions and treatments developed in the family<sup>13</sup>.

The results of the research of Sri, Herman, and Mudatsir (2016) prove the influence of health education on family health tasks on hypertension diet obedience in the working area of Blang Mangat Health Center in Lhokseumawe City <sup>11</sup>.

Meanwhile, Mery, Oktaviani and Patriani (2017) shows the influence of education with the theoretical approach of the Dorothy E. Johnson's behavioral system model towards changes in blood pressure in hypertensive patients with P value of systolic blood pressure: 0.001 and P value of diastolic = 0.007 (Solon, Putri, & Naing, 2018).

Heni and Supriyah (2019) proves the influence of family assistance in self-care for the blood pressure stability in hypertensive patients <sup>14</sup>. Based on the research of M. Isra et al (2017), respondents who have high family support tend to have a low degree of hypertension<sup>15</sup>.

Meanwhile the research of Novita, Asti and Mamat stated that there is an effectiveness in providing salt diet to the stability of elderly people's blood pressure with hypertension in Purwoyoso village in Semarang with P value of systolic blood pressure: 0.008 and P value of diastolic: 0,0001 <sup>16</sup>.

## Conclusion

Family empowerment is one of the interventions that empowers families in controlling hypertension. In this research there were significant differences before and after intervention of the family empowerment model implementation.

**Recommendation:** The family empowerment can be used as an intervention to control hypertension.

Relevance of Research: This research has highlighted

the problem of family empowerment where the families have not understood hypertension and its treatment well, and lack of attention, support and motivation to the elderly people regarding their condition, causing no improvement in blood pressure.

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# Risk Factor of Hypertension among Adolescence: A Literature Review

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## Abstract

Hypertension is one of the non-communicable diseases whose numbers continue to increase in both developed and developing countries. This increase in prevalence will increase the risk of cardiovascular disease. Current developments, hypertension can also occur in the teen age group. The purpose of this study was to analyze the risk factors for hypertension that occur in adolescence. A literature review was conducted from 55 references sources and 10 article was eligible to this study. Data source using Science Direct, Proquest, SAGE dan Springer Link which published since 2007 until 2017. The results of the analysis of hypertension risk factors in adolescents showed that groups of adolescents with overweight and obesity had a higher risk of developing hypertension. Family history, high consumption of salt, consumption of cigarettes and low physical activity also increase the risk of hypertension. The development of adolescent hypertension can also be predicted through wrist circumferences, high waist circumference and high levels of fat in the blood. Overweight and obesity in adolescents characterized by an increase in body mass index are the most common risk factors for hypertension in adolescents. These risk factors can be reduced through efforts to lose weight and make modifications to healthy lifestyles such as consuming healthy foods, increasing physical activity and preventing smoking cigarettes.

**Keywords:** Hypertension, adolescence, overweight, obesity, body mass index.

## Introduction

Current disease developments have shown the epidemiology transition from infectious diseases to non-communicable diseases. The increase in non-communicable diseases does not only occur in developed countries, but also increases significantly in developing countries. The development of non-communicable diseases is multifactorial and this will have an impact on increasing non-communicable diseases such as high

blood pressure, high cholesterol and an increase in blood glucose<sup>29</sup>. The current development of hypertension does not only affect adults and the elderly. Teenagers also have a risk for hypertension. In the last two decades it was found that hypertension tends to continue to increase and threaten since a young age<sup>13</sup>. The Basic Health Research Results conducted by the Ministry of Health of the Republic of Indonesia in 2013 showed that the national prevalence of hypertension in adolescents aged 15-17 was 5.3% with a distribution of 6% in male adolescents and 4.7% in adolescents women. Based on regional distribution, adolescent hypertension was higher in rural areas (5.6%) compared to urban areas (5.1%)<sup>12</sup>.

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Hypertension is a disease that involves the interaction of genetic, demographic, comorbid and



environmental influences and become a risk factor for the occurrence of heart disease.<sup>24,28</sup> If hypertension is uncontrolled there will be a risk of complications such as coronary heart disease, stroke and chronic kidney failure<sup>2, 3, 30</sup>. The results of the study show that deaths in patients with heart disease, by 30%, have a history of hypertension. Any increase of 20/10 mmHg in systolic/diastolic pressure, will increase by 20% the risk of death in heart disease<sup>27</sup>.

The prevalence of hypertension in adolescents is certainly at risk of experiencing an increase if maximum prevention efforts are not carried out. Based on the expert panel conducted and published by the American Academy of Pediatrics, it was reported that according to the results of an epidemiological survey in the last 20 years there has been an increase in the prevalence of adolescents who experience prehypertension and hypertension. The development of hypertension in each year, estimated at 7% of prehypertensive teens develop hypertension. The purpose of this paper is to describe the risk factors for hypertension in adolescents.

### Method

This study was used literature review of articles that published from 2007 to 2017 from the database of Science Direct, Proquest, SAGE and SpringerLink. The inclusion criteria from the selection of articles that have been published is discussing the prevalence of hypertension in adolescents and risk factors for the incidence of adolescent hypertension. Based on the literature review of 55 articles that discussing hypertension in adolescents, 10 articles that met the requirements of the specified inclusion criteria were selected, which discussed the prevalence of hypertension and risk factors that increase the occurrence of adolescent hypertension.

### Result

Analysis of the research method used by the ten articles reviewed has found that the entire article uses quantitative research method. As many as 9 articles the research design used was using a cross sectional study approach, while 1 other article used a cohort study approach. The instruments used were questionnaires, anthropometry measurement and mercury sphygmomanometer or digital sphygmomanometer.

The results of the analysis of 10 reviewed articles show that as many as 90% of articles describe adolescents with overweight and obesity are risk factors that are

often associated with the occurrence of hypertension in adolescents. A total of 2 articles showed the development of adolescent hypertension can also be identified from the measurement results of wrist circumferences and high waist circumference. For risk factors associated with adolescent hypertension, others include family history of hypertension, consumption of high salt foods, consumption of cigarettes, lack of physical activity and high levels of fat in the blood.

### Discussion

The results of article review shown that overweight and obesity in adolescents as indicated by an increase in body mass index were the most common risk factors for hypertension in the teen age group<sup>1,8,10,16,17,18,23,25,26</sup>. Risk factors for hypertension in adolescents can be seen based on anthropometry, kidney and electrolyte function, innervation mechanism, stress response, hyperdynamic circulation, influence of insulin on hemodynamics, gout, family history, genetic influence, and birth weight<sup>7</sup>. The results of the other study, show that adolescents with overweight are directly proportional to the occurrence of hypertension in adolescents, where 30.33% of overweight adolescents have prehypertension and 13.93% of overweight adolescents have hypertension<sup>26</sup>. The results of other studies showed that in overweight adolescents, 16% had prehypertension and 45% had hypertension. In obese adolescents, 23% had prehypertension and 45% had hypertension<sup>25</sup>. Not only that study, other research show that the Incidence Rate (IR) development of adolescent hypertension was 0.5% - 0.8% per year. In obese adolescents there are a significant increase in the development of hypertension. On the first visit, obese adolescents who had blood pressure > 120/80 mmHg were 31.3%; the second visit was 29.3%; the third visit was 59.3%<sup>23</sup>. Other factors associated with the incidence of prehypertension and hypertension in adolescents include history, consumption of cigarettes, lack of physical activity, consumption of foods high in salt and increased levels of fat in the blood<sup>8,9,25</sup>.

Increased sedentary lifestyles cause overweight and obesity and this will have an impact on increasing high blood pressure<sup>29</sup>. In addition, adolescent behavior in carrying out unhealthy lifestyles such as lack of physical activity, high sedentary activities, low consumption of high fiber and smoking behavior are closely related to the incidence of overweight in adolescents<sup>32</sup>. This is in accordance with the results of this literature review which shows that low physical activity, unhealthy food

consumption and cigarette consumption are also risk factors for hypertension in adolescents.

To reduce the risk of hypertension in adolescent groups, it is very necessary for adolescents to make behavioral changes towards healthy lifestyles such as regulating diet by limiting fat consumption, regulating body weight by seeking weight loss, actively exercising regularly and regularly, preventing smoking and blood pressure monitoring. Setting diet and increasing physical activity are very important for overweight adolescents with the aim of proper energy balance<sup>6,19</sup>. Efforts to prevent hypertension in overweight adolescents through optimizing health promotion and specific protection are very important. A healthy lifestyle campaign is a form of health education that aims to reduce unhealthy behavior that can increase the risk of hypertension. One form that can be done is peer health education. Peer health education is able to change one's lifestyle so that this will have an impact on controlling blood pressure and reducing the risk of cardiovascular disease<sup>5</sup>. In addition, it also activates non-communicable disease health services in schools with the aim of screening risk factors and early detection of hypertension<sup>13</sup>. In addition to health education, mentoring can also be used as an effort to prevent hypertension early in overweight adolescents. Mentoring is effectively used to manage body weight and increase self-esteem in obese individuals<sup>14</sup>. Assistance is carried out, so that youth involvement will begin early in terms of planning and controlling actions. Action planning and action control are mediators in the intention and formation of one's behavior<sup>31</sup>. Planning will influence the control of actions which can ultimately affect behavior<sup>4</sup>.

### Conclusion

Overweight and obesity are risk factors that can increase the occurrence of adolescent hypertension. Other risk factors are family history, high salt consumption, cigarette consumption and low physical activity. To reduce these risk factors, efforts to lose weight and make a healthy lifestyle such as consuming healthy foods, increasing physical activity and preventing consumption of cigarettes are very important things.

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# The Influences of Coping Strategies on Emotional Well-Being Victims of Verbal Bullying in Senior High School 11 Surabaya

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## Abstract

**Background:** Bullying problem which happened to students in schools continues occur and increasing every year throughout the world. Bullying is unpleasant behavior with intentional to hurt others and occurs repeatedly and it shows difference power between bullied and victims. Bullying can cause feelings of stress which victims experienced the most. Victim of bullying can overcome feelings of depression by coping strategies. Adaptive coping strategies can contribute to generating positive emotional well-being for victims of bullying at school. Bullying happened at Senior High School 11 Surabaya can cause emotional problems in students. This study aims to analyze the influences of coping strategies on emotional well-being of victims of verbal bullying in Senior High School 11 Surabaya.

**Material and Method:** This type of research was observational analytic with cross sectional design and used a quantitative approach. The sample of the study was 94 students who were victims of verbal bullying in Senior High School 11 Surabaya. The sampling technique was used proportional stratified random sampling method. Data analysis was used logistic regression test.

**Result:** Coping strategies were significantly influence on emotional well-being victims of verbal bullying in Senior High School 11 Surabaya were dispositional coping style ( $p = 0.017$ ), positive reappraisal ( $p = 0.022$ ), and positive events ( $p = 0.040$ ).

**Conclusion:** The conclusion of the study showed that emotional well-being of victims of verbal bullying in SMA Senior High School 11 Surabaya influenced by dispositional coping style, positive reappraisal, and positive events that are carried out as coping strategies in overcoming the verbal bullying behaviors. Teenagers can use coping strategies in dealing with life stressors to prevent adverse effects on emotional well-being.

**Keywords:** *Bullying, Emotional Well-Being, Victims of Verbal Bullying.*

## Introduction

Bullying is an aggressive behavior with intentional to repeated this action from time to time, and combined

with power aggression to hurt others<sup>1</sup>. Bullying is a serious topic of concern to the government and the general public<sup>2</sup>. UNICEF U-Report was reported that two-thirds of 100,000 young people in 18 countries have been victims of bullying. GSHS was reported that the percentage of students aged 13 to 17 have been victims of bullying were 20.6%. The Center for Urban Education Success was reported that the prevalence of students involved in bullying, which were as a perpetrator, victim or perpetrator as well as a victim were 20-29% per year.

UNICEF was reported that the prevalence of children in Indonesia aged 13 to 15 years who have been

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victims of bullying in schools were 50%. KPAI was reported that the amount of educational cases happened until 30 May 2018 in Indonesia were 161 cases including 23 cases of victims of brawls, 31 cases of brawls and 36 cases of victims of violence and bullying, 41 cases of violence and bullying children and 41 cases of policy victims such as illegal levies, expelled from school, not allowed to take the exam, and 30 cases of dropped out of school.

The results of previous studies showed that bullying in Senior High School 11 Surabaya happened in four forms, which were physical, verbal, social and cyberbullying<sup>3</sup>. Victims of bullying were generally adherent and unconfident teens<sup>4</sup>, physically weak, and rejected by peers<sup>5</sup>. Adolescents who have experienced bullying were 1.5 times more likely to experienced depression compared to adolescents who did not experience bullying<sup>6</sup>.

Victims of bullying were often feeling insecure and unhappy at school, which causes victims of bullying experienced difficulty concentrating, regulating attention that affects academic achievements, and tend to absent from school, and dropped out of school<sup>7</sup>. Victims of bullying were associated with various interpersonal difficulties such as refusal of friends, low friend acceptance, few or no friends, and negative friendship quality<sup>8</sup>.

Bullying in schools have been associated with poor student well-being and had an effect on student education, which were decreased academic grades, and can cause mental health problems such as symptoms of depression, anxiety, internalization, loneliness and withdrawal from the social environment, had suicidal thoughts, self-harm, and violent behavior in adulthood<sup>9</sup>. Victims of verbal and physical bullying were more likely to engage in maladaptive behavior and experienced internal pressure<sup>9</sup>.

Students who were faced bullying adopted different coping strategies depends on age and gender<sup>10</sup>. Coping strategies are the processes to reduce stress by using all efforts and self-regulation in order to influence stressors, which are considered as burdens that exceed the ability of individuals. Coping strategies aim to reduce the impact of stressful situations or increase resources and efforts to deal with stress.

The results of previous studies showed that the sefive coping strategies were the most often used by students

in the UK aged 13 to 16 years, including discussing the experienced of bullying with someone, ignoring the problem with experienced of bullying, defending themselves, avoiding or moving away from bullies and make many friends<sup>11</sup>.

The results of previous longitudinal studies showed that support from peers and family have been associated with decreased depression while firm coping strategies such as meeting or contacting bullies has been associated with increased depression<sup>12</sup>. The aim of the study was to analyze the influences of coping strategies on emotional well-being of victims of verbal bullying in Senior High School 11 Surabaya.

## Materials and Method

This research was an observational analytic study with cross sectional design and used a quantitative approach. The research was conducted in August, 2019. The research sample were 94 students who were victims of verbal bullying in Senior High School 11 Surabaya. The sampling technique was used proportional stratified random sampling method. Data collection techniques was used primary data from questionnaire results. Data processing was used SPSS software. Data analysis techniques was used logistic regression test.

### Findings:

**Table 1. Frequency distribution of coping strategies in Senior High School 11 Surabaya**

Coping Strategies	N	%
<b>Problem management</b>		
Good	63	67,0
Poor	31	33,0
<b>Dispositional Coping Style</b>		
Good	57	60,6
Poor	37	39,4
<b>Social Support</b>		
Good	54	57,4
Poor	40	42,6
<b>Positive Reappraisal</b>		
Good	56	59,6
Poor	38	40,4
<b>Positive Events</b>		
Good	53	56,4
Poor	41	43,6

Table 1 showed that the majority of victims of verbal bullying had good coping strategies in overcoming verbal

bullying behaviors at school. The majority of victims of verbal bullying had good problem management were 67%, good dispositional coping style were 60.6%, good social support were 57.4%, good positive reappraisal were 59.6%, and good positive events were 56.4%.

**Table 2. Frequency distribution of emotional well-being in Senior High School 11 Surabaya**

Emotional Well-Being	N	%
Good	43	45,7
Poor	51	54,3

Table 2 showed that the majority of victims of verbal bullying had poor emotional well-being were 54.3% due to experienced verbal bullying behaviors at school.

**Table 3. The results from logistic regression analysis of the influences of coping strategies on emotional well-being of victims of verbal bullying in Senior High School 11 Surabaya**

Variable	Sig.	Details
Problem management	0,142	Not significant
Dispositional Coping Style	0,017	Significant
Social Support	0,086	Not significant
Positive Reappraisal	0,022	Significant
Positive events	0,040	Significant

Table 3 showed that coping strategies that had significant influence on emotional well-being were dispositional coping style (0.017), positive reappraisal (0.022), positive events (0.040). Whereas the problem management and social support did not have significantly influence on emotional well-being of victims of bullying.

### Discussion

Emotional well-being is an emotional quality of individual’s daily experience which characterized by the frequency and intensity of an individual experiencing feelings of sadness, anxiety, anxiety, happiness, depression, anger, cheerfulness, and affection that make an individual’s life pleasant or unpleasant<sup>13</sup>.

The results of logistic regression analysis showed that dispositional coping style, positive reappraisal, and positive events had significant influenced on emotional well-being. This is consistent with previous research showed that students who have dispositional resilience with good positive attitudes had the state good psychological well-being in almost alldimensions<sup>14</sup>. Victims of verbal bullying tend to prefer the optimistic

on performed dispositional coping styles to produce good emotional well-being. Optimism is a cognitive construct that has been linked with motivation, so individual who have an optimistic will exert effort to get the desired results<sup>15</sup>.

The results showed a positive reappraisal have been influences on emotional well-being of victims of verbal bullying. This is consistent with previous research that showed positive reappraisal used by caregivers to create positive emotional feelings in dealing with difficult situations to resolve and it significantly correlates with positive influence in interpreting the experience of caring for a sick partner and facing the death of a partner being treated<sup>16</sup>. Positive reappraisal encourages victims of verbal bullying to interprets the experience of verbal bullying behaviors at school as a lesson to improve the ability to deal with difficult situations which can contributes to creating positive emotions that will influences on emotional well-being of victims of verbal bullying.

The results also showed that positive events have been influences on emotional well-being of victims of verbal bullying. This is consistent with previous research showed that positive events influence individual to produce positive feelings and it significantly correlates with increased well-being<sup>17</sup>. Positive events contribute to creating emotional well-being can be caused because victims of verbal bullying were more likely to be active in carrying out positive activities in accordance with their passion that causes feelings of happiness.

The results of logistic regression analysis showed that the problem management and social support variables were not significantly influences on emotional well-being. This is in accordance with previous research which showed that seeking for social support and convincing thoughts and perceived sense of control, and expressing emotions were not significantly associated with psychological well-being<sup>18</sup>. While problem management were not significantly influence on emotional well-being can be caused by victims of verbal bullying prefer problem solving by seeking social support from family, friends or teachers to help victims in obtaining information about solutions to overcome the problems encountered.

### Conclusion

The conclusion of the study showed that emotional well-being of victims of verbal bullying in SMA Senior

High School 11 Surabaya influenced by dispositional coping style, positive reappraisal, and positive events that are carried out as coping strategies in overcoming the verbal bullying behaviors. Teenagers can use coping strategies in dealing with life stressors to prevent adverse effects on emotional well-being.

**Suggestion:** Teenagers can produce good emotional well-being by using adaptive and positive coping strategies to facing bullying at school.

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# The Role of the School's Health Clinic Teacher on Clean and Healthy Life Behavior in Elementary School Students in the South Ternate City

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## Abstract

Clean living behavior and health in schools is a set of behaviors that are practiced by students, teachers and the school community based on awareness so that they are independently able to prevent disease, improve their health, and play an active role in creating a healthy environment. The purpose of this study was to analyze the role of the school's health clinic teacher on a clean and healthy life behavior in elementary school students in South Ternate City. This research is *pre-experimental* with method *one group pre-post test design*. The unit of analysis in this study was all grade 4 and 5 elementary schools in South Ternate City, with a sample size of 269 students. The sampling technique is done by *stratified random sampling*. This analysis used *paired sample t test*. The results showed that the teacher's role in the respondent's knowledge ( $p=0,000$ ) the attitude ( $p=0.000$ ) and the skills of the respondent ( $p=0.002$ ). This mean that there are significant differences between the pretest and posttest groups. The conclusion in this study is that there is an effect of the role of the teacher School's Health Clinic on clean and healthy behavior in students in the South Ternate City Elementary School.

**Keywords:** *Role of Teachers School's Health Clinic, Clean and Healthy Living Behaviors, Elementary Schools, South Ternate City.*

## Introduction

Indonesian health status is strongly influenced by clean and healthy living behavior. This program should be implemented from school age so that healthy lifestyle practices can persist into adulthood<sup>(1)</sup>. One of the efforts in health development is through the application of Clean and Healthy Behavior. Clean and healthy living behavior is a set of behaviors that is practiced based on awareness as a result of learning, which makes individuals, families, groups or communities able to help themselves (independent) in the health sector and play an active role in realizing the public health<sup>(2)</sup>.

Implementation of a clean and healthy lifestyle that is not good can cause school-age children (6-10 years) more easily experience various diseases, such as diarrhea, intestinal worms, dental caries/cavities, nutritional problems (malnutrition, poor nutrition, over-nutrition, anemia), problems related to risk factors (drug abuse, free sex, sexually transmitted infections including HIV/AIDS, reproductive tract infections) and health problems related to basic sanitation (clean water, latrines/toilets, and wastewater disposal) who lack health requirements such as typhus, cholera, dysentery<sup>(3)</sup>.

Health problems in school-age children are influenced by the environment and personal hygiene behavior. Based on Riskesdas data (2018), around 23.1% of children in Indonesia first smoke at the age of 10-14 years. The prevalence of smoking habits increased from 1.4% to 2.1% and the prevalence of children lacking in physical activity increased from 26.1% to 33.5%. The proportion of correct bowel behavior at  $\geq 10$  years is 87.3% and 43% is correct in hand washing. Around

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31.8% of children aged 10-14 years in North Maluku Province have behaved correctly in washing their hands, but this proportion has decreased from the proportion in 2013 which was 59.5%.

Efforts have been made to create clean and healthy life behavior in schools through the School's Health Clinic activities. School's Health Clinic is an effort to foster and develop healthy habits and behavior in school-age students which are carried out thoroughly and in an integrated manner<sup>(4)</sup>. Clean and healthy life behavior in schools needs to be endeavored, especially to increase self-awareness of school residents. Self-awareness arises through school education programs. The impact of the implementation of the School's Health Clinic program can improve the health status of school residents with indicators of decreasing student and teacher absenteeism due to illness, decreasing cases of malnutrition, decreasing the number of students who need P3K handling, students achieving normal weight and height, and improving personal hygiene students<sup>(5)</sup>.

The program activities School's Health Clinic has not been able to be implemented properly if the teachers' School's Health Clinic does not carry out their roles to the full. Teacher School's Health Clinic as the executor of the School's Health Clinic program acts as an educator, controller (supervisor) and provides a good example or example to their students<sup>(6)</sup>. The role of the teacher School's Health Clinic is very important in health education especially applying clean and healthy behavior in the school environment<sup>(7)</sup>. Based on this the researcher conducted training on clean and healthy behavior of school children to teachers School's Health Clinic, so that the health status of school children can be increased through the role of the teacher. The evaluation was carried out by surveying the clean and healthy behavior of elementary school children.

**Method**

This research is pre-experimental using method one group pre-post test design. The study was conducted in 10 elementary schools in South Ternate City. The sample size is 269 students in grades 4 and 5. The collected data is then processed using the SPSS 25.0 program with the Paired t test. Data collection techniques are done by filling out questionnaires and sheets checklist.

**Findings:**

**Characteristics of Respondents:**

**Table. 1 Characteristic of Respondents**

No.	Variable	n	%
1.	Age (Year)		
	8 – 9	120	44.6
	10 – 11	149	55.4
2.	Sex		
	Man	130	48.3
	Female	139	51.7
	Total	269	100

Table 1 showed that most respondents aged 10-11 years were 149 (55.4%), and males were 139 (51.7%).

**Knowledge, behavior, and skill before and after applying clean healthy life behavior by the school health clinic teacher:** Table 2 showed the differences in the average value of knowledge before (63.31) and after (70.33) interventions with an increase of 7.02. Paired t-test results showed the p value = 0.000, <0.05 which means that the difference is significant. There are differences in the average value of behavior before (66.54) and after (69.23) intervention with an increase of 2.69. Paired t-test results showed the p value=0.000, <0.05 which means that the difference is significant. There is a difference in the average score of skills before (27.48) and after (28.32) interventions with an increase of 0.84. Paired t-test results showed the p value = 0.002, <0.05 which means that the difference is significant.

**Table 2. Knowledge, behavior, and skill before and after applying clean healthy life behavior by the school health clinic teacher**

Group	Average	Difference	p value
<b>Knowledge</b>			
Pretest	63.31	7.02	0.000
Posttest	70.33		
<b>Behavior</b>			
Pretest	66.54	2.69	0.000
Posttest	69.23		
<b>Skills</b>			
Pretest	27.48	0.84	0.002
Posttest	28.32		

**Discussions**

**Effect Role of Teachers School's Health Clinic Against Knowledge Students about Behavior of Living Healthy:** According to Notoatmodjo<sup>(8)</sup> knowledge is the result of knowing after someone in sensing a certain object. There is an increase in knowledge of

respondents after the application of clean and healthy living behaviors through the role of the School's Health Clinic Teacher in Elementary Schools in South Ternate City. This study is in line with research conducted by Chandra, Fauzan<sup>(9)</sup> that there is a significant relationship between the variable knowledge with the variable clean and healthy life behavior in primary school students in Ceribon District. This is in line with the results of research conducted by Rorimpandey, Rattu<sup>(10)</sup> which examines the factors associated with clean and healthy living behaviors (clean and healthy living behavior) at SMP Negeri 2 Tompaso students.

Following other studies also, that there are differences before and after being given peer education interventions on the knowledge of respondents<sup>(11)</sup>. Based on the results of a further analysis it can be concluded that there are significant differences in respondents' knowledge about clean and healthy life behavior after being given education better than before education was given to the intervention group. The teacher's role is the most dominant factor with clean and healthy life behavior in the school setting. So that through the role of the School's Health Clinic Teacher, a healthy lifestyle will be formed for students in the School.

The results of this study indicate that the school's health clinic teacher plays a very important role in the behavior of students including clean and healthy living behaviors (clean and healthy behavior) in the school setting, thus forming a healthy lifestyle in the school through increasing student knowledge. This statement was also stated by Pratama<sup>(12)</sup> where clean and healthy living behavior is an effort to provide learning experiences or create conditions for individuals, families, groups, and communities, by opening communication channels, providing information, and conducting education to improve knowledge. The introduction of health to students is sought by elementary schools in the city of South Ternate through the school's health clinic teachers. This is as suggested in the research of Arifin, Heriyani<sup>(13)</sup> which states that the need for government policy support to improve the implementation of clean and healthy living behavior in the form of regulations, decrees, and instructions in the program implementation of clean and healthy living behavior.

**The Effect Of The School's Health Clinic Teacher's Role on Student Behavior:** Behaviors are reactions or responses that are still closed from someone to a stimulus or object<sup>(14)</sup>. The attitude clearly shows the

connotation of the suitability of the reaction to certain stimuli which in everyday life are emotional reactions to social stimuli. School's health clinic teachers provide health education to respondents using demonstration method with the help of posters and video media. This is to support changes in student behavior. There is an increase in changes in positive behavior of respondents after the application of clean and healthy living behaviors (clean and healthy behavior) through the role of the School's Health Clinic Teacher in Elementary Schools in South Ternate City.

The results of the pre-test of respondents who had a negative attitude turned positive after being intervened through the role of the school's health clinic teacher using the demonstration method with the help of poster and video media and health education. This is statistically significant so that it is obtained that health education through the role of the school's health clinic teacher influences the attitude of elementary school students in the city of south ternate about behavior and healthy behavior before and after the intervention. It was similarly stated by Maimun and Erawan<sup>(15)</sup> that there was an influence of public health practitioner kids on improving the attitude of fifth-grade elementary school students about clean and healthy behavior before and after the intervention in Poasia State Elementary School, Kendari City 2016. The study Gomo, Umbuh<sup>(16)</sup> in Manado with the results of the study showed that the knowledge of acceleration students in Manado was good enough where 90.4% of students knew about clean and healthy behavior in schools with 68% of students practicing their knowledge. Raharjo and Indarjo<sup>(17)</sup> states that there is a relationship between attitudes and the application of clean and healthy life behavior to dispose of waste in its place after being given the facility of garbage bins in schools.

The role of the school's health clinic teacher is very capable to assist students in determining attitudes so that most of the students can respond and appreciate what is taught by the school's health clinic behavior about clean and healthy living behavior. For example, some students have applied several indicators of clean and healthy life behavior such as washing hands with soap in running water, taking out the trash in place, taking part in sports, choosing healthy foods cleaning toilets, cutting nails, and weighing weight in the room school's health clinic. This is as said by Harahap, Saefuddin<sup>(18)</sup> that the clean school environment has a significant influence on students' clean lifestyle behavior. Teacher's behavior

on a clean lifestyle also has a great impact on students' clean lifestyle behavior and makes the clean school environment the impact on student behavior becomes stronger.

**Effect of the School's Health Clinic Teacher's Role on Students' Skills:** There is an increase skills (real actions) of respondents after the application of clean and healthy living behaviors through the role of the School's Health Clinic Teacher in Elementary Schools in South Ternate. This study is in line with research conducted by Maimun and Erawan <sup>(15)</sup> that there are significant differences in the actions of respondents after being given better education than before being given education in the intervention group, so it can be concluded that there is an influence of public health practitioner kids to increase respondent's actions regarding clean and healthy life behavior.

The results of this study are supported by the results of monitoring and evaluating activities of clean and healthy life behavior at the School, where elementary school students in the city of South Ternate demonstrate washing their hands with soap in running water when they finish picking up trash, seen buying nutritious snacks in the canteen, defecate/urinate in the school bathroom, doing sports at school once a week, taking out the trash in its place, and showering and brushing teeth every morning and before going to bed. Supporting facilities for the application of clean and healthy life behavior have also been provided by the school in such as the availability of handwashing areas using soap the existence of a healthy canteen at school, weight measuring devices, proper latrines, trash bins, posters of handwashing steps the dangers of smoking and Throw garbage in its place.

Theoretically, behavioral factors contribute to 30-35% to health status. Because the impact of behavior on health status is quite large, efforts are needed to change unhealthy behaviors into healthy ones. The healthy paradigm is elaborated and operationalized among others in the form of clean and healthy life behavior Citrawathi, Adnyana <sup>(19)</sup>. To that end, by providing information about healthy and clean living through the role of the School's Health Clinic Teacher, by providing health education, demonstrations or modeling in the form of behavior (concrete actions) it is hoped that students will be able to form a habit of clean and healthy life behavior. However, facilities and infrastructure alone are not enough to support an attitude that will manifest in the

form of action. Policies and regulations made by the principal will help in turning an attitude into a behavior.

## Conclusions

There is an increase in knowledge, changes in positive behavior and increased skills (real actions) of respondents after the application of clean and healthy living behaviors (clean and healthy behavior) through the role of the School's Health Clinic Teacher in Elementary Schools in South Ternate City. There is an influence of the role of the school's health clinic teacher on the behavior of clean and healthy living (Clean And Healthy Behavior) elementary school students in the City of South Ternate.

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# Correlation between Plasma Sex Hormones Levels and Hepatitis C Infection in Some Iraqi Male

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## Abstract

Hepatitis C virus (HCV) is an infectious agent which is responsible for hepatic illness, cirrhosis and hepatocellular carcinoma. The present work was designed to find out the correlation between sex hormones (Testosterone, Estradiol E2 and Progesterone) and its prevalence. Infection with HCV was diagnosed with Sacace HCV Genotype Plus Real-TM kit and plasma levels of sex hormones were measured by Roche Elecsys and cobas e analyzers. The two of three studied hormones showed alteration in the patients in comparison with the controls. The plasma Testosterone and Estradiol mean level was increased significantly in male patients with HCV infection in compared with healthy control there is no significant difference between patients and control in progesterone plasma level. There is no significant correlation between HCV viral load mean results and the mean levels of Testosterone and Estradiol while there is significant correlation with Progesterone mean levels.

**Keywords:** Hepatitis, HCV, Testosterone, Estradiol, E2, Progesterone, Sex Hormone.

## Introduction

Hepatitis C virus (HCV) infection is an important worldwide public health trouble. Most HCV cases turn into chronic hepatitis C (CHC), which may progress to liver fibrosis, cirrhosis, and hepatocellular carcinoma. The global prevalence of HCV infection is estimated at more than 170 million people, and some studies estimate that mortality related to HCV infection (death from liver failure or hepatocellular carcinoma) will continue to increase over the next two decades<sup>1</sup>.

HCV is an enveloped RNA virus, classified as a separate genus (*Hepacivirus*) of the *Flaviviridae* family. The genome of HCV is a 9.6 kb single-stranded RNA of positive polarity with a 5' untranslated region (UTR)

that works as an internal ribosome site of entry, a single long open reading frame encoding a polyprotein of approximately 3,000 amino acids (aa) and a 3' UTR<sup>2</sup>. HCV is classified into six main genotypes (1-6) and subdivided into various subtypes named in alphabetical order from a to z. Currently, sequencing of HCV isolates has identified more than 83 subtypes from the six genotypes<sup>3</sup>. The distribution and prevalence of HCV genotypes depend on geographical location. Three broad patterns of genotype distribution have been identified to date. One pattern, characterized by high genetic diversity, involves geographically discrete areas of West Africa with types 1 and 2, Central Africa with type 4 and Asia with types 3 and 6. This pattern is suggestive of a long period of endemic infection. Another pattern involves areas with a few subtypes circulating in specific risk groups, e.g., subtype 3a in drug addicts. The third pattern involves areas where a single subtype is present, such as in Egypt with subtype 4a and South Africa with subtype 5a<sup>4</sup>.

The largest rate of infection with HCV in the general population (10-20%) has been reported in Egypt. It can differ from 5.3% in parts of Africa to about 2.2%

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in South East Asia, 1.7% in North America, and 1% in Europe. There is wide alteration within the Asia-Pacific region too: Western Pacific (3.9%), Thailand (1.5%), China (1.3%), Japan (1.1%), Taiwan (1.0%) and Korea (0.6%). Emerging data from the rest of Asia too suggests a wide variation in prevalence rates. In India the seroprevalence rate was 1.85% of blood donors. Through the general population it has been studied that 4.57% in Pakistan, 1.8% in Saudi Arabia and 2.1% in Yemen have been recorded as being infected with the disease<sup>5</sup>.

Males have strikingly raised risk of advanced liver illness (cirrhosis and HCC) across diverse disease etiologies, including HCV, so supporting the potential roles for gender-associated differences in risk factor exposures as well as sex-based biological variances in disease progression<sup>6</sup>. Females are more likely than males to clear HCV in the acute phase of infection, even within a little month after infection. These notes imply the possibility that female hormones inhibit the infection with HCV, either at the levels of virus attachment/entry, virus RNA replication, virus protein synthesis or production of infectious virus particles (virions)<sup>7</sup>.

Antiviral drugs typically used to fight hepatitis C may cause sexual dysfunction (SD) and decreased libido. SD is the most frequently executed side effect of many antidepressant medications used to treat the reduction and anxiety connected with HCV combination treatment. Sexual dysfunction was reported to be more common in patients with chronic hepatitis C than in individuals without known liver illness<sup>8</sup>.

### Patients and Method

In this study, thirty blood samples were taken from male patients with hepatitis C virus infection were diagnosed by real time PCR by using Sacace HCV Genotype Plus Real-TM kit, attending the Nursing Home Hospital in Medical City of Baghdad during the period from September to December 2018, and thirty blood samples were collected from apparently healthy individual (control). The age of patients was between 21 – 63 years with the mean age at presentation being 39.23 years and from 20 to 58 years with the mean age 44.4 years for healthy control. Plasma levels of Testosterone (TES), Estradiol (E2) and Progesterone (PPOGES) were detected for patients and control by using Roche Elecsys and cobas e analyzers.

Statistical Analysis: The Statistical Analysis System- SAS (2012)<sup>9</sup> program was used to effect of

difference groups in study parameters. T-Test was used to significant compare between means variables. Estimate of correlation coefficient between parameters in this study.

### Results and Discussion

The statistical analysis for results of HCV PCR results for patients and control were shown in Table 1. The mean results of HCV PCR load for patients  $13248092.80 \pm 4905056.25$  IU/ml ( $57389739.67 \pm 21651522.21$  copy/ml) was significantly higher than healthy control  $0.00 \pm 0.00$  IU/ml ( $0.00 \pm 0.00$  copy/ml).

The plasma Testosterone mean level in male patients with HCV infection ( $7.091 \pm 0.55$  ng/mL) was significantly higher than healthy control ( $5.592 \pm 0.43$  ng/mL). (Table 2).

This result agreed with El-Serafi *et al.* who reported that testosterone was found to be significantly increased in the patients with HCV infection above that found in healthy control<sup>10</sup>. Total serum testosterone is associated with an elevated risk of both progressive hepatic fibrosis and progressive hepatic inflammatory activity in infected men with HCV. Testosterone may be very important in the pathogenesis of HCV-related advanced liver illness in males<sup>6</sup>. Active HCV infection was described by higher level of total testosterone compared with participants who accomplished HCV viral clearance the relationships among hepatic function impairment, testosterone and chronic viral infection are complex. Active HCV infection and accompanying impaired liver function are celebrated as risk factors for hypogonadism also changed in semen production. Hypogonadism is also a recognized complication of end stage hepatic disease, which was observed to improve after orthotropic liver transplant<sup>11</sup>. Testosterone is primarily metabolized by the liver, and the metabolic clearance of testosterone is decreased in severe hepatic disease<sup>12</sup>.

Experimental study elucidated that the Hepatitis C virus also augments AR signaling. The AR, whose preponderant ligand is testosterone, is a nuclear hormone receptor expressed in liver. In addition to regulating genes implicated in sexual dimorphism the AR regulates/co-regulates abundant other genes involved in diverse cellular processes of relevance to liver illness, including differentiation, cellular proliferation, inflammatory response and apoptosis (e.g. phosphate and tensin homolog, epidermal growth factor receptor, interleukin-6 signal transducer and tumor protein p53)<sup>13</sup>.

While Nguyen *et al.* reported that Hepatitis C Virus infection modulates androgen status indirectly via elevated Sex hormone binding globulin (SHBG). Screening for androgen deficiency in the context of HCV infection should selectively target males with more severe liver illness or documented higher grade fibrosis<sup>14</sup>.

The plasma Estradiol mean level in patients with HCV ( $55.33 \pm 3.01$  Pg/mL) was significantly higher than healthy control ( $32.99 \pm 2.05$  Pg/mL) (Table 2).

This result agreed with Wang *et al.* who reported that male patients with Hepatitis C infection showed significantly higher E2 concentrations than healthy males<sup>15</sup>. Farnetti *et al.* studied expression of estrogen receptors, type of estrogen receptors and oxidative DNA in patients with HBV and HCV-related chronic liver diseases, indicating that positivity in the liver for an estrogen receptor variant could result in elevated genomic harm and greater rates of cytoproliferation and carcinogenesis<sup>16</sup>.

It was noted that, owing to elevated aromatase activity the peripheral conversion of androgens to estrogen improved. The conversion of adrenal androstenedione to estrone in cirrhotic patients was also reported<sup>17</sup>. As a result of these data and research, our patient group's comparable elevated estradiol concentration was consistent with prior research. Iyer *et al.* also reported that Wild estrogen receptor (ER $\alpha$ ) basal expression in the liver is greater in men than in women. In addition the enhanced subcellular expression of ER subtypes found in diseased livers correlates with the expression of oncogenic and inflammatory markers. During pathogenesis of HCV, this modified expression of ER subtypes in the liver can lead to the progression of cirrhosis and cancer<sup>18</sup>.

The liver receptors of estradiol and estrogen safeguard hepatocytes from oxidative stress, inflammatory injury, and cell death, all contributing to fibrosis. As a result of the general slower development of liver disease and reduced viral clearance in females the disease burden resulting from HCV infection is mainly discovered in males<sup>19</sup>.

Estradiol (E2) may play a positive role in permanent liver injury by stopping the accumulation of monocyte-

macrophages and inhibiting the development of inflammatory cytokines<sup>20</sup>.

The plasma Progesterone mean level in male patients with HCV infection ( $0.624 \pm 0.04$  ng/mL) showed no significant difference with healthy control ( $0.693 \pm 0.05$  ng/mL) (Table 2).

This results were disagreed with the study done by Ahmed *et al.* who showed that progesterone serum levels were elevated in female patients with HCV in compare with healthy control<sup>21</sup>. Yuan *et al.* reported that Progesterone can counteract these beneficial E2 impacts by increasing the accumulation and cytokine output of inflammatory cells by means of progesterone receptor PR<sup>20</sup>.

Table 3 showed there is negative relation between HCV PCR load and the levels of Testosterone and Estradiol but it was not significant while there is a significant correlation with Progesterone level.

Wang *et al.* reported that men with high concentrations of serum testosterone had the smallest concentrations of antibodies and inflammatory cytokines after viral infection<sup>15</sup>. Each 1 ng/ml rise in total serum testosterone was correlated with a 27% rise in the danger of advanced fibrosis and a 16% boost in the danger of advanced inflammatory activity among males infected with HCV<sup>6</sup>. One possible explanation for testosterone's < proviral < consequences is that it alters the development of lipoprotein in a manner that encourages replication of HCV. Another chance that is demonstrated by this research is that testosterone inhibits immune responses to HCV infection<sup>22</sup>. Testosterone inhibits immune responses to HCV infection<sup>15</sup>.

## Conclusion

We concluded that plasma Testosterone and Estradiol mean level was increased significantly in male patients with HCV infection in compared with healthy control and there is no significant difference between patients and control in progesterone mean level also there is no significant correlation between HCV viral load mean results and the mean levels of Testosterone and Estradiol while there is significant correlation with Progesterone mean levels.



**Table 1. Compare between patients and control in HCV-PCR**

Groups	HCV PCR Load*** (IU/ml)	HCV PCR Load*** (copy/ml)
Patients (No. =30)	13248092.80 ± 4905056.25	57389739.67 ± 21651522.21
Control (No. =30)	0.00 ± 0.00	0.00 ± 0.00
T-Test	173.38 **	766.671 **
P-value	0.00304	0.00375
* (P<0.05), **Mean ± SE.		

**Table 2. Compare between patients and control in level of hormones**

Groups	Testosterone*** (ng/mL)	Estradiol-E2*** (Pg/mL)	Progesterone*** (ng/mL)
Patients (No. =30)	7.091 ± 0.55	55.33 ± 3.01	0.624 ± 0.04
Control (No. =30)	5.592 ± 0.43	32.99 ± 2.05	0.693 ± 0.05
T-Test	1.021 *	10.915 **	0.1643 NS
P-value	0.0414	0.0002	0.3943
* (P<0.05), ** (P<0.01), ***Mean ± SE, NS: Non-Significant.			

**Table 3. Correlation coefficient between HCV and hormones in patients**

Parameters	Correlation Coefficient-r	
	HCV PCR Load (IU/ml)	HCV PCR Load (copy/ml)
Testosterone	-0.03 NS	0.08 NS
Estradiol-E2	-0.04 NS	-0.01 NS
Progesterone	-0.26 *	-0.27 *
P-value		
* (P<0.05), NS: Non-Significant.		

**Ethical Clearance:** Ethics approval was obtained from the Department of Biomedical Engineering, University of Technology.

**Source of Funding:** Self.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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# Impact of Discharge Educational Program on Preterm Infants' Mothers' Knowledge and Practice

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## Abstract

Preterm infant discharge educational program ensure best practice and help guide the mothers to appropriate level of care following birth. The aim of the current study was to evaluate the impact of discharge educational program on preterm infant mothers' knowledge and practice. A multiple time series quasi-experimental research design was utilized. Between March 2018–February 2019, a convenient sample of sixty mothers of preterm infants was recruited from neonatal intensive care unit of El-Monira Pediatric Hospital-Cairo University. These mothers were assigned equally to either the study or control group. Mothers in the study group received four educational sessions along with hospital routine care; mothers in the control group only received hospital routine care. Mother's knowledge and practice were assessed during preterm infant hospitalization and post discharge three times using structured interview sheet and observational checklist. Results revealed that mothers' knowledge and practice about preterm infant was in the unsatisfactory level for both groups before the program intervention. Mothers' knowledge and practice total mean scores in the three times post intervention were significantly higher for study group than those in the control group. Conclusion: Discharge educational program can improve mothers' knowledge and practice to take care of their preterm infant.

**Keywords:** *Discharge Educational Program, Preterm Infants Mothers, knowledge, practice.*

## Introduction

Discharge of a premature infant is a stressful experience for parents because they will be engaged in full responsibility for their child care for the first time<sup>(1)</sup>. Another reason is that most parents lack discharge preparation and the confidence to take care of their neonate at home<sup>(2)</sup>. Previous studies suggested that parental knowledge and practice were significantly correlated with preterm infant safety, parent satisfaction and physical, emotional, psychological and social well-

being of the family<sup>(3)</sup>. It is essential that parents have acquired adequate knowledge and skills to take care of their child before discharge home.

Early discharge programs facilitate the transition to the home and have beneficial effects on both the parents and children. However, only a few studies have been conducted to identify the real needs of parents of preterm infants and to determine whether early discharge programs meet such needs<sup>(4)</sup>. Health education could increase mothers' knowledge, care abilities and self-confidence, which will subsequently assist them in handling the pressures of caring for a fragile infant at home<sup>(2)</sup>.

Prematurity is of great relevance, due to its social impact, economic costs, and effect on quality of life, as well the health consequences for premature infants<sup>(5)</sup>. Discharge education is a primary means to help parents get ready for caring for their child at home<sup>(6)</sup>. Previous

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studies found that providing information and support for parents during hospitalization could impact parental confidence, parenting behavior and family wellbeing at home <sup>(7)</sup>. Parental discharge education usually begins while the infants are in NICUs, aiming at providing anticipatory guidance and information to help parents successfully care for the infant at home <sup>(8)</sup>. Meanwhile, many strategies have been established to improve the effectiveness of discharge education programs <sup>(9)</sup>, researchers found that education programs for parents of preterm infants during the hospitalization period contributed to higher levels of parental knowledge of parenting infants, more parental satisfaction with nursing service <sup>(10)</sup>, lower infant morbidity after discharge <sup>(11)</sup> and lower readmission rates <sup>(12)</sup>.

Despite receiving training by neonatal nurses, mothers of preterm infants encounter difficulties at home, hospital readmission rates increase and family life is disrupted <sup>(13)</sup>. The majority of governmental pediatric hospitals in Egypt prohibit mothers from providing care in NICUs, where the preterm infants are hospitalized due to care safety and survival concerns. However, few studies in Egypt examined the effect of education programs on mothers' knowledge and practice for their preterm infant discharge from NICUs. The interactions between healthcare practitioners and parents of preterm infants are limited in Egypt NICUs.

**Aim of the study:** To evaluate the impact of discharge educational program on preterm infants' mothers' knowledge and practice.

**Hypotheses:** Mothers who received the discharge educational program about their preterm infants will have higher mean knowledge and practice scores than those not received.

## Material and Method

**Research Design:** A multiple time series quasi-experimental research design was utilized.

**Participants:** A convenience sampling of mothers of preterm infants in NICU was recruited from Elmonira Pediatric Hospital, Cairo University. The inclusion criteria of mothers of premature infants were: 1) age of 18 years or above; 2) primary caregiver of the premature infant after discharge; 3) and their preterm infants gestational age ranged between 32 - <37 weeks of gestation. Mothers of preterm infants were excluded if their child experienced surgery; had a congenital

malformation; or was abandoned, readmitted or deceased. A total of 60 mothers were recruited in this study and assigned to either the control group (N = 30) or the study group (N = 30).

### Tools of Data Collection:

1. **A structured interview sheet:** It was developed and conducted by the research investigators and included two main parts:

**Part I (Mothers' personal data):** involved questions related to personal characteristics of mothers such as, age, level of education, occupation, place of residence and other data related to maternal history.

**Part II:** Mothers' knowledge and practice sheet (pre & post-test): included 65 questions to assess mothers' knowledge about preterm infants; it covered areas of preterm infants criteria, needs of preterm infants, warming, sleeping, feeding, skin care, prevention of infection, Kangaroo mother care, vaccination, management of some preterm infants problems and follow up.

2. **Observational Checklist:** It designed by research investigators and involved 109 questions divided to 10 procedures was used to evaluate mothers practice regarding "mothers' practice related to breast feeding, expression of breast milk, cup feeding, bottle feeding, cord care, eye care, sponge bathing, table tub bathing, diaper care and kangaroo mother care".

**Tool Validity and Reliability:** Data collection tools were submitted to three experts in the field to test the content validity. Reliability was done by cronbach's alpha test and the result of knowledge was 0.78 and practice 0.75.

**Procedure:** After the Ethical Committee approval was obtained the potential mothers were contacted to provide a detailed explanation of the study and also obtain written informed consent. All the participating mothers were asked to complete the demographic data. Mothers were assigned to either the study or control groups. The content of discharge education in this study was based on the baseline assessment for mothers' needs which were assessed individualized for each mother by pretest and used as baseline data for educational program. The discharge educational program was based on small groups (three- five mothers) and was delivered in the teaching rooms of the NICU. The discharge education

program included four sessions and each session lasted maximum 60 minutes about preterm infants criteria, needs of preterm infants, warming, sleeping, feeding, hygienic care, prevention of infection, Kangaroo mother care, vaccination, management of some preterm infants problems and follow up. Teaching approaches were a question/answer; a lecture discussion, videos, computer, power point data show demonstration-redemonstration of procedures and illustrated Arabic booklet.

The program was provided after preterm infant admitted to NICU and before infant discharge. For the study group, a prior appointment was made with mothers to decide when and where to initiate the discharge education. After finishing the four education sessions, each mother received Arabic booklet containing the discussed information.

All mothers of preterm infants in the two groups were asked to complete the post-test three times after their preterm infants discharge from NICU at the 2<sup>nd</sup>, 4<sup>th</sup> and 8<sup>th</sup> weeks follows up. All the data were collected from March 2018–February 2019.

**Statistical Analysis:** Data were statistically described in terms of mean ± standard deviation and percentages when appropriate. Data distribution was tested using Kolmogorov Smirnov test. Comparison of numerical variables between the study groups was done using Student *t* test for independent samples in comparing two groups of normally distributed data and Mann Whitney *U* test for independent samples for comparing not-normal data. Within group comparison of numerical variables was done using paired *t* test in comparing two groups when normally distributed and Wilcoxon signed rank test for paired (matched) samples when not normally distributed. For comparing categorical data, Chi-square (*c*<sup>2</sup>) test was performed. Two sided *p* values less than 0.05 was considered statistically significant.

All statistical calculations were done using computer program IBM SPSS 22.

## Results

**Table (1): Mothers’ characteristics of both groups in percentage distribution (n=60).**

Mothers’ characteristics	Groups				P
	Control (n. 30)		Study (n. 30)		
	N	%	N	%	
<b>Age/year:</b>					
• <20	3	10.00	3	10.00	0.557
• 20 - <25	5	16.666	5	16.666	
• 25 - <30	9	30.00	10	33.333	
• 30 - <35	8	26.666	8	26.666	
• ≥ 35	5	16.666	4	13.333	
Mean ± SD	28.83 ± 6.597		27.87 ± 6.084		
<b>Educational level:</b>					
• Can’t read & write	2	6.7	8	26.7	0.186
• Basic education	12	40.0	7	23.3	
• Secondary	10	33.3	10	33.3	
• University	6	20.0	5	16.7	
<b>Job:</b>					
• House wife	26	86.7	28	93.3	0.915
• Working	4	13.3	2	6.7	
<b>Place of residence:</b>					
• Urban	25	83.3	25	83.3	1.000
• Rural	5	16.7	5	16.7	
<b>Parity:</b>					
• Primi	10	33.3	7	23.3	0.390
• Multi	20	66.7	23	76.7	

Table (1) No significant differences were found between the study and control groups with regard to mothers’ characteristics (i.e. age, education level, place of residence and parity).

**Table (2): Comparison of total mean mothers’ knowledge and practice of both groups in pre/post-tests.**

Mothers’ Knowledge & Practice	Tests							
	Pre		1 <sup>st</sup> Post		2 <sup>nd</sup> Post		3 <sup>rd</sup> Post	
	Mean±SD	P	Mean±SD	P	Mean±SD	P	Mean±SD	P
<b>Knowledge:</b>								
Control Group	21.10±8.54	0.021	27.15±8.35	0.000	29.09±7.09	0.000	30.35±6.21	0.000
Study Group	16.50±6.27		61.30±2.45		60.77±3.29		58.79±2.24	
<b>Practice:</b>								
Control Group	25.00±11.09	0.261	33.42±9.26		35.57±9.81		35.50±11.75	
Study Group	27.93±8.80		100.00±6.30	0.000	98.10±6.49	0.000	96.86±6.64	0.000

Results showed that the mean score of total knowledge in the control group was significantly higher than the corresponding mean scores in the study group ( $p = 0.021$ ), while no significant difference was found

for practice ( $P = 0.261$ ) between the two groups in pretest. Post-test the mean scores of total knowledge and practice were significantly differed (Table 2).

**Table (3): Relation between mothers’ knowledge and practice level of both groups in pre/post-tests.**

Mothers’ Knowledge & Practice	Tests																			
	Pre					1 <sup>st</sup> Post					2 <sup>nd</sup> Post					3 <sup>rd</sup> Post				
	Control (n. 30)		Study (n. 30)		p	Control (n. 26)		Study (n.30)		p	Control (n.23)		Study (n.30)		p	Control (n.20)		Study (n.29)		p
	N	%	N	%		N	%	N	%		N	%	N	%		N	%	N	%	
<b>Knowledge:</b>																				
• Unsatisfactory	28	93.3	30	100.0	0.150	23	88.5	---	---	0.000	21	91.3	---	---	0.000	17	85	---	---	0.000
• Satisfactory	2	6.7	---	---		3	11.5	30	100.0		2	8.7	30	100		3	15	29	100	
<b>Practice:</b>																				
• Unsatisfactory	30	100	30	100		26	100.0	---	---	0.000	23	100	---	---	0.000	20	100	---	---	0.000
• Satisfactory	---	---	---	---		---	---	30	100		---	---	30	100		---	---	29	100	

Results illustrated that mothers of both groups had unsatisfactory knowledge and practice level with no significant relation in pretest, while a significant relations were found in the 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> post-tests.

**Discussion**

The current study evaluated the impact of discharge educational program on knowledge and practice among the mothers of preterm infants. After implementation of the discharge educational program mothers in the study group reported a higher satisfaction level of knowledge and practice about how to care for their preterm infants than those in the control group. The discharge education program as a nursing therapeutic intervention was significantly improved knowledge and practice of mothers about how to care for their preterm infants at home. This may be attributed to several causes: First the study group received four sessions of discharge education that provided basic knowledge about caring for their preterm infants after discharge which met mothers’ needs, second, after participating in the discharge education, mothers might feel supported by healthcare providers <sup>(14)</sup> so that they have more confidence and excitement after discharge <sup>(2)</sup> and third, because the education program used small groups (one-four mothers), mothers had more chances to exchange experience with each other and to receive support from buddy mothers <sup>(15)</sup>.

The findings of the current study denoted the positive effects of education on knowledge and practice among the mothers of preterm infants, this in consistent with <sup>(16)</sup> study. Similarly, a study conducted by <sup>(14)</sup> reported that mothers involved in the education program had increased knowledge and skills about how to care for their preterm infants. Another study <sup>(17)</sup> reported that an improvement was observed in mothers’ knowledge and skills on post-test and the experimental group showed greater improvement than the control group, with statistical significant in both groups. However the current study findings contradicted with <sup>(5)</sup> showed that interventions were not effective for mothers in caring for their preterm infants at home.

At present there are no standardized protocols about hospital discharge and follow-up care of premature infants in Egypt. Consequently, premature infants may leave the hospital without adequate discharge and follow-up care plans to ensure appropriate and adequate care at home. Based on the results in this study, it is recommended that discharge education program for mothers about caring for their preterm infants should be included in clinical routine care and clinical care policy should be established to support the use of discharge education program so as to benefit premature infants and their families.

## Conclusion

Mothers who received the discharge educational program about their preterm infants had higher mean knowledge and practice scores than those not received.

**Ethical Clearance:** Approvals were obtained from research ethical committee at faculty of nursing, - Cairo University. All mothers who participated in the study were informed about the aim, procedure, benefits, and nature of the study. A written consent was obtained from mothers. The anonymity and confidentiality issues of information were assured and the mothers had the right to refuse or withdraw from the study at any time during the study without any effect on the care provided to their preterm neonates.

**Conflict of Interest:** There is no conflict of interest.

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# Effect of Protocol of Care for Mothers on Selected Postoperative Outcomes among their Children with Developmental Dysplasia of the Hip

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## Abstract

Developmental dysplasia of the hip (DDH) is a common pediatric orthopedic condition. DDH is an abnormal development of the hip joint. The aim of the current study was to evaluate the effect of protocol of care for mothers on postoperative outcomes among their children with developmental dysplasia of hip. Time series quasi-experimental research design was utilized. A convenient sample of 60 children with DDH was recruited. The study findings revealed that mothers who received protocol of care had a higher mean score of knowledge and practice regarding care of their children with DDH than those in control group. There were highly statistical significance correlations between children's improved postoperative outcomes and mothers knowledge and reported practice after implementation of protocol of care. The study concluded that application of protocol of care for mothers' of children with DDH has a positive effect in improve postoperative outcomes. It is recommended that protocol of DDH care should be available at orthopedic department and designing suitable booklet about proper care, follow up and complication of DDH. In-service education for nurses may refresh their knowledge regarding DDH and nursing management of the orthopedic children.

**Keywords:** Protocol of care, Postoperative outcomes, Mothers of children with DDH and children with DDH.

## Introduction

Developmental dysplasia of the hip (DDH) is a common pediatric orthopedic condition. In spite of recent advances in the understanding of DDH the precise definition of DDH itself is controversial. It represents a broad spectrum of conditions affecting the proximal femur and acetabulum, in which the femoral head and the acetabulum are not aligned and do not develop proportionately<sup>1</sup>. The incidence of DDH varies greatly with nations and continents, but around the world

incidence of DDH ranges from 1 to 34 cases per 1000 births<sup>2</sup>.

Eight in ten cases are females; roughly 6 in 10 children occur in the first born children. Furthermore, ultrasound studies have demonstrated hip instability in up to 15% of all newborn<sup>3</sup>. Numerous factors can lead to DDH which includes several mechanical, hormonal, genetic and environmental factors. Early finding and management offers the best possible result. Hip dysplasia into teens and later life may result in irregular gait, reduced the strength and generate many hip and knee disease<sup>4</sup>. The final outcome of DDH depends on the age of child the severity of child's condition and the response to treatment such as (a special brace or harness, casting, surgery). After surgery child will be put into a hip spica cast for a minimum of 6 weeks<sup>5</sup>.

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Families, especially mothers, can suffer

psychological and social problems such as anxiety, guilt, fatigue, depression, and social isolation during home care. All of the parents had problems with care giving activities in the home, especially toileting, cast care, and skin care, pain, feeding and personal hygiene<sup>6</sup>.

Protocols of care are instruments that can reduce the variability of conduct among the professionals involved in health care, to promote greater security for the patient and for the professional, to allow process and outcome indicators to be developed, to improve the quality of care and the rational use of resources<sup>7</sup>.

Nurses play a significant role in identifying signs of DDH in new born. The primary goals in caring for a child at the hospital pre & post-operative care is followed by caring for a child in cast to maintain the position of the hip joint. Moreover, prevent complications and provide stimulation necessary for the developing child. As early as possible, involve parents in caring for their children to build confidence in their ability and provide home care<sup>8</sup>.

#### Hypotheses:

1. Mothers who will receive the protocol of care will have higher mean score of knowledge and practice related to care of children with DDH than those who don't.
2. Children of the mothers who will receive the protocol of care will have better postoperative outcomes than those who don't.

#### Material and Method

**Participants:** A convenient sample of 60 mothers of children with DDH was participated in the study.

**Setting:** The study was conducted at pediatric orthopedic surgical unit and in the pediatric orthopedic surgical outpatient clinic at Cairo-University Specialized Pediatric Hospital, Cairo, Egypt.

#### Data Collection Tools:

1. A structured interview sheet: It included child and mothers' personal data as child age, gender, rank, mothers' age, level of education and child's past and present medical history.
2. Postoperative Outcomes Recording Sheet: It was developed by the researchers to assess the children during postoperative period. It included established child postoperative outcomes criteria related to vital signs, intensity of pain, status of cast, skin integrity,

occurrence of complications of immobilization, child's appetite, occurrence of potential injuries, as well as positioning.

3. Pre/Post Test: it was developed by the researcher to assess mothers' knowledge regarding DDH such as definition of DDH, causes, types and plan of treatment. Observation Checklists evaluate the mothers' practice regarding care of children with DDH. it was modified and simplified by the researcher<sup>7</sup>.ory, to fit the capabilities of mothers. Observation checklists was involve measurement of skin and hygienic care, cast care, care of immobilized child, protect from potential injury.
4. Pain Rating Scales: It was used to assess the intensity of postoperative pain among children with DDH it was include:
  - A. The Face, Legs, Activity, Cry, Consolability scale (FLACC) to assess pain for children between the ages of 2 months and 7 years or children. The scale is scored in a range of 0–10 with 0 representing no pain.
  - B. Faces Pain Rating Scale to assess pain intensity among children aged more than three years of age. The scale is treated as a 5 level Likert scale with scores ranging from 0 (no pain) to 5 (worst pain).

**Tool Validity and Reliability:** The tools was submitted by three experts in pediatric surgery nursing, and pediatric orthopedic surgery to test the content validity of the tools to ensure the content validity. Reliability of tools was performed to confirm its consistency and was calculated statistically.

**Procedure:** Written consent was obtained from caregivers and oral acceptance from the children after description of the aim and nature of the study. The researcher attended to orthopedic surgical unit and outpatient orthopedic clinic. Through an individual interview with each child and mother the researcher provided completed data about the child, parents' personal data and child history. The researcher conducted preoperative teaching for mothers having children with DDH about postoperative care. Before teaching sessions the mothers were exposed to pre-test to assess their knowledge about care should be given to children with DDH. Then the research investigator explained teaching through two educational sessions the first session provided the mothers knowledge about definition of

DDH, predisposing factors, symptoms, orthopedic operation for those children. The second session was focused on care should be given by the mothers such as reducing child's pain, skin and hygienic care, cast care, care of immobilize child, protection from potential injuries, enhance appetite of the child and positioning. These activities were applied through demonstration and re-demonstration through simulation. The implementation on the child of the protocol took place during the first week after orthopedic operation through re-demonstration of care for child by the mothers guided by research investigator. To evaluate the mother's care giving activities regarding care of children with DDH was taken place using modified and simplified observational check lists and postoperative outcomes recording sheet will be assessed. They would be assessed three times; the first time immediate postoperative of orthopedic surgery for DDH children in the orthopedic surgery department the second time after two weeks and then the third one

after one month of the orthopedic surgery in orthopedic outpatient clinic.

**Statistical Analysis:** The collected data was tabulated, and summarized. Data was computerized and analyzed using appropriate descriptive and inferential statistical tests to test the research hypothesis (SPSS) program version 21 were used. Level of significance was set at  $P < 0.05$ .

**Findings:** Table (1) indicated that the highest percentages of children in both groups (60% & 56.7% respectively) aged less than 3 years. The mean age of children in the study group was  $3.5 \pm 2.48$  years and it was  $2.8 \pm 1.71$  years for children in control group. Two fifths and more than half (40% & 56.7% in order) of children in both groups were ranked as first child in their families. The majority of children in study and control groups (63.3% & 73.35 correspondingly) didn't enter school.

**Table (1): Percentage Distribution of Children' Personal Characteristics (n=60).**

Children' Characteristics	Study Group (n=30)		Control Group (n=30)		$\chi^2$	p-value
	No.	%	No.	%		
<b>Age/Years</b>						
<3	18	60.0	17	56.7	4	0.13
3-<6	7	23.3	12	40.0		
6-<10	5	16.7	1	3.3		
X $\pm$ SD	3.5 $\pm$ 2.48		2.8 $\pm$ 1.71			
<b>Child Rank</b>						
First	12	40.0	17	56.7	1.7	0.63
Second	7	23.3	5	16.7		
Third	6	20.0	4	13.3		
More than third	5	16.7	4	13.3		
<b>Education</b>						
Did not enter school	19	63.3	22	73.3	1.5	0.47
Nursery	6	20.0	6	20.0		
Primary	5	16.7	2	6.7		

\*Significant at p-value<0.05.

Figure (1) proved that more than three quarters and less than two thirds (76.7% & 60% correspondingly) of children with DDH in the study and control groups were females.

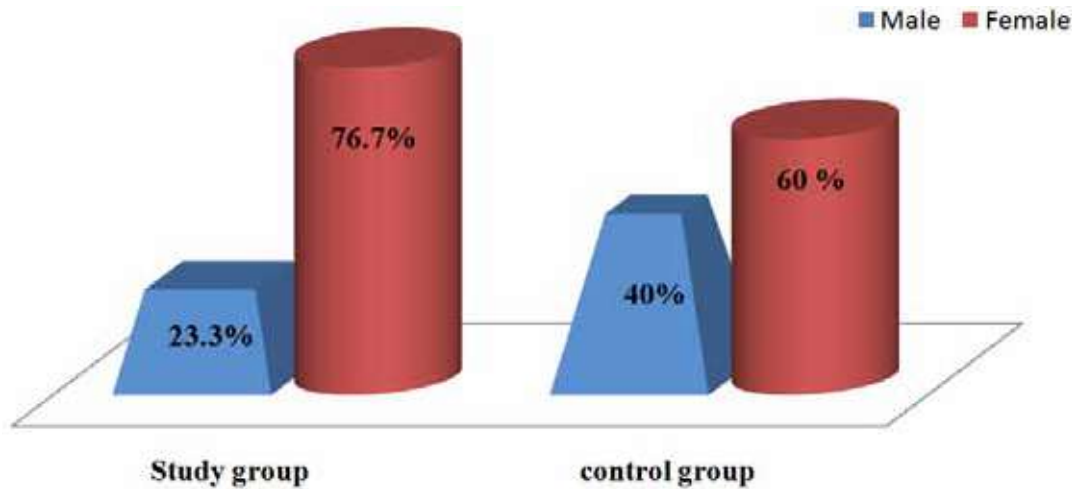


Figure (1): Percentage Distribution of Children's Gender in the Study and Control Group (n=60).

In relation to mothers knowledge outcomes table (2) proved that all of mothers (100%) of the study groups had satisfactory knowledge out comes compared with mothers in the control group still had unsatisfactory

knowledge out comes (86.7%, 66.7 & 50% in order). There were statistical significance difference between mothers in study and control group related to knowledge outcomes (p>0.05).

Table (2) Comparison between Outcomes of Knowledge Related to Postoperative Care of Their Children in Study and Control Groups.

Knowledge Outcomes	Study Group (n=30)		Control Group (n=30)		$\chi^2$	P-value
	N	%	N	%		
<b>Immediate Postoperative</b>						
Satisfactory	30	100	4	13.3	21.37	0.041*
Unsatisfactory	0	0	26	86.7		
<b>After 2 Weeks</b>						
Satisfactory	30	100	10	33.3	10.01	0.002*
Unsatisfactory	0	0	20	66.7		
<b>After 1 Month</b>						
Satisfactory	30	100	15	50	5.00	0.025*
Unsatisfactory	0	0	15	50		

\*Significant at p-value < 0.05.

Table (3) illustrated that there was no statistical significant correlation between children improve postoperative outcomes and mothers' reported practice in pretest (r= 0.190, p>0.05). There were statistical significant correlations between children improved postoperative outcomes and mothers reported practice in immediate postoperative, two weeks after surgery and one month after surgery (r = 0.190, p<0.05, r = 3.86, p < 0.05, r = 2.8, p < 0.05 & r = 0.26, p < 0.05).

Table (3) Correlations between mothers Reported practice and Improved Postoperative Outcomes (n=60).

Improved Postoperative Outcomes	Mothers' Reported Practice	
	r	P
Before the surgery	0.190	0.146
Immediate after surgery	3.86	0.012*
Two weeks after surgery	2.8	0.049*
One month after surgery	0.26	0.043*

\*Significant at p-value<0.05

It was evident from table (4) that there were highly statistical significant correlations between children improved postoperative outcomes and mothers knowledge and reported practice ( $r = 0.98$ ,  $p < 0.05$ ,  $r = 0.94$ ,  $p < 0.05$  in order).

**Table (4) Correlation between Knowledge and Reported Practice of Mothers and Improve Postoperative outcomes.**

Variables	Improve postoperative outcome	
	r	P
Level of knowledge of mothers	0.98	0.0001*
Reported practice of mothers	0.94	0.0001*

\*Significant at p-value  $< 0.05$ .

### Discussion

Based on the result of the current study the highest percentages of children in both groups aged less than 3 years. On the same line with this findings of a study done by<sup>9</sup> who indicated that repeated, carefully performed clinical examinations of the pediatric hip from newborn to walking age remain the best method for early detection of DDH. Regarding the child's rank the highest percentages of children in both groups ranked as first child in their families. This finding is in agreement with a study carried out by<sup>10</sup> who found that; first-born children were associated significantly with an increased risk of DDH.

The results of this study indicated that more than three quarters and less than two thirds of children with DDH in the study and control groups were females. This result was in the same line with<sup>3</sup> which reported that 8/10 of children are females. In addition other studies by<sup>11</sup>,<sup>12</sup> and<sup>10</sup> were also supported that the female sex had a significantly high prevalence among the children with DDH.

Concerning mothers' knowledge about postoperative care provided for their children after DDH surgery the results of the study highlighted that all of mothers of the study groups had satisfactory knowledge outcomes compared with mothers in the control group still had unsatisfactory knowledge outcomes<sup>13</sup> are agreed with the results as they found that, Improper postoperative care can lead to unplanned, increased morbidity and complication, use of appropriate education materials teaching method, caregivers will gain an improved comfort level and increased knowledge base. This will

translate to better children care and more complete caregiver education for home.<sup>8</sup> endorsed that educational programs should be provided about suitable nursing interventions for children with DDH.

The existing study showed that there were no statistical significant correlations between children improved postoperative outcomes and mothers reported practice in pretest. There were statistical significant correlations between children improved postoperative outcomes and mothers reported practice in immediate postoperative, two weeks after surgery and one month after surgery. The foregoing result supported by<sup>14</sup> who illustrated that application of standard operation procedure for perioperative nursing increased the completeness of preoperative preparation, decreased the incidence of postoperative complications, and the parental satisfaction was greatly improved.<sup>15</sup> who proved that implementation of quality improvement program resulted in a shift toward fewer cast complications, leading to overall improved patient care.

The current study clarified that there were statistical significant correlations between children improved postoperative outcomes and mothers' knowledge and reported practice after administration of the protocol of care. These results were in accordance with<sup>16</sup> who found that there was a highly statistical significant positive correlation between the studied mothers' total knowledge score and total practices score regarding shunt infection. This may be because of the increasing knowledge of mothers, leading to improved care and practices for their children.

### Conclusion

Protocol of care for children with DDH improves knowledge and practice of mothers' related to care of children with DDH as well as postoperative outcomes.

#### The study recommended the following:

- Protocol of DDH care can be used and integrated with the routine care for children with DDH with emphasize to be performed at home to improve postoperative outcomes.
- Designing suitable booklet about proper care, follow up and complication of DDH.
- In-service education for nurses may refresh their knowledge regarding DDH and nursing management of the orthopedic children.

**Ethical Clearance:** A written approval was obtained from the ethics and research committee of the Faculty of Nursing-Cairo University. Written informed consent was obtained from the caregivers and oral acceptance from children was confirmed after explaining the purpose, nature and benefits of the study. Children were informed that participation in the study was voluntary; anonymity and confidentiality of the data were assured.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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# The Temporal Pattern of Ambient PM<sub>2.5</sub> and Health Risk Assessment in Thailand

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## Abstract

This study aims to investigate the distribution pattern and the health risk assessment of PM<sub>2.5</sub> in the Thailand atmosphere. Data used from initially PM<sub>2.5</sub> monitoring station of 5 cities in Thailand that different major source of polluted PM<sub>2.5</sub> recorded data during January 2014 to December 2017 were observed. The findings shown that average concentration ranged from 1 µg/m<sup>3</sup> to 247 µg/m<sup>3</sup>, highest in Saraburi. The diurnal patterns shown highest peak concentrations at 08.00 – 09.00 am and lowest at 02.00 - 04.00 pm. Due to weekly pattern the concentrations in weekday were likely more than weekend. The seasonal patterns comparison was highest in winter and lowest in rainy. For the potential health risk analysis the population were divided into four age group (children 1-5 years, children 6–11 years, children 12–19 years and adults 20 and over). The health risk analysis was considered age-specific respiratory rates and body weights for different age group. There were shown that negative health effect for all age group, especially cement plant area (Saraburi), urban (Khon Kaen), coal power plant (Mae-Moh), industrial area (Rayong) and Moon soon area (Hat-Yai) respectively. The children 1-5 years group had the highest health risk, children 6-11 years, children 12-19 years and adults respectively. This study concluded that PM<sub>2.5</sub> is still a challenging environmental health problem for Thailand and is a risk to public health. Knowing the distribution patterns helps policymakers to plan solutions.

**Keywords:** PM<sub>2.5</sub>; Health risk; Air pollution.

## Introduction

Air pollution has become environmental health problem in Thailand a past decade, due to economic growth and air pollutions has decreasing also. The rapid urbanization led to numerous of air pollution source including, building construction, mobile exhausts, heating combustion and resuspended dust form road. Throughout the 25 years (1990-2015) air pollution is one of the environmental risks for global burden of disease, especially in South East Asia, chronic obstructive

pulmonary disease is associated with a 700 - 800 DALYs per 100,000 and 30 - 40 deaths per 100,000<sup>(1)</sup>.

Thailand has experienced about air pollution over the past decades. There are efforts to solve the air pollution by driving the legal mechanism and installation of an air quality station for surveillance. Due to hard work, many air pollutants were maintained good standard in most areas. However, Thailand is still experiencing the problem of inhalable dust over the guideline in many areas. For instance the PM<sub>2.5</sub> that is getting attention in the past 2-3 years due to PM<sub>2.5</sub> can enter the lower respiratory tract and cause short-term and long-term health effects <sup>(2)</sup>. Moreover the proportion of disease burden attributable of PM<sub>2.5</sub> for lung cancer and cardiovascular disease were 16.8% and 14.6% respectively and mortality attributable to PM<sub>10</sub> was 3.4% for all-causes mortality, 1.7% for respiratory and 3.8% for cardiovascular mortality<sup>(3)</sup>.

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Previous studies of Thailand ambient fine particulate matter were conducted in high risk areas such as the haze episode phenomenon in the north the heavy traffic roads, open burning area and industrial areas (4)(5)(6)(7)(8)(9)(10). However, to collect ambient air particulate matter samples, it is necessary to use special tools that are still limited in Thailand because these tools must be imported from abroad and are expensive. For this reason, in the long-term study of changes in order to see the pattern of distribution of ambient dust is difficult because of the high budget required. In the long-term studies, most of the time, data is often used from air quality monitoring stations. In the past, Thailand has only monitored and monitored on total suspended particulate matter and PM10. PM2.5 monitoring stations in Thailand began to be installed and measured in 2014, making the study of PM2.5 in Thailand is still limited. Thailand is a tropical country, which is different from the research that is widely distributed in America, Europe and China. The study of the distribution pattern of PM2.5 could provide the consistency of the quantity in each period and area of which will be the informatics solutions to the PM2.5 problem in Thailand.

Therefore, this study aims to investigate the distribution pattern of PM2.5 over time and assess the health risk from exposure in each age group in the Thailand atmosphere.

### Material and Method

**Ambient PM2.5 Data:** Air quality monitoring stations in Thailand are set up to monitor the concentration of 6 air parameters, consisting of PM10, PM2.5, CO, NO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub>. Measurement and reporting results are based on standards of United States Environmental Protection Agency (US-EPA). Air pollutants concentrations were reported every 1 hour and collected in the Thailand air pollution database of Pollution Control Department (PCD). In this study, selected hourly PM2.5 concentration data from January 1, 2014 to December 31, 2017 (4 year) from 5 stations with completed data that different regions of Thailand and the characteristics of the main sources of pollution are different, namely Khon Kaen, Saraburi, Mae Moh, Rayong and Hat Yai, that be representative, namely

urban areas, cement industries, petrochemical industry zone and tropical monsoon zones, respectively.

Concentration data will be compared the average for each hour of the day and analyzed mean difference by linear regression model in daytime-nighttime, weekday-weekend and season. Stata version 13 was used to analyze in this study.

**Health Risks Assessment:** To investigate the potential health risk of population exposed to PM2.5 were applied to calculate the total daily respiratory intake. The pathway of health risk to population's exposure was assessed using the hazard quotient (HQ). This study was analyzed by age group consisting of children 1-5 years, children 6-11 years, children 12-19 years and adults 20 years and older that followed to the exposure factors calculated by the US-EPA (2009)<sup>(11)</sup>. The procedure for calculating health risk was shown in figure 2.

The description of the steps of health risk assessment to PM2.5 are followed below:

1. Identification of the potential health risk substance. In this study assessed potential risk by ambient PM2.5 concentration.
2. Assessment of PM2.5 population exposure rate (ER). The equation is described below,

$$ER = (C_{PM2.5} \times IR \times FR \times FA \times EF \times ED) \times (BW \times AT)^{-1}$$

Were;  $C_{PM2.5}$  is the average hourly concentrations of PM2.5 ( $\mu\text{g}/\text{m}^3$ ); IR is inhalation rate ( $\text{m}^3/\text{day}$ ); FR Factor of Retention; FA Factor of Absorption; ET Exposure Time (hrs/day); EF Exposure Frequency (days/year); ED Exposure Duration (year); BW is body weight (kg); AT Average Time of Exposure (day). The exposure factors used in this study shown in table 1.

3. Toxicity assessment, in this study, calculated from RfC. based on de Oliveira et al., 2012<sup>(12)</sup>.

$$RfD = RfC \times (IR \times BW)^{-1}$$

4. The health risk characteristic will be assessed by the hazard quotient (HQ), if  $HQ > 1$  there were potential adverse health.

$$HQ = ER \times RfD^{-1}$$



**Table 1: The health risk assessment parameters and value of parameters**

Exposure Factors	Adult	Children		
	≥20 Year	1-5 Year	6-11 Year	12-19 Year
IR; inhalation rate (m <sup>3</sup> /day)	13	7.6	11	14
FR; Factor of Retention	1	1	1	1
FA; Factor of Absorption	1	1	1	1
ET; Exposure Time (hrs/day)	24	24	24	24
EF; Exposure Frequency (days/year)	365	365	365	365
ED; Exposure Duration (year)	30	2	3	3.5
BW; body weight (kg)	65	16	29	52
AT; Average Time of Exposure (day)	30×365	2×365	3×365	3.5×365
RfD; Reference dose (µg/kg.day)	0.006	0.041	0.016	0.007

**Result**

**Ambient PM2.5 concentration:** The concentration of PM2.5 in all cities, maximum peaks were observed in cities with the largest cement industrial in Thailand–Saraburi, exceeds annual WHO guideline (20 µg/m<sup>3</sup>) by 9 times (mean 41 µg/m<sup>3</sup>, min 1 µg/m<sup>3</sup>, max 247 µg/m<sup>3</sup>). The diurnal cycle there are two valleys in whole day, it is highest value around 7:00-9:00 and lowest around 14.00 – 16.00 and rising again around 18.00 – 21.00 after that there are decrease for the second time around 1.00 – 5.00, this pattern shown in all stations.

The weekly cycle shown that there are downward trends in weekend, especially Saraburi, Sunday is lower than other days obviously.

The annual examination results that Saraburi, Mae Moh, Rayong and Khon -Kaen shown similar pattern, all peak around February – Mar and lowest around June–August. In other hand, Hat-Yai, mass concentrations do

not vary different throughout the year there are minor rise around June and October.

The analyzing of mean different by multiple linear regression, in this study, use nighttime, weekday and rainy season as a reference parameter and controlling the confounding factor with meteorological factors such as wind speed, wind direction, temperature and rainfall. The study indicated that most of the daytime had a higher concentration than nighttime, except for Rayong which had lower daytime than nighttime and Saraburi with no significant differences. When comparing between weekends and weekdays, it was found that all stations had a significantly lower average on weekends than weekday. As for the season, it is found that most of the winter and summer that dry season are higher than the rainy season, except for Hat Yai station in the tropical monsoon zone, which makes this station different from others. The study results are shown in Table 2.

**Table 2: The comparison of the average concentration of PM2.5 between daytime-nighttime, weekday-weekend and season.**

Station	Daytime	Weekend	Winter	Summer
	Mean dif. (95% CI.)			
Saraburi	-0.241 (-0.841, 0.358)	-0.689* (-1.257, -0.122)	24.162* (23.486, 24.838)	14.002* (13.341, 14.663)
Rayong	-5.479* (-5.886, -5.073)	-0.576* (-0.992, -0.160)	9.878* (9.398, 10.359)	11.830* (11.323, 12.338)
Mae-Moh	1.338* (0.863, 1.812)	-1.438* (-1.917, -0.958)	45.442* (44.889, 45.996)	12.185* (11.633, 12.737)
Hat-Yai	1.996* (1.689, 2.304)	-0.089* (-0.396, 0.220)	-0.892* (-1.256, -0.523)	-3.991* (-4.349, -3.633)
Khon Kaen	0.646* (0.136, 1.155)	-1.391* (-1.909, -0.874)	35.842* (35.252, 36.432)	17.923* (17.313, 18.532)

\* significant value (P-value <0.05)

**Table 3: The hazard quotients values of different age groups**

Station	Hazard quotients (HQ (sd.))			
	Adult (≥20 years)	Children (1-5 years)	(6-11 years)	(12-19 years)
Saraburi	1.171(0.703)	19.010(11.407)	5.924(3.555)	1.840(1.104)
Rayong	0.654(0.577)	10.619(9.359)	3.309(2.915)	1,028(0.906)
Mae Moh	0.788(0.795)	12.784(12.900)	3.984(4.020)	1.237(1.248)
Hat Yai	0.505(0.313)	8.199(5.082)	2.555(1.584)	0.793(0.492)
Khon Kaen	0.947(0.716)	15.377(11.624)	4.792(3.622)	1.488(1.125)

**Health Risk Assessment:** Hazard quotients for the 5 cities in Thailand are show that the potential health risks of PM2.5 exposure for children age groups were highest in Saraburi, followed by Khon Kaen, Mae Moh, Rayong and Hat Yai, respectively. Comparing by age range, found that children 1-5 years are the

group that has the highest risk of exposure to PM2.5, at Saraburi Station, which has the highest PM2.5 concentration. Children aged 1-5 years have a higher Hazard quotient than adults and children 12-19 years to 19 times. The level of health risk of each age range in each station is shown in Table 3.

**Discussion**

The results show that PM2.5 is a significant environmental health problem in Thailand due to the concentration exceeding the WHO guideline (20 µg/m<sup>3</sup>) and exceeding the Thailand air quality standard (25 µg/m<sup>3</sup>), especially in cement industry area that must be given priority in finding the instrumentality of controlling, from the production process, transportation process that requires large numbers of trucks, must have standards to measure the pollution level emitted from the transportation process. The results show that the average daily concentration of PM2.5 is highest during rush hour, which is the period of heavy traffic, consistent with the study in 6 major cities in South East Asia. Including Bangkok, Beijing, Sennai, Bandung, Manila and Hanoi, where traffic is considered the main source of pollution in urban areas<sup>(13)</sup>. After that the concentration level is the lowest of the day in the afternoon. Because the sun causes the temperature to increase the low air pressure and the air rises, leading to the spread of PM2.5. This meteorological phenomenon is consistent with the studies of Barmpadimos et al., In 2012 and Vu et al., In 2015. The considering of PM2.5 level in each month of the year, it was found that the dry season month is more concentrated than the wet season due to the

relative humidity and rainwater, eliminating dust in the atmosphere<sup>(14)(15)</sup>.

Health risk assessments show that people are at risk of exposure to PM2.5 exposure, especially among children aged 1-5 years and children 6-11 years old, consistent with the study of de Oliveira et al. In 2012, it was found that children between the ages of 2 - 12 years had a higher risk than children older than 12 years and adults<sup>(12)</sup>. The child is more likely to be at a higher risk because the child has a respiratory rate to weight more than adults in the same amount of exposure to PM2.5, children have a higher risk. The risk level depends on the amount of exposure, causing the risk level to vary with the concentration of PM2.5 in the atmosphere. In this study, it is shown that the change in the level of PM2.5 in the air in diurnal circle and each season is different. Allowing people, especially children 1-11 years, to reduce or avoid exposure to pollutants during times of high risk, which can reduce the risk of public health.

**Conclusion**

This study provides the assessment of the ambient PM2.5 concentration and health risks in the 5 different background of Thailand. The daily average PM2.5 mass concentrations in the previous 4 years (2014 – 2017), all stations exceed WHO air quality guideline, especially Saraburi, mass concentrations exceed 9 times, which indicated an overall improvement of the air quality in Thailand. PM2.5 mass was decrease 2 periods around 8.00 – 9.00 and 19.00 – 21.00 and are likely rise in weekday. Due to annual cycle the concentration highest in winter and summer month, with lowest concentrations in rainy. The risk analysis shows that the potential health risks are highest in cement plant background, followed by urban and coal power plant. Winter and summer conditions are more serious for inhalable particles health risk. The hazard quotient shown the public health risk especially children.

The results of the present study can contribute to policy making by the set-up authorities to control or elimination of the pollutants and the risk to public health.

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**Ethical Clearance:** Human ethics submission is not required from Khon Kaen University Ethics Committee in human research. Because this study does not involve an experiment or a trial to be conducted in human, collection of personal data or human biological specimens.

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# Psychological Wellness of Early Childhood Educators Inventory: A Reliability Analysis Study

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## Abstract

The aim of this paper is to determine the reliability index of Psychological Wellness of Early Childhood Educators Inventory (PWECEI) that was developed by Jais et al. (2019) that consists of 163 items in total. This inventory consists of five domain which are Career Interest, Personality, Psychological Well-Being, Basis Knowledge, and Ethics and Regulation. Total of 191 early childhood educators that participate in Nursing and Early Education Courses (male:11, female:180) were involved in pilot study. The internal consistency reliability analysis was conducted and results revealed that overall the Cronbach Alpha value for this inventory was .86 which shows that PWECEI has acceptable reliability value to measure early childhood educators' wellness in Malaysia. Further studies are needed to validate this variable across different population, culture, and with higher number of samples by using confirmatory factor analysis (CFA).

**Keywords:** Caregivers; Psychological Wellness; Career Interest; Personality; Psychological Well-Being; Basis Knowledge; Ethics and Regulation.

## Introduction

**Problem Statement:** Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving high level of personal well-being as well as being able to contribute to the harmony and betterment of the family the society and the nation at large <sup>[1]</sup>.

In the pursuit of achieving this, early childhood educators have been proven to be one of the most

important factors responsible to the success of the initial education program aimed at building the basis of stable children's emotional and mental development. However the country is often shocked by the news of abusive and abusive baby sitting. The issue of baby and toddler abuse by baby sitters and children either in the registered care centre or in the home is endless as it appears on a daily basis in local newspapers.

Usually parents who send their children to a day care center expressed concern and encourage every teacher and caregiver to undergo a mental health screening to avoid cases of repeated abuse<sup>[2]</sup>. Although they find it difficult to do so they feel it is one of the ways to reduce child abuse cases in nursery or kindergarten. Some of the nursery owner also agree that every employer needs to screen caregivers who want to be taken seriously.

In addition to aspects of psychological well-being, criminogenic elements also need to be filtered to identify pro-violence or pro-crime background and stance. This is emphasized by Dr Geshina Ayu Mat Saat from the University of Science Malaysia who is also a psychologist. She proposed that the government

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enforced individuals who involved in childcare services to undergo periodic psychokinetic profiling to prevent repeated child abuse cases<sup>[3]</sup>.

In addition, a press release reports that the tragedy of a five-month-old baby boy was found in a fridge caused many people to express dissatisfaction and even dared to criticize the care of the victim who was also the accused in the case<sup>[4]</sup>. They also question the credibility of the babysitter and the appropriate actions that need to be taken to prevent such cases from happening again. Undoubtedly the incident involving Adam certainly caused trauma to the community, especially to parents who sent their children to a daycare center.

Associate Prof Dr Balan Rathakrishnan emphasized that parents should take into account the mental health aspects of caregivers before deciding to send children to caregivers. In his opinion, in the case of Adam the accused may have suffered from a mental health condition that prompted him to commit such cruel acts. According to him, a caregiver may be subjected to excessive pressure and may cause them to sometimes act outside their sanity. This is because they may look normal, but if there is a trigger their actions can reach an unexpected level. In addition, past history can also encourage the accused to look for something weak to release anger and self-gratification<sup>[4]</sup>.

In addition, Metro Daily reported on average cases of negligent caregivers are over unregistered and caregivers with no training and accreditation from the Social Welfare Department (JKM)<sup>[5]</sup>. The main quality to look for in caregivers is patience and they have undergone stress-free courses. In KAP there is a unit for the ethics and professionalism of caregivers, but the authorities want caregivers out there to uphold this profession as a professional. This is because caregivers sometimes need to be nurses, doctors, cooks and many more.

They also recommend that the JKM refer to and apply Rule 3 (2) of the TPA Act as it is provided that any person passing the KAP must register as a registered nurse with the JKM with the doctor's report previously required. They also requested that Ministry of Health be able to continue this provision to ensure registered nurse record statistics. Many do not do this. There are still many caregivers refuse to register. One recommendation they have made to the ministry in the past is for caregivers to have a board of trustees release an identity or list of caregivers' names in the portal

for easy review using their identity card numbers so that they can review background, work ethic, criminal record, abuse and more<sup>[5]</sup>.

**Literature Review:** Emotional well-being includes the ability to cope with stress such as being flexible and compromising to solve problems in which it involves building awareness and accepting others' feelings<sup>[6]</sup>. According to Goleman<sup>[7]</sup>, emotional well-being is the ability of a person to manage his emotional well-being, maintain harmony and express emotions through skills of self-awareness, self-control, self-motivation, empathy and social skills.

Spiritual well-being involves the exploration of meaning and purpose in human life and individuals with spiritual well-being can be identified through basic characteristics such as feelings of meaningful life and direction and relationship with their Creator<sup>[6]</sup>. Spiritual well-being has a significant relationship with an individual's mental health. This finding is supported by the findings of Shima<sup>[8]</sup> in which she found that individuals with spiritual well-being are at lower risk for mental health problems such as anxiety, and depression.

Physical well-being is the ability of the body to perform activities as well as refrain from substance abuse activities and individuals who achieve good physical health have resistance to any diseases that may affect their functioning<sup>[9]</sup>. Well-being enables the development of one's potential to live and work effectively and to make significant contributions to society. Therefore, physical well-being is very important to ensure that you work well and optimally.

The well-being of the environment is described in a manner that respects mutual respect and in harmony with the environment in which individuals who have a good environmental well-being choose to live by protecting the environment around them<sup>[6]</sup>. Financial well-being is a relatively new dimension and is generally adopted as the eighth welfare dimension after the effects of the Depression that lasted from December 2007 to June 2008<sup>[6]</sup>. Joo<sup>[10]</sup> states that financial well-being is a healthy, happy and free financial condition based on subjective assessment of financial condition. The lack of finances can lead to conflicts with family members and can also lead to social problems as a result of having to find resources to meet family needs.

Job well-being is described by Sha'ari, Rajjah, Rames and Rosnida<sup>[6]</sup> as routine demands combined

with new and uncertain challenges that make a job enjoyable, meaningful and rewarding. There have been studies that found that a poor work environment can affect caregiver satisfaction and commitment. For example, limited promotion opportunities [11], low salaries [12], high childcare ratio [13-15] and long working days (typically between 6.30am and 6.30pm) were the main reasons for their departure.

Sha'ari, Raijah, Rames and Rosnida [6] state that social well-being refers to the ability to communicate and connect with others with positive self-image (confident, friendly, and caring towards others). According to Deming and Kahn [16], among the criteria that factor into a high wage earner and good job performance are the social and cognitive well-being of individuals involved in relation to experience, education and writing levels.

**Methodology**

**Sample:** This current study uses a quantitative method to find the reliability of the Psychological Wellness of Early Childhood Educators Inventory

(PWECEI). To measure the reliability of this inventory, this pilot study recruited 191 early childhood caregivers from eight areas in Malaysia that participated in Nursing and Early Education Courses.

**Procedure:** Researcher explained about any benefits or harm that participants will get from this study before the data collection process conducted. After that, if they agree to participated in this study they were asked to fill up the consent form first before proceed to the inventory part. This inventory took up around 20 minutes to be completed by the participants.

**Measure:** Table 1 shows that this inventory consists of five domain that represented by 16 different sub-domain. PWECEI was developed by Jaiset al. [17] to measure the psychological wellness among caregivers of early childhood in Malaysia. This self-reported inventory was developed in Malay language and consists of five point Likert scale comprise of positive and negative items. The positive, negative and total number of items in each constructs before and after the reliability analysis has been conducted can be seen in Table 1.

**Table 1: Domain and Construct in PWECEI**

Domain/Construct		Item		
		Positive	Negative	Total
<b>Career Interest</b>				
1.	a. Social	All positive item	-	16
	b. Artistic	All positive item	-	17
2.	Personality	All positive item	-	10
<b>Psychological Well-Being</b>				
3.	a. Emotional	All positive item	-	10
	b. Spiritual	1,2,3,4,6,7,8	5	8
	c. Physical	All positive item	-	3
	d. Environment	1,2,3,5	4,6	6
	e. Financial	1,2	3,4,5	5
	f. Occupational	All positive item	-	13
	g. Social	All positive item	-	8
<b>Basis Knowledge</b>				
4.	a. Human Development Knowledge	All positive item	-	14
	b. Balanced Nutrition	All positive item	-	7
	c. Nursing and Education	All positive item	-	13
	d. Safety, Cleanliness and Health	All positive item	-	13
<b>Ethics and Regulation</b>				
5.	a. Ethics	2,3,4,6,7,10,11	1,5,8,9,12	12
	b. Regulation	All positive item	-	8
<b>Total</b>		<b>152</b>	<b>11</b>	<b>163</b>

### Result

Overall the internal consistency of this inventory after internal consistency reliability analysis had been conducted is .86 range from .58 to .96 and the mean of inter-item correlation is .45. According to Table 2 the total number of items in this inventory was 204, but after conducted reliability analysis (internal consistency) the total number of items become 163 with total number of items been removed was 53. The Cronbach alpha value before removing the item was .82, but after some of the items have been removed the Cronbach alpha value increase to .86 which shows a good reliability value according to DeVellis<sup>[18]</sup>. The general rule of thumb suggested ideal Cronbach alpha value is above .70 (good), .80 (better) and .90 (best) <sup>[18]</sup>.

Some of the construct and sub-construct have fewer items that is below than 10 items have a quite low Cronbach alpha value as it is quite sensitive to the number of items in the scale<sup>[19]</sup>. So, Pallant <sup>[19]</sup> suggest that it would be more appropriate to report the mean inter-item correlation value for the items. BrckaLorenz, Chiang, and Nelson <sup>[20]</sup> recommend optimal range for inter-item correlation is between .15 to .85 while optimal mean inter-item correlation is between .15 to .50. In this study the inter-item correlation varies between .23 to .64 with total average inter-item correlation value is .45 that shows an acceptable value.

**Table 2: Outcome from Reliability Analysis of PWECEI**

Domain/Construct		Number of Item		Reliability Value (α)		Mean Inter-Item Correlation	
		Before	After	Before	After	Before	After
1.	<b>Career Interest</b>						
	a. Social	20	16	.91	.92	.36	.41
	b. Artistic	20	17	.91	.92	.36	.40
2.	Personality	24	10	.73	.87	.12	.39
3.	<b>Psychological Well-Being</b>						
	a. Emotional	13	10	.80	.88	.27	.43
	b. Spiritual	9	8	.79	.80	.40	.43
	c. Physical	5	3	.58	.71	.23	.44
	d. Environment	6	6	.58	.58	.25	.25
	e. Financial	6	5	.79	.79	.39	.44
	f. Occupational	20	13	.91	.91	.36	.45
	g. Social	9	8	.80	.86	.36	.44
4.	<b>Basis Knowledge</b>						
	a. Human Development Knowledge	15	14	.94	.94	.50	.51
	b. Balanced Nutrition	15	7	.92	.94	.45	.70
	c. Nursing and Education	15	13	.96	.96	.63	.64
	d. Safety, Cleanliness and Health	14	13	.94	.95	.61	.62
5.	<b>Ethics and Regulation</b>						
	a. Ethics	13	12	.69	.76	.19	.23
	b. Regulation	12	8	.89	.93	.44	.64
<b>Total</b>		<b>204</b>	<b>163</b>	<b>0.82</b>	<b>0.86</b>	<b>0.37</b>	<b>0.45</b>

### Discussion

The aim of this paper is to determine the reliability of Psychological Wellness of Early Childhood Educators Inventory (PWECEI) that was developed by

Jais et al.<sup>[17]</sup>. Reliability define as the extent to which a research instrument consistently has the same results if it is used in the same situation on repeated occasions<sup>[21]</sup>. In this study the type of reliability that being used in this

study is internal consistency by using Cronbach' Alpha test which in this test the average of all correlations in every combination of split-halves is determined. The Cronbach's  $\alpha$  result is a number between 0 and 1. An acceptable reliability score is one that is 0.7 and higher<sup>[22]</sup>.

Finding from this study shows that this PWECEI has an acceptable and good reliability value ( $\alpha = .86$ ). As finding shows that this inventory has an acceptable reliability value, this inventory can be used as an early step to measure psychological wellness of early childhood educators before they been hired by the related party. This can help government, especially the Ministry of Women, Family and Community Development to plan appropriate action plans. Further studies are necessary to revalidate PWECEI across different population, culture, and with higher number of samples by using confirmatory factor analysis (CFA).

**Ethical Clearance:** The inform consent was acquired from the participant who agreed to participate in this study.

**Conflict of Interest:** There is no conflict of interest in this research.

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# The Correlation Factors on Epilepsy Stigma amongst People in Indonesia

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## Abstract

**Background:** Epilepsy is a recurrent attack or seizure disorder more than twice for no reason derived from cerebral cortical cerebral neurons, and sometimes accompanied by a decrease in consciousness, both motor and sensory and behavioral or emotional intermittent and stereotyped behavioral or emotional. Until now the etiology of epilepsy is still not known with certainty and multifactorial nature of this matter that raises many wrong assumptions and views of some Indonesian people about epilepsy disease. The study was conducted to find out the correlation between social factors background (domicile, age and occupation as well as education) and stigma towards people with epilepsy in the community.

**Method:** This study was an observational analytic study by observing domicile, age, occupation, last education, and knowledge of epilepsy in society and analyzing the relationship between age, domicile, occupation and education of respondents with stigma against epilepsy patients. The method used is cross sectional data collection through a modified questionnaire from Knowledge, Attitudes, and Practice towards Epilepsy Survey (KAPE) which has passed the validation stage of previous research. The data taken were analyzed descriptively and tested by *chi-square* test using SPSS.

**Result:** With a total of 127 respondents based on domicile got significant correlation, based on last education level also got significant relation with p value is  $0,028 < 0,05$  whereas no correlation on age variable with stigma where p value is  $0.834 > 0.05$  and there is no significant correlation between occupation with stigma where p value is  $0.730 > 0.05$ .

**Conclusion:** There is correlation between domicile and education level with stigma to epilepsy patient.

**Keywords:** Epilepsy; Stigma; Knowledge, Attitudes, and Practice.

## Introduction

Epilepsy is a brain disease that define by conditions occurring at least two attacks without symptom (or

reflex) by a distance of more than 24 hours. Epilepsy consider treatable for individuals having epilepsy, but they are having no seizures for the past 10 years, and without seizure drugs for the past 5 years<sup>1</sup>. Epilepsy is the second chronic neurological disease which is often faced by neurologists and affects nearly fifty million people worldwide<sup>2</sup> while the patient's seizure-free condition were taken from medical records. Then quality of life of seizure-free temporal lobe epilepsy patients were compared with not seizure-free patients after amygdalohippocampectomy. The statistical tests used were unpaired t-test if the data was distributed normally, and Mann-Whitney test if the data was not distributed

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normally. Results: 31 patients, 21 were seizure free (Engel 1. In developed countries, it is estimated that every year 30 to 50 new cases occur from 1,000 people in the general population, whereas in developing countries it can reach double<sup>3</sup> hypopharynx cancers account for a small proportion of the head and neck cancer workload in the UK, and thus suffer from the lack of high level evidence. This paper discusses the evidence base pertaining to the management of hypopharyngeal cancer and provides recommendations on management for this group of patients receiving cancer care. Recommendations \* Cross-sectional imaging with computed tomography of the head, neck and chest is necessary for all patients; magnetic resonance imaging of the primary site is useful particularly in advanced disease; and computed tomography and positron emission tomography to look for distant disease. (R. There are around 1.5 million sufferers of epilepsy in Indonesia the prevalence of 0.5-0.6%<sup>4</sup>.

Stigma is all forms of physical and social attributes that reduce a person's identity<sup>5</sup>. Stigma is usually associated with health problems or illness as a social process characterized by rejection, reproach, or exclusion of certain individuals or groups<sup>6</sup>. In Indonesia the stigma about epilepsy is rather high, many assumptions and wrong point of views to Indonesian regarding epilepsy. Most Indonesian consider that epilepsy is a contagious hereditary disease and curse. This assumption causes suffering to sufferers because in addition to having to bear the weight of suffering at the time of the coming attack the sufferer is sometimes cleansed by the community. This can affect the quality of life of epilepsy patients<sup>7</sup>.

Many factors influence the emergence of wrong views about the disease epilepsy, namely knowledge of health, education level, and culture. Many inconsistencies in the results of a treatment due to the influence of ethnic and socio-economic cultural factors. This is also due to differences in understanding and perception at the time of receiving information, daily lifestyle and adherence to treatment<sup>8</sup>. Data on public perceptions about epilepsy sufferers in Indonesia has not been widely reported.

This study aimed to determine the correlation between social factors background (domicile, age and occupation as well as education) and stigma towards people with epilepsy in the community.

## Method

This study is an observational analysis of data

from a questionnaire sheet modified from Knowledge, Attitudes, and Practice towards epilepsy survey (KAPE) 9 with a cross sectional case study.

**Sample:** The research sample was taken using the simple random sampling method where a minimum quota was determined in each sampling area consisting of, 50 people from Surabaya and 50 people from Mataram and the surrounding area. With the following details, 25 who live in urban areas of Surabaya, 25 people who live in rural areas of Surabaya, 25 people who live in urban areas of Mataram and surrounding areas and 25 people who live in rural areas of Mataram and surrounding areas. With a minimum total of 100 samples.

**Time and Place:** This research was conducted in 2 cities, Surabaya City (the working area of Pacar Keling Health Center and East Silver Health Center) and Mataram City (working area of Pagesangan Health Center and Tanjungkarang Health Center). The period was conducted on 1 September 2016 - 1 October 2017 based on questionnaire sheet data.

**Data Analysis:** Data from the questionnaire sheets analyzed with frequency and chi-square with SPSS 19.0 (SPSS.Inc., Chicago, IL). Significant level was reached when  $p < 0.05$ . Odd ratio calculation was used to calculate the ratio of differences between groups of stigma against patients with epilepsy.

## Result

**Behaviors and Actions (Stigma) of Respondents Against Patients with Epilepsy:** Based on stigma of respondents towards people with epilepsy, it said that stigma are severe when answering  $> 75\%$  ( $> 2$  of the stigma questions, Score = 0-6) and to be mild stigma if answering  $\leq 25\%$  ( $\leq 2$  of the questions) stigma, Score = 7-9). (Table 1)

**Analysis of Factors of Domicile, Age, Occupation, Education with Stigma Against People with Epilepsy:** There was a difference shown by the statistics of the domicile of respondents in the city and in the village. The value of  $p = 0.001$  with an odd ratio of 6,300 (95% CI 2,100 - 18,903) which shows that respondents who live in Surabaya City or in the City Matrix have severe stigma against those who live in Surabaya Desa or Mataram Desa. (Table 2)

While for the age factor, it can be seen that from 127 respondents found stigma against patients with epilepsy, were at least in the age group 65-74 years

with a total of 2 respondents (50%). Likewise, stigma to the most severe patients with epilepsy were found in the 18-24 age group with 22 respondents (44.9%). Mild and severe stigma towards patients with epilepsy are dominated by the 18-24 age group because the most respondents obtained from the 18-24 age group with a total of 49 respondents. This difference was not statistically significant with a value of  $p = 0.834$ . (Table 2).

The type of respondent's occupation with severe stigma towards epilepsy sufferers was at least in the type of occupation as a farmer with 2 respondents (33.3%), besides the most severe stigma towards epilepsy sufferers were found in the type of occupation as a housewife with 20 respondents (37%). Each of the severe and mild stigma was dominated by the type of housewife's work because the largest number of respondents comes from the type of work as a housewife. P Chi-square value of  $p = 0.730$  obtained where the value was not statistically significant. (Table 2).

The results showed that there were more people who had behaviors and actions towards patients with mild epilepsy (stigma) against sufferers of epilepsy in the amount of 58.3%. While people who have behaviors and actions towards patients with severe epilepsy (stigma) against epilepsy in the community category based on recent education were only 41.7%, and the difference was statistically significant with a  $p$  value = 0.028. (Table 2).

Respondents who have good knowledge about epilepsy with severe stigma categories were 13 people (32.5%) and the difference was not statistically significant with  $p = 0.153$ . an odd ratio value of 1.768 (CI 95% 0.807 -3,874) shown that respondents with less knowledge have a tendency to be 1,768 times more likely to have severe stigma towards sufferers of epilepsy compared to respondents who have good knowledge. (Table 2).

**The correlation between the respondent's education level category and stigma of epilepsy sufferers:** Out of the 127 respondents obtained stigma

towards patients with severe epilepsy in the last education under primary school as many as 9 respondents (29%), while the stigma in the last education higher than elementary school were 44 respondents (45.8 %) and the difference was not statistically significant with  $p = 0.099$  and an odd ratio of 2.068 (95% CI 0.864-4953). Respondents with more than elementary school education have a tendency to have 2 times more severe behavior and actions (stigma) compared to respondents with education below elementary school.

Comparison of the latest education under junior high school and more than junior high school shown that from 127 respondents found the stigma in the last education less than junior high school were 12 respondents (26.1%), while the behavior and stigma in the last education higher than junior high school as many as 41 respondents (50.6%). The difference was statistically significant with  $p = 0.007$  and an odd ratio of 2.904 (95% CI 2.904-6.394). It is obtained where respondents with education more than junior high has a tendency to have stigmatized compared to respondents with education below junior high. (Table 3).

**Table 1: Distribution of respondents based on domicile and stigma level**

Stigma		Respondents (n)	Total
Mild	Surabaya City	10	74(58.3%)
	Surabaya Village	24	
	Mataram City	17	
	Mataram Village	23	
Severe	Surabaya City	21	53(41.7%)
	Surabaya Village	8	
	Mataram City	13	
	Mataram Village	11	
Total	Surabaya City	31	127(100%)
	Surabaya Village	32	
	Mataram City	30	
	Mataram Village	34	

**Table 2: Analysis of variables correlation towards stigma in epilepsy sufferers**

Stigma Against Sufferers of Epilepsy								
Variables	Severe Stigma		Mild Stigma		Total		P Value (chi Square test)	POR CI 95%
	N	%	N	%	N	%		
<b>Domicile</b>								
Surabaya City	21	67.7	10	32.3	31	100	0.001	6.300 (2.100-18.903)
Surabaya Village	8	25	24	75	32	100		
Mataram City	20	66.7	10	33.3	30	100	0.001	5.556 (1.895-16.286)
Mataram Village	9	26.5	25	73.5	34	100		
<b>Age</b>								
18-24	22	44.9	27	55.1	49	100	0.834	-
25-34	9	33.3	18	66.7	27	100		
35-44	9	50	9	50	18	100		
45-54	9	40.9	13	59.1	22	100		
55-64	2	28.6	5	71.4	7	100		
65-74	2	50	2	50	4	100		
<b>Occupation</b>								
Student	16	48.5	17	51.5	33	100	0.730	-
Housewife	34	62.9	20	37.1	54	100		
Farmer	4	66.7	2	33.3	6	100		
Entrepreneur	8	61.5	5	38.5	13	100		
Others	12	57.2	9	42.8	21	100		
<b>Last Education</b>								
Un-educated	1	10	0	90	10	100	0.028	-
Primary school	8	38.1	13	61.9	21	100		
Junior High School	3	20	12	80	15	100		
Senior High School	30	47.6	33	52.4	63	100		
Bachelors	11	61.1	7	38.9	18	100		
<b>Knowledge</b>								
Less	40	46	47	54	87	100	0.153	1.768 (0.807-3.874)
Good	13	32.5	27	67.5	40	100		

**Table 3: Comparison of respondents' educational level and stigma against epilepsy sufferers**

Stigma Against Sufferers of Epilepsy								
Variables	Severe Stigma		Mild Stigma		Total		P Value (chi square test)	POR CI 95%
	N	%	N	%	N	%		
<b>Comparison of last education (Primary School)</b>								
Under primary school	9	29	22	71	31	100	0.099	2.068 (0.864-4.953)
Above primary school	44	45.8	52	54.2	96	100		
<b>Total</b>	<b>53</b>	<b>41.7</b>	<b>74</b>	<b>58.3</b>	<b>127</b>	<b>100</b>		
<b>Comparison of last education (Junior high school)</b>								
Under junior high school	12	26.1	34	73.9	46	100	0.007	2.904 (2.904-6.394)
Above junior high school	41	50.6	40	49.4	81	100		
<b>Total</b>	<b>53</b>	<b>41.7</b>	<b>74</b>	<b>58.3</b>	<b>127</b>	<b>100</b>		

## Discussion

Compared to respondents who live in rural areas, Respondents who live in urban areas experience stigma and get a p value smaller. As a result, it can be concluded that there is a significant correlation between domicile and stigma against patients with epilepsy. This trend is caused by people from rural areas tend to live in village-type communities and were closer to the tendency to offer support to one another. People in rural areas were more receptive to disease.<sup>10</sup> Geographical regions with strong cultural perceptions of diseases that rely on non-scientific explanations, such as Asia and Africa have a worse attitude towards epilepsy as evidenced by the misunderstanding of epilepsy as an infectious disease caused by spiritual science<sup>11</sup>

For the results of processing the correlation between age and stigma there is no significant correlation between it. Increased levels of stigma in the elderly age group shown differences in choosing social networks based on increasing age. With increasing age the perception of time constraints leads to psychological needs so as to produce smaller social networks with increased emotional ties. In general there is no correlation between age and community stigma against people with epilepsy.<sup>12</sup>

From the chi square results, it can be concluded that there is no significant correlation between work and stigma for patients with epilepsy. Based on previous research there was also no significant correlation between work status and the stigma, such as people who do not work, work part-time or work full day. Those all do not have a correlation with negative behavior or discrimination against epilepsy<sup>12</sup>. Similarly, research conducted in the western world many people with epilepsy found working as employees and found no discrimination against epilepsy sufferers who work<sup>13</sup>cross-sectional epidemiologic study of 241 persons with epilepsy identified from an at-risk population of 24,130 individuals (64.7% from urban and 35.3% from rural areas.

The wrong view of epilepsy was also influenced by the level of education. Several studies have shown that a better level of education will provide an attitude towards epilepsy<sup>14</sup>. However, this opinion has not in line with the results of research conducted. Mild stigma was found at all levels of education except in the bachelor. There were more respondents who have severe stigma than mild stigma. The results of the chi square value indicated a

significant correlation. The level of education did not guarantee that a person does not have discrimination against sufferers with epilepsy. In a study from Thailand, 38% of elementary school teachers never heard or read about epilepsy and 15% preferred to find all children with epilepsy in a special class.<sup>15</sup> Saudi Arabia included private/public schools designated for male and female students. A structured 37-item questionnaire was used to examine their demographics, knowledge, attitudes, and experience with epilepsy. Results Six hundred and twenty primary school teachers working in public (58%.

From the research conducted there were no significant correlation between the knowledge variables with stigma against patients with epilepsy. The data obtained respondents who have both of less knowledge and good knowledge have the amount of mild stigma more than severe stigma. Someone who has heard, obtained information and known about epilepsy tends to behave positively and does not discriminate against someone with epilepsy<sup>14</sup>.

**Limitation:** This research does not explain the factors that influence the presence of severe stigma in urban areas.

## Conclusion

There is a significant correlation between the domicile (city or village) and the last education of the respondent and stigma towards sufferers of epilepsy.

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**Ethical Clearance:** This study received a certificate of ethical clearance no. 015/EC/KEPK/FKUA/2017 from ethical commission of Faculty of Medicine, Universitas Airlangga Indonesia.

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# Effect of a Learning Activity Package on Improving Awareness about Liver Fluke Prevention and Control for Secondary School Students in Northeastern Thailand

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## Abstract

**Background:** Liver fluke has long affected the health of Thai people, particularly those who live in the Northeast Region. It is a major cause of Cholangiocarcinoma (CCA), which is one of the important causes of mortality affecting people in this region. The national helminth prevalence survey also reported that children were infected by *Opisthorchis viverrini* (OV).

**Objectives:** To evaluate the effects of “The Learning Activity Package (LAP) on Improving Awareness of Liver Fluke Prevention and Control” for secondary school students.

**Methodology:** This quasi-experimental study primarily focused on improving awareness of liver fluke prevention and control among secondary school students in Grade 7, with three components, attitude, acceptance and giving value, as well as consciousness of responsibility at individual, family and community level. The LAP was implemented for 8 weeks in 6 schools at Don-Chan District, Kalasin Province, Thailand. Data collection used a questionnaire and data analysis used descriptive statistics, paired t-test, and Wilcoxon signed-rank test.

**Results:** After the LAP intervention implementation among 121 students, this study showed a significant increase in all awareness components. The mean of the post-test awareness scores increased from baseline to 45.01 points (95 % CI =42.66 - 47.35 points,  $p < 0.001$ ), reflecting a large effect. (Cohen’s  $d=3.45$ )

**Conclusion:** This LAP intervention is an effective and beneficial school-based program to impact liver fluke infection prevention and control behavior among secondary school students at individual, family and community level.

**Keywords:** Awareness, Liver Fluke, Secondary School Student.

## Introduction

Liver cancer is one of the leading causes of health

problems worldwide. Reports on liver cancer mostly indicate it to result from hepatocellular carcinoma and CCA.<sup>1</sup> CCA is the most reported liver cancer (82.0-89.0%) in Thailand.<sup>2-4</sup> Particularly in the Northeast Region, it is mostly found to be caused by OV. In the past decade, OV infection was estimated to affect population 10 million worldwide, with 80 % in Thailand.<sup>5</sup> Results from the 2009 Helminths and Protozoa Infections National Survey (HPINS) by the Department of Disease Control indicated that the overall OV infection rate

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among the Thai population was 8.7%, with the highest rate of 18.6% found in the Northeast Region.<sup>6</sup>

In the past the Ministry of Public Health of Thailand has implemented a national control strategy to alleviate OV infection using three main approaches: 1) stool examination and treatment; 2) health education and campaigning about OV infection preventive strategies and 3) promoting community participation.<sup>7</sup> Even though the strategies have been implemented the OV infection prevalence among adults remains. In addition, results from the 2009 HPINS reported that OV infection also affects children. The same survey noted that for children infected with OV in the Northeast Region the youngest was 7 years. Such a pattern suggests that OV infection increases among children as they grow up.<sup>6</sup> This agrees with the study in 1983-1994, in which a prevalence of liver fluke caused by OV was also reported among school children thereby increasing the need to provide health education among this population group in a school setting.<sup>8</sup> Consequently, this current study put more emphasis on young adolescents aged 12-14 years for their energetic and readily exploring nature, and keenness to learn new information. It is expected that they could benefit highly from the OV preventive strategies and intervention that is directly provided to them. It is notable that the intervention under focus in this study could serve as a new group approach. The focus has long been on the traditional target group of adults whose behaviors are ingrained, since they have long been grounded in their sociocultural and environmental context, so that it is hard to change.

Don-Chan District, Kalasin Province has the highest liver fluke prevalence rate.<sup>9</sup> In addition, Don-Chan has many such as 23 natural water reservoirs, which serve widely for sources of fresh water fishes, including cyprinid fishes, known as the intermediate host of the OV infective stage in humans.

LAP was developed from Contemplative Practices Theory<sup>10</sup>, because this theory suggests that transformative learning can create a change from the inside, creating a new paradigm, changing mind sets and bringing about change in cognitive, affective and psychomotor domains, in line with this study intent to improve awareness at individual, family and community level. It is expected that it could be highly beneficial for OV preventive strategies and interventions that directly related to them. It is notable that the intervention under focus on this study could serve as a new group approach.

It has shifted the focus to the younger group from the traditional target group of adults, whose behaviors are ingrained from their sociocultural and environmental context making it hard to change.

This study aims to evaluate the effects of the "Learning Activities Package (LAP)" on improving awareness of liver fluke prevention and control among grade 7 of secondary school students.

## Materials and Method

A quasi-experimental study with pre/post-test design was conducted in Don-Chan District, Kalasin Province, Thailand. This study purposively selected 6 secondary schools. The target population was 158 grade 7 studying students. The exclusion criteria were students who had (a) a long sickness or (b) a learning disorder. The students were recruited voluntarily from each school.

**Sample Size:** Since this study aimed to evaluate the effect of the LAP, it was decided to include all 158 of the voluntary students in 6 secondary schools.

**Intervention:** The 8-week intervention called the LAP was designed to improve the awareness about liver fluke prevention and control among secondary school students. The awareness comprised of three components, including attitude, acceptance and giving value, as well as consciousness of responsibility at individual, family and community levels. Before proceeding with the intervention the standardized teachers in each target school were improved their knowledge and contemplative teaching for the target students<sup>[11]</sup>. The training program for the teachers included knowledge of liver fluke infection, contemplative practices and teaching skills. In addition, lesson plans and the objectives of LAP was created by experts and stakeholders, which given to trained teachers for standardization for teaching and teaching planed.

**Measurement:** The measurement tool was a self-administrated questionnaire which comprises 2 parts: (1) general information and (2) awareness that has three components. First, attitude towards prevention and control of liver fluke infection (items 1-15) with a rating score of 1-4 points (Strongly Disagree =1, Disagree =2, Agree=3, Strongly Agree =4 points). Second, acceptance and giving value to problems of liver fluke infection (items 16-21), with a rating score of 1-5 points, (Very Little=1, Little=2, Moderate=3, Much=4, Very Much=5). Third, consciousness of responsibility at the

individual level (items 22-28), family level (items 29-35) and community level (items 36-42) of prevention and control of liver fluke infection, with a rating score of 1-4 points (Never=1, Rarely=2, Sometimes=3, Often=4).

For the part of awareness towards prevention and control of liver fluke infection developed by the researchers the validity was confirmed by three specialists (education, helminths and methodology) and a Cronbach’s alpha coefficient for the present sample of 0.86 was found.

Measurements were taken at baseline among 158 students at 6 schools before the LAP intervention, and again after these groups had completed the intervention at the eighth week.

**Data Collection:** The questionnaires were given to the students in their classrooms. The data abstraction was checked for completeness, and the data double entry technique was used to ensure the accuracy of the data entry process and transferal of data for analysis in the SPSS program with Khon Kaen University license. The statistics used were frequency, percentage, percentile, median, mean and standard deviation, paired t-test and Wilcoxon Signed-Rank test. Additionally, Cohen’s d was used to indicate the effect size of the LAP intervention<sup>[12]</sup>.

This study was reviewed and approved by the Ethics Committee for Research on Human Subjects, Khon Kaen University, Thailand. (HE601240).

**Results**

The number of students at the beginning of the study was 158 students, but only 121 participated for the full period of program. Their average age+SD was 12.72+0.5 years and 56.20 % were girls.

**Effects of the LAP:** After completing the LAP implementation the mean score of all components significantly increased and the highest mean score difference was the component of the acceptance and giving value, while the second highest mean score was the component of being conscious of taking responsibility at the community level. The total mean score of awareness difference within the group was statistically significant at 45.01 points (95 % CI, 42.66-47.35). The Cohen’s d found a large effect for the intervention(Table).

**Comparisons of median and percentile score by awareness items:** This part aims to check the score difference of the students before and after the intervention. This study found the median scores changed for 37 items (20 items changed a lot) from 42 items. There were 5 items (items of 1. Liver fluke infection is an important problem. 3. Liver fluke infection is not a severe health problem. 5. Consumption of raw fish makes strong health (Negative statement).14. Food vendors selling raw fish dishes in the community cause more LFI affected community members. 15. Traditional ceremonies which serve raw fish dishes cause more LFI affected persons.) that did not change but items 3, 5 and 14 moved to better quartiles. Items 1 and 15 didnot change both the median scores and quartiles, because they had a high score.

**Table : Mean scores of awareness of liver fluke infection prevention and control by components**

Awareness components	Baseline		Post-test		Mean Difference	SD	p-value
	Mean	SD	Mean	SD			
Awareness (174 points)	97.95	10.97	142.96	10.28	45.01	13.03	<0.001*
(1) Attitude (60 points)	45.11	4.12	51.84	4.39	6.74	5.48	<0.001**
(2) Acceptance and giving value (30 points)	11.27	3.12	24.74	2.78	13.47	3.67	<0.001**
(3) Consciousness of responsibility							
- Individual level (28 points)	17.68	4.09	24.38	2.91	6.70	4.34	<0.001**
- Family level (28 points)	13.94	4.23	22.22	3.24	8.29	4.79	<0.001**
- Community level (28 points)	9.97	2.96	19.78	3.01	9.81	3.76	<0.001**
Cohen’sd = 3.45							

P-value test by \*Paired t-test/\*\*Wilcoxon signed rank test

## Discussions

This research study examined the effects of the “LAP” on improving awareness of liver fluke infection prevention and control with the application of contemplative practices, based on the situation context and health behavior especially for the study area. This study found the mean score of awareness was different among the students before and after the intervention. From the contemplative theory<sup>13</sup> the LAP transferred knowledge and awareness using the students self-regulation, understanding themselves better and increasing the capacity of their minds<sup>14-16</sup>. In addition the contemplative teaching by the teacher can improve the classroom climate to support the development of inside attention, emotion, self-regulation, empathy, compassion for self and others, and action in order to encourage and transform self-learning among the students<sup>11</sup>.

To evaluate the effect of LAP, this study used a Quasi Experimental design with the appropriate intervention evaluation in students by purposive school. However the limitation was not randomly allocated therefore, this study results may be used only for schools with similar context. In addition the target students dropped out at 23.0%, and most students come from one school, because of a no fixed classroom for learning, and some students had gone to participate often in social activities outside the school. In addition, some students were still regularly absent in other subjects too. As a result the students who completed period participating in this full were 121 students.

## Conclusions

This LAP intervention is an effective and beneficial school-based program to impact a liver fluke infection prevention and control behavior among secondary school students at individual, family and community levels.

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**Conflict of Interest:** No conflicts of interest to disclose.

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# Protective Effect of Ethanolic Extract of *Zingiber Officinale* Against Mercuric Chloride Induced Renal Toxicity In Rats

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## Abstract

The current study was designed to investigate the possible protective effects of ethanolic extract of *Zingiber officinale* on renal damage induced by mercuric chloride intoxication in rats. Forty albino adult rats (180±10g, n=10 per group) were administered HgCl<sub>2</sub> (3mg/kg, Ip, 3 times weekly). The treatment of *Z. officinale* extract (200 mg orally for 8 weeks. HgCl<sub>2</sub> administration altered the body weight, kidney weight, chemical parameters of creatinine, urea, and MDA. Body, kidney weight the biochemical and histopathological findings of this study significantly (P≤0.05) showed a protective effect of a *Z. officinale* extract against HgCl<sub>2</sub> intoxication. In conclusion, *Z. officinale* extracts may be an ideal choice against kidney damage induced by HgCl<sub>2</sub>.

**Keywords:** mercuric chloride, *Zingiber* extract, histopathology, kidney.

## Introduction

Mercuric chloride accumulates mostly in rat liver and kidney as these organs involved in the detoxification and excretion of foreign materials<sup>1</sup>. Mercury contamination of the environment continues to be a concern and a major source of this contamination is from human activities by industrial waste which releases mercury into the environment<sup>2</sup>. The renal cortex and liver are considered to be the most susceptible organs affected which leads to functional impairment (3). Several studies were focused on the role of free radicals and oxidants due to mercuric toxicity affect the proximal convoluted tubules injury, which suggests that the nephron plays an important role in the active transport of this heavy metal<sup>3,4,5,6,7,8,9</sup>

Natural herbaceous plant *Zingiber officinale* Roscoe is one of the most common food-flavoring spices used worldwide<sup>7</sup>. For many years, several pharmacological properties of ginger, such as anti-inflammatory, analgesic, gastrointestinal regulating agent, antioxidant and antimicrobial properties have been identified<sup>8,9,10</sup>. Efforts are now being directed in obtaining drugs with different chemical features since many modern drugs originated from plants the investigation of the chemical composition of traditional medicinal plants could lead to the development of new drugs. The study therefore, investigated the possibility of utilizing the ethanolic extract of *Z. officinale* in the treatment of HgCl<sub>2</sub> induced nephrotoxicity.

## Method

**Experimental Design:** Forty healthy adult albino rats 180±19g, were separated into four groups of ten rats for each group. eight weeks the animals kept in suitable cages and was feeder standard diet and water ad libitum. The control group received distilled water (10ml/kg/ intraperitoneal (Ip) the second group-administered three times per week (ip) injection of HgCl<sub>2</sub> at a dose of 3mg/

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kg. Third group, treated with [HgCl<sub>2</sub>(3mg/kg) plus (200mg/daily orally)] of *Z officinale* extract, and the fourth group treated with *Z officinale* extract (200mg/daily orally).

**Sample Preparation:** At the end of 8 weeks, all animals were scarified the body and kidney weight is measured. Clear sera were collected and stored at -20°C for biochemical assay. The kidneys was rapidly excised and stored in 10% formalin solution and processed for histological examination.

**Determination of biochemical and histomorphometric parameters:** Serum creatinine, urea and lipid peroxide contents were measured in all rats involved in this study using standard laboratory method.

Body and kidney weights were estimated at the end of 8 weeks. Under light microscopy the number and the diameter of (pct) were measured beside the histological examination.

**Statistical Analysis:** The data were expressed as means ± standard deviation (X ± SD). ANOVA (analysis of variance) to compare between more than two groups of numerical (parametric) data followed by post hoc Tukey test. A P value <0.05 was considered statistically significant.

**Results**

**Effect of Zingiber officinale extract treatment on body and kidney weights:** Table 1 showed a significant decrease in (b.w) and a significant increase in (k.w) of the rats among the HgCl<sub>2</sub> group(P≤0.05). While the (k.w) of the rats treated with extract of *Z officinale* showed a significant decrease when compared with rats among the HgCl<sub>2</sub> group(P≤0.05). No significant difference in the body and kidney weight between (*Z officinale* + HgCl<sub>2</sub>) group and the control group.

**Effect of Zingiber officinale extract treatment on the diameter and number of (pct):** Means diameter of

(pct) shows a significant increase in HgCl<sub>2</sub> treated group compared with other groups (P≤0.05), while the number of (pct) showed a significant decrease in HgCl<sub>2</sub> compared with other treated groups (P≤0.05). Table 3 showed a significant decrease in the diameter of (pct) among rats treated with *Z officinale* + HgCl<sub>2</sub> group (P≤0.05), also showed a significant increase in the number of the (pct) of *Z officinale* + Hgcl<sub>2</sub> group(P≤0.05). No significant difference in the diameter of (pct), and the number of (pct) of the *Z officinale* extract and control group.

**Table 1: Effect of Zingiber officinale extract treatment on body and kidney weights**

Groups	Bodyweight (gm)	Kidney Weight (gm)
Control	190.50±6.123 (A)	1.397±0.013 (C)
HgCl <sub>2</sub>	157.83±2.041 (C)	4.055±0.181 (A)
HgCl <sub>2</sub> +Z officinale	171.50±5.205 (B)	2.220±0.216 (B)
Z officinale	189.67±5.887 (A)	1.406±0.019 (C)

Values are expressed as mean± SD of 10 rats in each group. Significantly different from Group HgCl<sub>2</sub> (P≤ 0.05). Capital letters denote differences between the groups.

**Table 3: Effect of Zingiber officinale extract treatment on the diameter and number of (pct)**

Groups	The Diameter of (pct)	No. of (pct)
Control	41.373±0.329 (C)	17.728±0.746 (A)
HgCl <sub>2</sub>	53.353±0.654 (A)	14.725±0.502 (C)
Z officinale + HgCl <sub>2</sub>	44.893±1.0731 (B)	16.415±0.521 (B)
Z officinale	41.165±0.245 (C)	18.036±0.934 (A)

Values are expressed as mean± SD of 10 rats in each group. Significantly different in Group Hgcl<sub>2</sub>, (P≤ 0.05). Capital letters denote differences between the groups, P≤0.05 vs. control.

**Effect of Zingiber officinale extract treatment on creatinine, urea and MDA levels:** Creatinine, urea and MDA levels shows significant elevate in the HgCl<sub>2</sub> group of rats compared with the control group (p < 0.05). While the *Z officinale* + HgCl<sub>2</sub> group rats shows a significant reduction in the serum creatinine and urea levels (P≤ 0.05) (table 2).

**Table 2: Effect of Zingiber officinale extract treatment on creatinine, urea and MDA levels**

Groups	Creatinine	Urea	MDA
Control	127.96±0.076 (C)	58.045±1.413 (C)	4.365±0.199 (C)
HgCl <sub>2</sub>	437.77±24.013 (A)	149.08±1.652 (A)	7.908±0.263 (A)
HgCl <sub>2</sub> +Z officinale	244.67±14.684 (B)	87.848±1.889 (B)	5.063±0.398 (B)
Z officinale	123.77±0.537 (C)	55.400±0.530 (C)	4.410±0.197 (C)

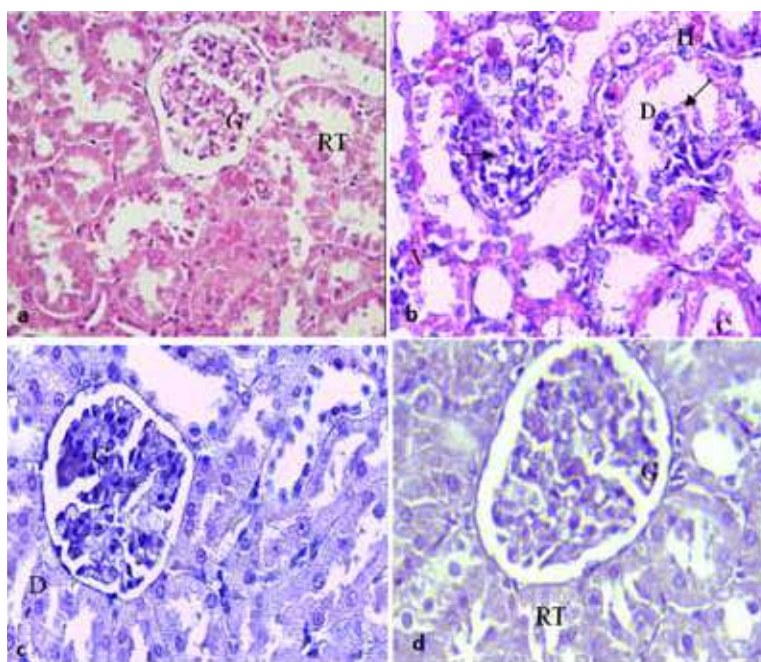
Values are expressed as mean± SD of 10 rats in each group. Significantly different from Group HgCl<sub>2</sub> (P≤ 0.05). Capital letters denote differences between groups.

**Morphological Examination:** The kidneys of rats of the *Z officinale* extract, *Z officinale* + HgCl<sub>2</sub> groups showed bean-shaped, reddish-brown in color with smooth and possess convex and concave borders nearly normal (fig. 1a,b & d), while the kidney of rats of the HgCl<sub>2</sub> group was pale, swollen and enlarged (fig.1c).

**Histological Examination:** Figure 2a: show histopathological findings from H & E stained kidney sections. In the control group rats, no glomerular or pathological abnormalities. However, HgCl<sub>2</sub> group rats showed multiple pathological changes, which include dilated of Bowman’s capsules, atrophy glomerulus tuft, vacuolated of epithelial cells and cast formation with the presence of interstitial exudates. Also, a glomerular cell cast of renal tubules proximal dense nuclear of epithelial cell, hyper atrophy of other cells, a hemorrhagic area with a mild aggregation of some inflammatory cells beside a swelling of epithelial cells as shown in (fig. 2b). Rat kidneys treated with *Z officinale* + HgCl<sub>2</sub> group showed normal renal tubules and nearly normal epithelial cells, with very mild degeneration, while normal kidney tissues appear in (fig. 2c) rats.



**Fig. 1: a, c & d. (normal, *Z officinale* & HgCl<sub>2</sub> + *Z officinale* extract groups) showed normal gross appearance kidney. b, HgCl<sub>2</sub> group showing pale and swollen kidney.**



**Fig. 2:a. Control group, showing normal glomeruli (G) and normal renal tubules (RT). b, HgCl<sub>2</sub> group showing dilated of Bowman’s capsules (D), glomeruli tuft atrophy (→) vacuolated of epithelial cells (V) and glomerulus cells cast of renal tubules (C), hemorrhagic area (H). c, Zingiber officinale + HgCl<sub>2</sub> group showed nearly normal renal tubules with normal epithelial cells, and very mild degeneration(D). d, Zingiber officinale group showed normal glomerulus tuft, normal renal tubules and normal glomeruli of Bowman capsule H & E400X.**

## Discussion

The pathogenesis of nephrotoxicity of mercury is due to binding of mercuric ions with sulfur, like a thiol group of amino acids, which transfer mercury ion via sodium ion channels to the kidney tubules, causing in accumulation in the renal proximal tubular cells and increasing free radicals formation and damaging renal tubules<sup>4,11,12</sup>. So the current study was undertaken to determine whether Zingiber can reduce or prevent HgCl<sub>2</sub> induced renal damage by examining different biochemical and histological parameters related to kidney function of intoxicated and treated rats.

Reduce of the body weight may be resulting from being an interruption of HgCl<sub>2</sub> in the absorption and metabolism of feed nutrients essential for health<sup>13</sup>. Mercury is capable of damaging the organism in many ways because of its high affinity to various tissues and its tendency to accumulates<sup>14,15,16</sup> the result of the present study is inconsistent with other findings<sup>12,16,17</sup>. The biological effects ascribed to Zingiber include induction of endogenous antioxidants in rat tissue organs, scavenged free radicals by giving electron(s) to them, protecting cells from oxidative stress and increased detoxification of foreign compounds<sup>18</sup>.

Serum Creatinine and urea are the most sensitive biochemical marker used in the assessment of renal tissue damage because the creatinine and urea are excreted through kidney therefore, in cellular damage there is retention of creatinine, urea in the blood<sup>19</sup>. Many previous studies reported that proteinuria from mercuric toxicity is due to disorders in the glomerular filtration barrier which resulted from damage in podocytes, and decreased reabsorption of filtered protein<sup>16,20</sup>. The significant increase in serum creatinine level is evidence of the reduced ability of the renal tubules to excrete and creatinine from the blood of the HgCl<sub>2</sub> group rats, a reality that was also supported by the photomicrographs of the kidney tissue. Creatinine and urea levels

return to nearly normal levels in the (*Z officinale* + HgCl<sub>2</sub>) group that give an indication that Zingiber has protective and ameliorative effects on HgCl<sub>2</sub> induced kidney damage (table 2). These results are inconsistent with a previous explanation that the zingiber contains a high concentration of flavonoids and alkaloids<sup>21,22</sup> and acts as an antioxidant and/or free radical scavenging activity. Also the present study showed that treated of rats with the HgCl<sub>2</sub>, markedly induced elevation in malondialdehyde (MDA) due to the induction of free

radical generation and stimulation of lipid peroxidation. Treatment of rats with Zingiber significantly reduces MDA level, due to Ginger compounds like gingerols, shagols, and ketone they have the capacity to reduce the free radical capacity<sup>22,23</sup>.

The epithelium of (pct) is the most sensitive part of the kidney to the toxic effects of mercuric chloride due to their enzymatic activity<sup>4,24</sup>. In a histomorphometric study the diameter of (pct) in the treated HgCl<sub>2</sub> group was significantly increased (P≤0.05) as compared with other experimental groups, this an agreement with previous results<sup>4,25,26</sup>. One of the reasons for the increase in the diameter of (pct) is loss of brush border due to oxidative stress produced by HgCl<sub>2</sub><sup>21,22</sup>. A significant decrease in the number of (pct) of the HgCl<sub>2</sub> reflects oxidative stress-induced necrosis and apoptosis<sup>27,28</sup>. In the present study the maintenance of the diameter of (pct) in the (*Z officinale* + HgCl<sub>2</sub>) group indicates the antioxidant and anti-inflammatory effects of Zingiber, as reported previously by<sup>26,29,30</sup>.

Figure 2 shows that the HgCl<sub>2</sub> causes pathological changes and, On another side the morphological picture of *Z officinale* + HgCl<sub>2</sub> rat kidney group shows nearly normal tissue architecture with very few degenerative changes. These results were consistent with previously published articles<sup>4,24</sup>. The result of the present study confirms the role of Zingiber in improving tissue damages by reducing/inhibit the number of pct and pathological changes induced by a toxic dose of HgCl<sub>2</sub>.

## Conclusion

*Z officinale* has an antioxidant effect and able to retard the progression of renal tubular pathological changes induced by HgCl<sub>2</sub>.

**Conflict of Interest Statement:** The authors declare that there is no conflict of interest.

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# Association between Superoxide Dismutase 2 p.(Ala16Val) and Superoxide Dismutase 3 p.(Arg213Gly) Genetic Variants and Risk of Peripheral Neuropathy in Children and Adolescents with Type 1 Diabetes

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## Abstract

Diabetic neuropathy (DN) is one of the microvascular complications of diabetes. Marked increase in oxygen free radicals (OFR) results in oxidative stress that leads to development of DN. Antioxidant enzymes play a major role in protection against progression of DN, by reducing OFR. This study aimed to investigate the association between superoxide dismutase 2 *SOD2*:p.(Ala16Val) and superoxide dismutase 3 *SOD3*:p.(Arg213Gly) genetic variants and the risk of neuropathy in Type 1 Diabetes children and adolescent. The study included 80 children with type 1 diabetes divided into 2 groups, group 1 of 40 patients with clinical DN and group 2 of 40 patients without DN. HbA1c levels were measured and genetic variants of *SOD2*:p.(Ala16Val) and *SOD3*:p.(Arg213Gly) were assessed by Taqman Real time Polymerase Chain Reaction (PCR) for both groups. The frequency of Ala/Ala genotype (OR=0.28 with 95% CI of 0.11-0.71) and Ala allele (OR=0.33 with 95% CI of 0.17-0.65) of *SOD2*:p.(Ala16Val) were significantly lower in group 1 (27.5%, 50% respectively) than group 2 (57.5%, 75% respectively) (p=0.007, p=0.001 respectively). In contrast the frequency of Val/Val genotype (OR=4.68 with 95% CI of 1.19-18.3) and Val allele (OR=3 with 95% CI of 1.54-5.86) were significantly higher in group 1 (27.5%, 50% respectively) than group 2 (7.5%, 25% respectively) (p=0.019 and p=0.001 respectively). Regarding *SOD3*:p.(Arg213Gly) gene variants the frequency of Arg/Arg genotype and Arg allele were higher in group 1 (100%,100% respectively) than group 2 (90%,95% respectively) but with statistical insignificance (P=0.06, P=0.058 respectively), however the frequency of Arg/Gly genotype and Gly allele were higher in group 2 (10%, 5% respectively) than group 1 (0%, 0% respectively) but also with no statistical significance (P=0.058 and P=0.06 respectively). There is a possible association between *SOD2*:p.(Ala16Val), but not with *SOD3*:p.(Arg213Gly) genetic variants and the occurrence of DN in patients with type 1 diabetes mellitus.

**Keywords:** Type 1 diabetes- neuropathy- *SOD2* gene- *SOD3* gene- Real Time PCR.

## Introduction

Diabetes Mellitus (DM) is a collection of metabolic abnormalities characterized by hyperglycemia which

results from defects in insulin secretion, insulin action or both.<sup>1</sup> Diabetes Mellitus Type 1 is caused by destruction of the insulin-producing beta cells in the pancreas<sup>2</sup> and can lead to microvascular complications as DN, affecting somatic and/or autonomic nervous system.<sup>3</sup> About 20% of patients with diabetes will develop clinically significant neuropathy within 10 years of diabetes onset<sup>4</sup> the molecular mechanisms involved in development of diabetic peripheral neuropathy (DPN) is complex process that includes over activation of polyol pathway and protein kinase C in presence of

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hyperglycemia, increase of free radical and oxidative stress are incriminated in the pathogenesis of DPN<sup>5</sup>, also genetic factors such as single nucleotide polymorphism (SNP) in the superoxide dismutase and catalase gene may be a risk factor for DN.<sup>6</sup> Superoxide dismutases are the primary antioxidant defense system, catalyzing dismutation of superoxids into O<sub>2</sub> and H<sub>2</sub>O<sub>2</sub>. In mammals there are cytosolic (SOD1), mitochondrial (SOD2) and extracellular (SOD3) isoforms that are all products of distinct genes.<sup>7,8</sup> Mitochondrial SOD2 gene is located on the chromosome 6q25.3, it contains five exons, coding for 223 amino acids which undergo post translational modifications via the mitochondrial translocases to facilitate the import process in the mitochondria.<sup>9</sup> The rs 4880 of *SOD2* p. (Ala-9Val) or p.(Ala16Val) is the most studied variant in exon 2 of *SOD2* gene<sup>10</sup> the replacement of alanine to valine affects the  $\alpha$ -helix configuration in the mitochondrial targeting sequence (MTS) affecting the influx to mitochondria causing enzyme degradation and decrease enzyme activity.<sup>11</sup> Extracellular superoxide dismutase 3 gene lies on chromosome 4p15.2, it contains 3 exons. The entire 720bp coding region lies within exon 3.<sup>12</sup> The rs 1799895 (Arg213Gly) is present in exon3 of *SOD3* gene at codon 213. SOD3 with Gly-213 inhibits ionic interactions between heparin and SOD3 enzyme so it binds less tightly to the plasma membrane, and its serum concentration is about nine times or more that of the isoenzyme with Arg-213.<sup>13</sup> This study aimed to investigate the association between *SOD2*:p.(Ala16Val) and *SOD3*:p.(Arg213Gly) genetic variants and the risk of peripheral neuropathy in Type 1 Diabetes children and adolescents with more advanced method than the one used by ElMasry et al. (2005), which was Real time PCR using Taqman probes. Moreover the present study targeted a younger age group with neuropathy with short duration of diabetes compared to that done by El Masry et al. (2005).<sup>14</sup>

## Method

This case control study was conducted on 80 patients with T1DM, diagnosed according to American Diabetes Association (ADA) criteria 2018<sup>1</sup> that were recruited from outpatient clinic of the Diabetes, Endocrine and Metabolism Pediatric Unit (DEMPU), at Children Hospital, Cairo University in the period from January 2018 to December 2018.

We divided 80 patients into two groups, group 1 consisted of 40 Type 1 diabetes patients with clinical DN, diagnosed on basis of symptomatic symmetrical distal

neuropathy (reduced or absent ankle reflexes, vibration sense at the medial malleolus and/or reduced sense of position with one or more typical symptoms, such as burning sensation, cramps, parasthesia or numbness) using scores for neuropathy symptoms and neuropathy examination regardless of age, or degree of glycemic control, with diabetes duration of 5 years or less.

Group 2 included 40 patients (age and sex matched to group 1 with diabetes duration of more than 5 years regardless of degree of glycemic control without any symptom of neuropathy as a control group. Patients with type 2 diabetes or those with any other cause of neuropathy were excluded from the study. All participants in this study were informed and consents were taken from their parents. All subjects were subjected to thorough history taking including: age of onset of symptoms and duration of diabetes. Full clinical assessment was done.

Four milliliters of blood were collected from each participant and divided into 2 tubes: one EDTA tube for measurement of Glycated Hemoglobin (HbA1c) and another EDTA tube for DNA isolation and PCR procedure. Glycated Hemoglobin (HbA1c) Assay: Withdrawn samples were assayed immediately after collection on Dimension clinical chemistry system using FDA approved kits supplied by Siemens healthneers\*®.

\*Dimension (Siemens): Siemens Healthcare Diagnostics Inc. 511 Benedict Ave/Tarrytown, NY 10591 Phone: +1 914 631-8000).

The HbA1c measurement was based on a turbidimetric inhibition immunoassay (TINIA) principle which is NGSP certified as traceable on the DCCT.<sup>15</sup> Determination of *SOD2*:p.(Ala16Val) (rs4880) and *SOD3*:p.(Arg213Gly) (rs1799895) gene variants by Taqman Real Time Polymerase Chain Reaction included two steps: Extraction of genomic DNA from peripheral blood leucocytes of EDTA anticoagulated blood using QIAamp DNA blood Mini kit (Qiagen) by spin columns,<sup>16</sup> then, amplification of extracted DNA and analysis of gene variants by real time PCR technique using TaqMan single nucleotide polymorphism (SNP) genotyping assay (Applied Biosystems) performed on Step One™ Real Time PCR System (Applied Biosystems). The reaction volume was 20 $\mu$ l/well, and the thermal cycler was adjusted for initial step for activation of AmpliTaq Gold DNA polymerase enzyme, by adjusting temperature at 95°C for 10 minutes followed by 40 PCR cycles; each cycle of PCR consisted of 3 steps: denaturation step at 92°C for 15 seconds, annealing step reaction mixture was cooled to 60°C for 30 seconds, extension reaction,

done at 60°C for 30 seconds. After PCR amplification, an endpoint plate read was performed using Step One™ Real Time PCR System (Applied Biosystems). The Sequence Detection System (SDS). Software used the fluorescence measurements made during the plate read to plot fluorescence (Rn) values based on the signals from each well. The plotted fluorescence signals indicated which alleles were in each sample and alleles were converted to genotypes.

Data obtained from the study was coded and entered using the software SPSS (Statistical package for social science) version 17(Chicago,IL,USA). Parametric data was summarized using mean and standard deviation. Frequency and percentages were used for qualitative variables. Comparison between groups was done using Chi square and Fischer exact test for qualitative variable. Student's t test was used to compare two groups. The odds ratio (OR) and their 95% confidence intervals (CI) were calculated to estimate the strength of the association between each of genotypes and alleles and patients and controls. P-value is considered significant if <0.05.<sup>17</sup>

## Results

The baseline clinical, demographic features and genetic variant analysis of SOD2 and SOD3 genes of

both studied groups are showed in (Table 1).

There was no statistically significant difference as regards the age of participants, or their HbA1c levels (P=0.12, and P=0.92 respectively), but there was a statistically significant difference regarding diabetes duration among the studied groups (P=<0.0001).

The frequency of Ala/Ala genotype (OR=0.28 with 95% CI of 0.11-0.71) and Ala allele (OR=0.33 with 95% CI of 0.17-0.65) of SOD2:p.(Ala16Val) were significantly lower in group 1 than group 2 (P=0.007 and P=0.001 respectively). In contrast the frequency of Val/Val genotype (OR=4.68 with 95% CI of 1.19-18.3) and Val allele (OR=3 with 95% CI of 1.54-5.86) were significantly higher in group 1 than group 2 (P=0.019 and P=0.001 respectively).

Regarding SOD3:p.(Arg213Gly) genetic variants the frequency of Arg/Arg genotype and Arg allele were higher in group 1 than group 2 but with statistical insignificance (P=0.058 and P=0.06 respectively). However the frequency of Arg/Gly genotype and Gly allele were higher in group 2 than group 1, but also with no statistical significance (P=0.058 and P=0.06 respectively (Table 1).

**Table 1: Baseline, demographic, biochemical data and univariate analysis of factors with SOD**

Variables	Group 1 (n= 40)	Group 2 (n= 40)	P- value
Age (Years) mean ± SD	13.45(±2.64)	12.67(±1.75)	0.12
Sex (male/female)	27/13	22/18	0.25
Diabetes duration (Years) mean ± SD	3.75 (±1.07)	7.75 (±1.03)	<0.0001
HbA1c (%) mean ± SD	8.86 (±0.97)	8.84 (±0.91)	0.92
SOD2Ala/Ala (%)	11 (27.5)	23 (57.5)	0.007
SOD2Ala/Val (%)	18 (45)	14 (35)	0.363
SOD2 Val/Val (%)	11 (27.5)	3(7.5)	0.019
SOD2Ala allele (%) n= 80	40 (50)	60 (75)	0.001
SOD2Val allele (%) n= 80	40 (50)	20 (25)	0.001
SOD3Arg/Arg (%)	40 (100)	36 (90)	0.058
SOD3Arg/Gly (%)	0 (0)	4 (10)	0.058
SOD3Arg allele (%) n= 80	80 (100)	76 (95)	0.06
SOD3Gly allele (%) n= 80	0 (0)	4 (5)	0.06

P-value is considered significant if <0.05

## Discussion

The current study threw the light on different genotypes of Superoxide dismutase 2 and 3 in type 1 diabetes children and aimed at finding an association between the different genotypes and the risk of diabetic neuropathy.

Genotypic analysis of *SOD2*:p.(Ala16Val) gene variant revealed that the frequency of homozygous Val/Val genotype and Val allele of *SOD2* was significantly increased in DN patients (27.5%, 50%) than in those without neuropathy (7.5%,25%) (P=0.019).

Val/Val genotype was found to be a significant risk factor for developing peripheral neuropathy in a diabetes patient, (OR=4.68 with 95% CI of (1.9-18.3), P= 0.019). So this genetic variation tend to be the main risk factor for diabetic neuropathy regardless the glycemic control which was comparable between our two groups and regardless the duration of diabetes which was intended to be more than 5 years in patients without neuropathy and 5 years or less in patients with neuropathy to identify the impact of genetic variation on the development of diabetic neuropathy.

It was also found that the frequency of Ala/Ala genotype was significantly lower in patients with DN (27.5%) compared to those without neuropathy (57.5%) (OR=0.28 with 95%CI of (1.9-18.3), P = 0.007). Hence this genotype was associated with lower risk of DN.

In agreement with these results, Stokov et al. (2003)<sup>6</sup> and Zotova et al. (2003)<sup>18</sup> showed that *SOD2*:p.(Ala16Val) gene variant in a Russian population was associated with a high risk of the development of neuropathy in type 1 diabetic patients they stated that Val/Val genotype was more common in diabetic neuropathy patients (18.6%,20.4% respectively) than in diabetic patients without neuropathy (5.4%,5.6 respectively) (P=0.009, P=0.02 respectively). Regarding Ala/Ala genotypes, it was found that, it was significantly more common in diabetic patients without neuropathy (P=0.03,P=0.03 respectively).

These observations are also consistent with the findings of El Masry et al. (2005),<sup>14</sup> who demonstrated that Val/Val genotype of *SOD2* (rs4880) was a significant risk factor in diabetes patients with neuropathy but not nephropathy and the Ala/Ala genotype was more common in diabetes patients without neuropathy or other microangiopathic complications than those having neuropathy.

On the contrary, in 2015 a study on the Polish population which was done by, Wegner et al. (2015)<sup>19</sup> found that, Val/Val genotype of *SOD2* (rs4880) did not increase the risk of T1DM or chronic diabetes complications in Polish T1DM patients (P= 0.761, OR= 0.407). This discrepancy may relate to different genetic background in sample selection.

Regarding rs1799895 of *SOD3*:p.(Arg213Gly) gene variants, our current study revealed that the frequency of Arg/Arg genotype and Arg allele were higher in group 1 (100%,100% respectively) than group 2 (90%,95% respectively) but with statistical insignificance (P=0.058, P=0.06 respectively), however the frequency of Arg/Gly genotype and Gly allele were higher in group 2(10%,5% respectively) than group 1(0%,0% respectively) but also with no statistical significance (P=0.058 and P=0.06 respectively). In harmony with our results, Zhai and his coworkers on 2017<sup>20</sup> declared that no significant association was found between *SOD3*:p.(Arg213Gly) genetic variants and development of type 2 diabetes mellitus and its complications in Chinese population (P=0.66). On other hand, Zotova et al. (2003)<sup>18</sup> reported that the *SOD3*:p.(Arg213Gly) genetic variant was significantly associated with the development of diabetic polyneuropathy in T1DM patients in a Russian population. This was attributed to significantly higher frequency of homozygous wild Arg/Arg genotype in diabetic neuropathy patients (27.9%) than the diabetic patients without neuropathy (9.7%) (P=0.002). It is recommended that the results obtained by this study would be confirmed on larger studies on wider scale including other microvascular complications as nephropathy and retinopathy and its relation to glycemic variability.

## Conclusion

This study suggested the presence of a possible association between the *SOD2*:p.(Ala16Val) (rs4880), but not *SOD3*:p.(Arg213Gly) (rs1799895) gene variants and the susceptibility of diabetic polyneuropathy in children and adolescents with type 1 diabetes mellitus. This susceptibility is independent of glycemic control or diabetes duration.

**Conflict of Interest:** None

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# Outcome of Treatment of Chronic Hepatitis C Patients by New Antiviral Drugs

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## Abstract

HCV constitutes a significant health burden worldwide. Hepatitis C is a disease with significant global impact. Egypt has a high prevalence of HCV worldwide (>10%) . In Africa and the western Pacific the prevalence ( $\geq 3\%$ ) is significantly higher than in North America and Europe (<2%). In general, everyone with chronic HCV should receive antiviral therapy. This is because patients who are cured of their HCV infection benefit from reduction in the risk of hepatocellular carcinoma, liver related mortality and even all-cause mortality. In general, everyone with chronic HCV should receive antiviral therapy, treatment should be given first to patients with advanced fibrosis and high risk for liver-related complications. Also, patients with severe extrahepatic HCV manifestations should be given high priority. The timing of treatment in patients with mild liver disease can be individualized. This review provides insight into clinical studies of NS3/4A protease inhibitors, NS5B viral polymerase inhibitor (nucleotide and non-nucleotide), and NS5A inhibitors, alone and in combination.

**Keywords:** Direct-acting antiviral agents (DAAs); Hepatitis C virus; Side effects.

## Introduction

HCV constitutes a significant health burden worldwide. Indeed, this virus has a high propensity for establishing a chronic infection. In the long-term lead to advanced fibrosis, cirrhosis and hepatocellular carcinoma (HCC) <sup>(1)</sup>.

Hepatitis C is a disease with significant global impact. According to the World Health Organization (WHO) 2014 there are 130 - 150 million people chronically infected with HCV, corresponding to 2-2.5%

of the world's total population. There are considerable regional differences. Egypt has a high prevalence of HCV worldwide (>10%) . In Africa and the western Pacific the prevalence ( $\geq 3\%$ ) is significantly higher than in North America and Europe (<2%)<sup>(2)</sup>.

HCV has seven main genotypes (1–7) with multiple subtypes based on the sequence heterogeneity of HCV genome. Genotyping is important for planning of HCV treatment and helps to identify cure rate. Genotype 1a is predominantly located in North Europe and North America, whereas genotype 1b is predominantly found in southern and Eastern Europe and Japan. Genotype 2 is found more frequently in Europe than in North America. Genotype 3 is endemic to South-East Asia. Genotype 5 is almost exclusively found in South Africa. Genotype 6 is primarily distributed in Asia. Genotype 7 is identified in patients originating from the Democratic Republic of Congo. HCV genotype 4 is the cause of about 20% of the 170 million cases of hepatitis C in the world. In Middle East and Africa, it causes more than 80% of

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HCV infections. Egypt has the highest frequency of HCV-4 that is responsible for almost 90% of infections and a major cause of chronic hepatitis, liver cirrhosis (LC), HCC and liver transplantation<sup>(3)</sup>.

In general, everyone with chronic HCV should receive antiviral therapy.

This is because patients who are cured of their HCV infection benefit from reduction in the risk of hepatocellular carcinoma, liver related mortality and even all-cause mortality<sup>(4)</sup>.

**Treatment Indication:** In general, everyone with chronic HCV should receive antiviral therapy.

This is because patients who are cured of their HCV infection benefit from reduction in the risk of hepatocellular carcinoma, liver related mortality and even all-cause mortality<sup>(4)</sup>. DAA regimens, ideally IFN-free, should be preferred<sup>(5)</sup>. However, if resources are limited and DAA therapies are not easily accessible, treatment should be given first to patients with advanced fibrosis and high risk for liver-related complications. Also, patients with severe extrahepatic HCV manifestations should be given high priority for immediate treatment. The timing of treatment in patients with mild liver disease can be individualised; waiting for IFN-free therapies with low risk of side effects should be considered<sup>(5)</sup>.

#### **Direct Acting Antivirals (DAAs):**

**Sofosbuvir:** Sofosbuvir (SOF) is a pyrimidine nucleotide analog inhibitor of NS5B, indicated in the treatment for HCV genotypes 1a, 1b, 2, 3, and 4 as a component of a combination antiviral treatment regimen.<sup>(6)</sup>

Sofosbuvir is phosphorylated within the cell, incorporates itself into the growing viral RNA strand, and terminates HCV RNA strand synthesis prematurely.<sup>(7)</sup>

SOF confers an excellent genetic barrier to resistance; among several clinical trials, resistance has been reported in just one patient, when it was utilized as a monotherapy.<sup>(8)</sup>

Sofosbuvir is activated in the liver by its phosphorylation to its triphosphate nucleoside analog, which is then dephosphorylated to the inactive GS-331007. Peak plasma concentrations (C<sub>max</sub>) of SOF is attained in 0.5–2 h and 2–4 h, while its terminal half-

life is 0.5 h and that of GS-331007 is 27 h. SOF can be administered with/without food; no gender or race difference has been reported with its use. Following a single 400 mg oral dose, most of the drug was eliminated in the urine (a little amount as the parent drug and the major as GS-331007). No dosage adjustments are recommended for hepatic or mild-to-moderate renal impairment.<sup>(6)</sup>

The most common side effects encountered for SOF was reported, when it was used in combination with IFN, and/or with longer (24 vs. 12 weeks) treatment. The adverse effects were fatigue, headache, nausea, insomnia, pruritus, irritability anemia, asthenia, and diarrhea. When it was combined with RBV and IFN the adverse effects were decreased appetite, influenza like illness, pyrexia, chills, neutropenia and myalgia.<sup>(7,8)</sup>

**Ledipasvir:** Ledipasvir (LDV) is an NS5A inhibitor and is currently available only as ledipasvir/sofosbuvir fixed-dose combination tablet for genotype 1a, 1b hepatitis C. LDV has shown efficacy to treat HCV patients without PEGinterferon or ribavirin. Natural resistance can emerge quickly against HCV NS5A, with suboptimal therapy. Patients with mutation in Y93H and Q30K are typically more susceptible to develop such resistance, a condition that may be minimized by the use of a combination treatment.<sup>(9)</sup>

Ledipasvir undergoes oxidative metabolism by unknown mechanism, and is excreted mainly through the biliary tract, while less than 1% in the urine. The parent drug accounts for about 70% of the excreted dose. The terminal half-life of LDV is 47 h.<sup>(10)</sup>

Ledipasvir has demonstrated a high efficacy as a combination with SOF in treating HCV 1 patients, with or without RBV. Moreover, it provides better sustained virological response in relapsing cases from RBV/SOF combination. The current recommendation for LDV use suggests there is no need to combine LDV/SOF with RBV or to prolong the treatment duration for more than 12 weeks.<sup>(11)</sup>

The most common side effects reported for LDV are diarrhea, nausea, fatigue, headache, insomnia and elevations in both bilirubin and lipase elevations. These side effects are more common with a longer duration of treatment (24 weeks) or concomitant RBV therapy.<sup>(12)</sup>

**Velpatasvir:** Velpatasvir is an inhibitor of viral NS5A was approved for the treatment of adult patients

with chronic HCV genotype 1, 2, 3, 4, 5 or 6 infection. A fixed dose combination of velpatasvir 100 mg and sofosbuvir 400 mg is to be taken orally once daily with or without food. The combination of velpatasvir/sofosbuvir being pan-genotypic has clinical importance as it cover HCV patients will all 6 genotypes and it may not be necessary to perform genotype testing. Velpatasvir/Sofosbuvir combination is indicated for chronic HCV patients without cirrhosis or with compensated cirrhosis. For indicated patients with decompensated cirrhosis the regimen should include ribavirin.<sup>(13)</sup>

Velpatasvir is subjected to metabolism via the CYP2B6, CYP2C8, and CYP3A4 pathways, and most of the dose is excreted in feces, primarily via biliary excretion of the parent drug.<sup>(14)</sup>

The commonly reported adverse events were headache, fatigue and nausea. As with other sofosbuvir-containing regimens.<sup>(13)</sup>

**Voxilaprevir:** Voxilaprevir (VOX) is an HCV NS3/4A protease inhibitor. Voxilaprevir is metabolised in vitro by CYP3A4, with the vast majority of drug in plasma being the parent drug. Velpatasvir and voxilaprevir are both inhibitors of drug transporters P-gp, BCRP, OATP1B1 and OATP1B3. Biliary excretion is the major route of elimination. The median terminal half-life of voxilaprevir is approximately 33 h<sup>(15)</sup>.

Sofosbuvir, velpatasvir and voxilaprevir are available in a three drug fixed-dose combination containing 400 mg of sofosbuvir, 100 mg of velpatasvir and 100 mg of voxilaprevir in a single tablet. The recommended dose of the combination is one tablet taken orally once daily with food<sup>(15)</sup>.

Child-Pugh A cirrhosis had no dose adjustment. The combination is not recommended in patients with moderate hepatic impairment (Child-Pugh B) and contraindicated in those with severe hepatic impairment (Child-Pugh C)<sup>(15)</sup>.

**Ritonavir-boosted paritaprevir:** Paritaprevir is an inhibitor of the HCV NS3/4A protease, has activities against genotypes 1a and 1b with good activities against genotypes 4a and 6a, whereas it is less active against genotype 2A and 3a. Ritonavir is an HIV-1 protease inhibitor that acts as a pharmacokinetic booster of paritaprevir.<sup>(16)</sup>

**Ombitasvir:** Ombitasvir is an inhibitor of HCV

NS5A with pangenotypic efficacy. ombitasvir is metabolized by amide hydrolysis and is highly bound to plasma proteins. It can be given with meals.<sup>(17)</sup>

**Dasabuvir:** Dasabuvir is a non-nucleoside inhibitor of NS5B RNA dependent RNA polymerase acting as an allosteric inhibitor of the palm domain of NS5B. Dasabuvir is active against replicons of genotypes 1a and 1b, whereas it has a reduced activity in the genotypes 2a, 2b, 3a, and 4a.<sup>(18)</sup>

All-oral Paritaprevir / Ritonavir / Ombitasvir plus Dasabuvir regimen is given with meals and is recommended for the treatment of genotypes 1a, 1b, and 4 with or without ribavirin. The All-oral regimen has high rates of SVR in treatment of both naïve and experienced patients with best outcome in non-cirrhotic patients with genotype 1b infections.<sup>(16)</sup>

The all-oral members are highly bound to plasma proteins, and apart from ombitasvir, which is metabolized by amide hydrolysis they are metabolized through hepatic CYP450 enzymes. Because non-renal mechanisms accounted for the elimination of all-oral regimen, renal impairment may not require specific recommendation and not recommended for patients with moderate hepatic impairment and is contraindicated in those with severe hepatic impairment. The adverse effects are nausea, pruritus, insomnia and asthenia.<sup>(19)</sup>

**Grazoprevir and elbasvir:** Elbasvir is an inhibitor of NS5A, whereas grazoprevir is an NS3/4A protease inhibitor. The combination of elbasvir and grazoprevir was approved with or without ribavirin for treating adult patients with chronic HCV genotype 1 or 4. A fixed-dose combination of elbasvir 50 mg and grazoprevir 100 mg is to be taken orally once daily without regard to meals. Genetic assessment for patients of genotype 1a is recommended to determine if the patient is NS5A resistant before the initial treatment, in order to determine the combination with ribavirin in regimen and the duration of therapy. Both elbasvir and grazoprevir undergo metabolism via the CYP3A pathway, and most of the dose is eliminated in the feces with little amount in urine. Subjects receiving Elbasvir/Grazoprevir for 12 weeks, most complained of fatigue, headache, and nausea as the common adverse reactions. In subjects receiving Elbasvir/Grazoprevir with ribavirin for 16 weeks the most often reported adverse reactions were anemia and headache.<sup>(20)</sup>

No dosage adjustment of Elbasvir/Grazoprevir

is recommended in patients with renal impairment, including patients on dialysis. No dosage adjustment of Elbasvir/Grazoprevir is recommended in patients with mild hepatic impairment. However, Elbasvir/Grazoprevir is contraindicated in patients with moderate or severe hepatic impairment.

**Daclatasvir:** Daclatasvir inhibits both viral RNA replication and virion assembly by binding to the N-terminus of NS5A causing structural distortions that interfere with NS5A functions. Daclatasvir is given once daily in oral dose (60 mg/day). It is well absorbed after oral administration with peak plasma concentrations occurring within 2 hours post dose; a high-fat, diet decreases daclatasvir bioavailability when compared with fasted conditions. There is no effect on daclatasvir bioavailability with normal diet. It binds to plasma protein by approximately 99%.<sup>(21)</sup>

Daclatasvir is metabolized by the liver with CYP3A4. The majority of the drug is eliminated in the feces and about 7% of the dose was excreted in the urine (primarily as unchanged daclatasvir). Its elimination half-life is about 13 hours and its clearance equals 4.2L/h. The most common reported adverse reaction are headache, fatigue, nausea and diarrhea. Daclatasvir is contraindicated with strong CYP 3A inducers. Consider the benefits and risks when prescribing daclatasvir to a pregnant woman. No data is available regarding the presence of daclatasvir in human milk. Benefit/risk patients should be considered in administering daclatasvir to lactating mothers. No dosage adjustment with renal impairment or any degree of hepatic impairment.<sup>(22)</sup>

**Simeprevir:** Simeprevir (SIM) is an NS3/4A protease inhibitor, its efficacy has been reported against HCV genotypes 1a and 1b. SIM has proven efficacy in non-responders from IFN-RBV treatment when it is combined with SOF in a daily dose of 150 mg with/without RBV for only 12 weeks schedule therapy<sup>(23)</sup>

SIM has demonstrated a higher genetic barrier to resistance. SIM reaches C<sub>max</sub> after 4–6 h. It is advisable to take SIM with food. It is metabolized by CYP3A family. Because of the intestinal CYP3A4 and p-glycoprotein inhibition, a careful monitoring for drug interactions is a mandatory precaution.<sup>(24)</sup>

Most of the drug is recovered in the feces. The terminal half-life reaches up to 41 hours. No dose adjustment is required in renal and mild hepatic impairment. Simeprevir is a well-tolerated drug. Most

of the reported side effects are known to result from the concomitantly taken medication. The side effects reported when it is combined with RBV/IFN are nausea, myalgia, rash, photosensitivity, pruritus and dyspnea. In other studies, when IFN is not included the side effects were nausea and headache. In the absence of IFN and RBV the reported adverse effects for SIM/SOF were rash, photosensitivity and pruritus<sup>(23)</sup>

## Conclusions

IFN-free antiviral treatment is safe and well tolerated. Patients can be treated almost independently of liver function or concomitant disease. Viral eradication is associated with reduced morbidity and mortality and better quality of life.

**Ethical Considerations:** The study protocol was approved by the ethical committee of the Internal Medicine Dept. at faculty of Medicine, Minia University.

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**Conflict of Interest:** None.

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# Evaluation of Implant Stability after Application of Platelet Rich Fibrin in Mandibular Posterior Ridge Splitting and Simultaneous Implant Placement Versus Xenograft Application: A Randomized Clinical Trial

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## Abstract

**Aim of the Study:** The purpose of this study aimed to answer a clinical question whether the use of platelet rich fibrin after ridge splitting with simultaneous implant placement will enhance implant stability in comparison with xenograft or not.

**Materials and Method:** sixteen patients were divided into 2 equal groups (Group I & Group II). Patients in both groups underwent surgical ridge splitting for narrow edentulous posterior mandibular ridge with simultaneous implant placement. In Group I, platelet rich fibrin used as a graft material around the implant in between buccal and lingual cortices. In Group II, Tutogen® xenograft used as a graft material around the implant in between buccal and lingual cortices.. Each patient was assessed for implant stability measured by Osstell™ by means of resonance frequency analysis (RFA) which is recorded as Implant Stability Quotient (ISQ) values first intraoperative then at intervals 3 months, 6 months and 9 months postoperatively. Moreover the bone relative density has been evaluated by cone beam computed tomography (CBCT) immediate postoperative and 6 months later.

**Results:** A higher mean value of ISQ was recorded in Group II than in Group I with no statistically significant difference ( $p=0.246$ ). In addition a higher mean value of bone density was recorded in Group I than in Group II with no statistically significant difference ( $p=0.601$ ).

**Conclusion:** Platelet rich fibrin could be used as grafting material from natural source, non-immunogenic, without xenopathy after ridge splitting in posterior mandibular region as a technique with time and cost saving with least morbidity.

**Keywords:** Platelet rich fibrin, xenograft, alveolar ridge splitting.

## Introduction

Bone loss presented as an ongoing process following tooth loss affecting the mandible four times more than the maxilla. Horizontal bone loss occurred faster and to

a greater extent than vertical bone loss, Deficiencies of alveolar bone constitute an obstacle for implant surgery in the oral and maxillofacial area, as a certain amount of supporting bone is necessary for dental implants.<sup>(1)</sup>

A variety of augmentation procedure as onlay bone grafts, horizontal guided bone regeneration, and ridge splitting techniques could be used which indicated mainly in cases with sufficient bone height but inadequate thickness. Use of ridge splitting technique allows implant placement simultaneously thereby treatment time is shortened.<sup>(2)</sup>

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Xenograft is a common graft material which has osteoconductive characteristics but lacks an osteogenic property. High survival and success rate of implant placed in xenograft is documented.<sup>(3)</sup>

Platelet-rich fibrin (PRF) is a second generation PRP and has an advantage of accelerating the healing of soft and hard tissue. The known significant role of platelets and leukocyte as biomaterial is synergized by fibrin matrix supporting them and harmony between cytokines and their supporting fibrin matrix give PRF unique importance than any other platelet derivative.<sup>(4)</sup>

The presented study is to compare between platelet rich fibrin application after ridge splitting with simultaneous implant placement and xenograft application in enhancement of implant stability by time.

## Materials and Method

### Materials:

**Group I:** Surgical ridge splitting was performed for narrow edentulous posterior mandibular ridge with immediate implant placement and use of platelet rich fibrin as a graft material around the implant in between buccal and lingual cortices.

**Group II:** Surgical ridge splitting was performed for narrow edentulous posterior mandibular ridge with immediate implant placement and use of Tutogen xenograft as a graft material around the implant in between buccal and lingual cortices.



**Fig. 1: Implant placement after ridge splitting.**

**Study Population:** 16 patients were selected suffering from mandibular posterior horizontal alveolar ridge deficiency with sufficient alveolar bone height and seeking for fixed prosthetic rehabilitation by implant placement. Full medical history had been recorded for every participant patient. Fabrication of study casts and radiographic stents was done also.

**Clinical Examination:** Careful examination of surrounding teeth, occlusion, soft tissue and bone was performed.

**Radiographic Examination:** Patients of both groups have been subjected to standard panoramic digital radiographs.

Implant stability has been measured in two planes perpendicular to each other: mesiodistal and buccolingual. The four readings summed and the average was considered. The readings have been recorded at intervals first intraoperative then 3 months, 6 months and 9 months postoperatively. The values were expressed as numbers between 1-100 ISQ.

Cone beam computed tomography (CBCT) was performed preoperatively for measuring the available bone width, length, inferior alveolar nerve tracing and bone density

## Results

All patients were females with average age group of 36 years (range 26-52 years).

**Clinical Results:** The early postoperative period for all patients went uneventful with no significant complications. All patients showed postoperative edema with variable degrees.

**Surgical Results:** In this study the following complications were encountered.

Numbness had occurred after ridge splitting and implant placement on one case in group I. The neurosensory testing was performed for this case by subjective patient assessment with visual analog scale for the follow up period. The patient reported gradual decrease in numbness sensation and reach normal sensation about 2 months after the surgery.

Seepage of implant down of its place in group II due to incomplete fracture of buccal cortical plate during ridge splitting.

**Implant Stability Assessment:** At 9 months a higher mean value of ISQ was recorded in xenograft II than in PRF group I with no statistically significant difference (p=0.246) Table (1).

**Bone Density:** Six months post-operative, a higher mean value of bone density was recorded in PRF group I than in xenograft group II with no statistically significant difference (p=0.601) Table (2).

**Table (1): Comparison of implant stability (ISQ) at 0, 3, 6 and 9 months.**

Group	Point of Comparison	0 months	3 months	6 months	9 months	Friedman Test (Effect of Time)
PRF	Mean	68.42	68.25	68.67	63.00	0.194ns
	Std. Error of Mean	4.38	6.51	6.59	6.02	
	Median	70.50	76.00	75.00	69.00	
	Std. Deviation	15.18	22.54	22.83	20.86	
	Range	56.00	84.00	85.00	77.00	
	Minimum	28.00	0.00	0.00	0.00	
	Maximum	84.00	84.00	85.00	77.00	
Xenograft	Mean	57.33 <sup>b</sup>	69.58 <sup>a</sup>	73.33 <sup>a</sup>	71.25 <sup>a</sup>	0.032*
	Std. Error of Mean	8.15	2.07	1.88	1.74	
	Median	65.00	69.00	74.00	71.00	
	Std. Deviation	28.23	7.18	6.53	6.02	
	Range	84.00	21.00	18.00	18.00	
	Minimum	0.00	60.00	65.00	62.00	
	Maximum	84.00	81.00	83.00	80.00	
Comparison between Groups	Mann-Whitney U	53.000	53.500	69.000	52.000	-----
	Wilcoxon W	131.000	131.500	147.000	130.000	
	P value	0.271ns	0.285ns	0.862ns	0.246ns	

Significance level p<0.05, \*significant, ns= non-significant.

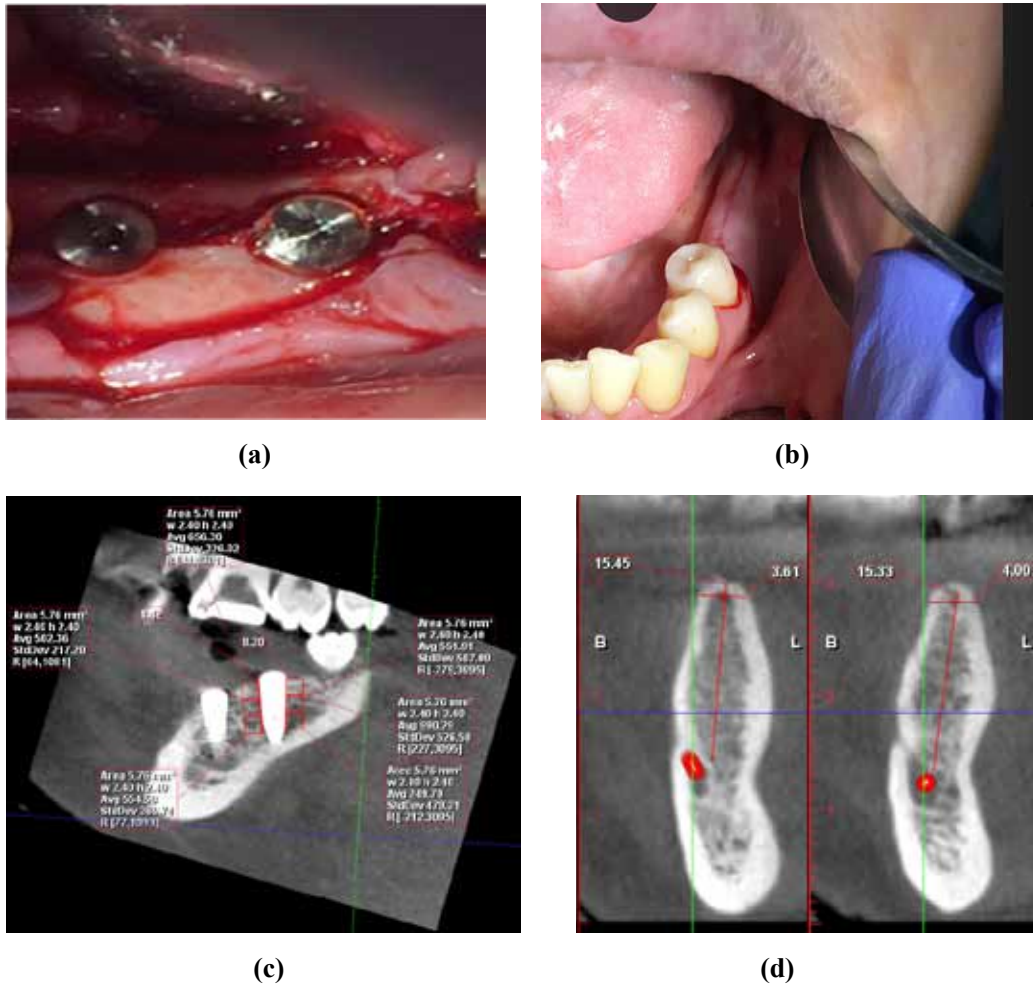
**Post hoc test: means sharing the same superscript letter are not significantly different:**

**Table (2): Comparison of bone density immediately and 6 months post-operatively.**

Groups		Immediate	Six months Post- operative	Wilcoxon signed rank test (effect of time)
PRF	Mean	616.92	838.00	0.004*
	Std. Error of Mean	43.81	33.03	
	Median	616.00	836.00	
	Std. Deviation	151.76	114.42	
	Range	505.00	309.00	
	Minimum	388.00	691.00	
	Maximum	893.00	1000.00	
	Mean	575.67	773.18	
Xenograft	Std. Error of Mean	50.84	66.46	0.009*
	Median	536.00	795.00	
	Std. Deviation	176.11	220.43	
	Range	581.00	730.00	
	Minimum	281.00	370.00	
	Maximum	862.00	1100.00	

Groups		Immediate	Six months Post- operative	Wilcoxon signed rank test (effect of time)
Comparison between groups	Mann-Whitney U	62.000	57.500	----
	Wilcoxon W	140.000	123.500	
	P value	0.564ns	0.601ns	

Significance level  $p < 0.05$ , \* significant, ns=non-significant.



**Fig. 2:(a) Preoperative clinical photo, (b) Intraoperative clinical photo, (c) Preoperative CBCT, (d) post-operative CBCT**

**Discussion**

In the present study 24 implants were inserted in 16 patients where ridge split technique was used for widening of horizontally deficient posterior mandibular alveolar ridge with immediate implant placement. Two different grafting techniques were used to fill the gap created after ridge splitting, and evaluation of implant stability over time was performed to compare between the used grafting materials.

All patients in both groups were subjected to surgical

operation of ridge splitting and immediate implant placement under local anesthesia without unpleasant experience for the patients.

However, Penarrocha et al reported that patients in his study expressed discomfort during the surgical procedure, because energy required to split and expand the ridge is dissipated throughout the maxillofacial region and he recommended that split procedure preferable be done under sedation or general anesthesia.<sup>(5)</sup>

The average ridge width in the present study



groups was 4mm this was according to Scipioni et al recommendation who suggested that wherever dental implants were placed, a minimal thickness of 1 to 1.5 mm of bone should remain on both the buccal and the lingual/palatal aspects of the implants. <sup>(6)</sup>

This also was in accordance with Simion et al who reported that ridge splitting technique was useful in managing narrow edentulous ridges for implant placement, and this technique was indicated when a standard osteotomy could not be created because of a crest width of 4 mm or less. <sup>(6)</sup>

In the present surgical technique after implant placement filling of the gap with either of the used materials was performed and the surgical site was tightly closed with intact mucoperiosteum. This was also advocated in an experimental study by Botticelli et al who studied healing that occurred adjacent to implants placed in recipient sites with a wide marginal defect and compared effects of bone grafting material and a collagen membrane, he concluded that if defects around implants were grafted or covered with collagen membranes, a higher percentage of bone to implant contact was obtained and marginal bone loss was avoided. <sup>(7)</sup>

This was also in a line with the conclusion of Han et al on his experimental study in dogs, who assessed the effects of bone grafting material and a collagen membrane after the ridge splitting technique and immediate implant placement and he reported that space created after ridge splitting could be filled with autologous/heterologous graft or application of platelets concentrates such as PRP or PRF that seemed to accelerate the healing of hard and soft tissues for higher success rate in ridge splitting technique with simultaneous implant placement. And also better for the prevention of marginal bone loss after ridge splitting procedures. And also he showed that the group which used no graft revealed a significantly lower percentage of bone to implant contact and most prominent marginal bone loss. <sup>(8)</sup>

However, this was in difference with Scipioni et al in his experimental study, where he evaluated healing at implants with and without primary bone contact and reported that gap created after ridge splitting could be filled with a blood clot, which in turn organizes and replaced with woven bone, and matured into load bearing lamellar bone at the implant interface. <sup>(9)</sup>

In the case which complained of numbness postoperatively the post-operative CBCT showed

approximation of placed implant to inferior alveolar nerve. This could explain numbness which had occurred, as ridge splitting maneuver was too near from mandibular canal and the dental implant was too close to the mandibular canal with subsequent formation of an adjacent hematoma that pressed against the nerve causing IAN compression. This was as reported by Khawaja and Renton that “cracking” of the IAN canal roof by its close proximity to preparation of the implant bed (millimetres) may cause haemorrhage into the canal or deposition of debris which may compress and cause ischemia of the nerve. <sup>(10)</sup>

Sohn et al reported that unwanted fracture of buccal cortical plate occurred in five patients among the 23 patients who underwent immediate lateral ridge expansion. <sup>(11)</sup> This goes in accordance with the case which encountered fracture of buccal cortical plate in this study.

The same complications were reported by Elian et al who reported that mandibles were at risk of malfracture in the osteomized segment because the mandibular bone had less flexibility and a thicker cortical plate during ridge expansion with simultaneous implant placement. <sup>(12)</sup>

In the current research results of implant stability after nine months revealed higher mean values in xenograft group. However the mean values of density, immediately post operatively, were higher in PRF group six months post operatively.

It could be elicited from results of this study that no correlation between the bone density values obtained by CBCT and implant stability. This is in a line with several studies such as the clinical study made by Roze et al who inserted twenty two implants into the maxillae and mandibles of human cadavers, and no correlations were found between (ISQ) values and bone density. Also, similar findings were documented in the clinical study by Huwiler et al on resonance frequency analysis in relation to jawbone characteristics. He reported that no relation was found between bone density and values of implant stability. <sup>(13,14)</sup>

In other hand, this could be possibly explained as PRF composed of densely thick fibrin networks with densely packed activated platelets meshed among the fibrins which act as natural matrix scaffold for the recruitment and attachment of tissue cells and also inducement of angiogenesis and also provide sustain release of growth factors into the wound area as reported by Dohan et al. <sup>(4)</sup>

Therefore the slow and continuous release of growth factors and the good characteristics of fibrin structure are the two essential factors to initiate and enhance bone regeneration in any condition even in the empty defect, so PRF alone could bridge the bone defects Kazakos et al. which accelerate new bone formation. However, xenograft undergo slow resorption as documented by clinical biopsies in another study Hallman et al. which in turn led to slow substitution of the newly formed bone. The slow resorption rate of xenograft provide extended stability and that could explain the higher implant stability in xenograft group.<sup>(16,17)</sup>

Based on the fore mentioned results, we can use the advantages of PRF being simple, natural inexpensive, affordable and easy prepared biomaterial as a favorable matrix for the development of a coherent healing without inflammatory excess for bone healing stimulation. Moreover this may overcome drawbacks of xenograft such as risk of cross contamination with bovine spongiform encephalopathy, its immunogenicity, financial ramifications and patient specific consent considerations based on religious, social issues associated with biologic tissues.

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# The Influence of Age, Work Period, Distance of Residence, and Midwife's Intention to Behavior in Recording and Reporting Routine Immunization

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## Abstract

One of the most critical issues in immunization recording and reporting is the validity of immunization coverage data, so the quality of immunization recording and reporting has a vital role in producing quality immunization coverage. The over report immunization report data is evidence that midwives are not compliant in carrying out recording and reporting. The behavior of midwives in carrying out routine immunization recording and reporting can be determined by intention or intention and several other factors. The purpose of this study was to analyze the influence of age, work period, distance of residence, and midwife's intentions on the behavior of implementing routine immunization recording and reporting. This research method included observational research with a cross-sectional design with primary data through interviews using a questionnaire that was read to midwives (n=110) and document studies using the Rapid Convenience Assessment (RCA) form in the community. The results showed that the behavior of midwives in carrying out routine immunization recording and reporting was influenced by the work period (p=0.011) and intention (p=0.031). Conclusion: There is a significant relationship between the length of work and the intention of the midwife towards the behavior of implementing routine immunization recording and reporting.

**Keywords:** *Recording and Reporting Routine Immunization, Midwives, and Behavior.*

## Introduction

WHO data in 2014 showed a significant decrease in mortality in children under five years old. This can be seen from the number of child deaths under five years in 1990 (12.6 million children) and 2013 (6.3 million children). The target of child mortality below five years in 2015 is estimated at two-thirds between 1990 and 2015, so it can be said to be still relatively high<sup>1</sup>. According to the Ministry of Health of the Republic of

Indonesia in 2015 the provision of immunization is one of the most effective efforts in reducing child mortality. Immunization should be able to reduce child mortality due to PD3I through increased coverage of complete immunization. However, in reality, around 22 million babies in the world do not get complete immunization and 9.5 million are in South East Asia, including children in Indonesia<sup>2</sup>. Based on the Indonesian Health Profile the success of the immunization program in infants aged 0-11 months is measured through indicators of complete primary immunization. The achievement of this indicator in Indonesia in 2015 was 86.24%. This figure has not yet reached the 2015 Strategic Plan target of 91%<sup>3</sup>.

East Java Province is a contributor to the highest number of cases of Extraordinary Events in Indonesia, such as Diphtheria outbreaks that occurred in 2011, 2012, and 2017. One of the factors causing the high number of Diphtheria cases in East Java in 2017 is a

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decrease in the number of babies age from 11 to 11 months which is not fully immunized basic in the last two years. The highest number of positive diphtheria cases were in Sampang Regency, ten positive cases, Pasuruan Regency 7 positive cases and Tuban Regency 3 positive cases<sup>4</sup>. It illustrates the problem, even though the achievement of complete primary immunization in 2016 in the Sampang Regency has reached the national target of 91.68%, but the number of diphtheria cases in the Sampang Regency remains high.

Various things can cause the low behavior of midwives in carrying out routine immunization recording and reporting. Research by Hargono et al. In 2012 states that one of the causes of the emergence of diseases that can be prevented by immunization is the low quality of recording and reporting of immunization programs. One of the most critical issues is the validity of immunization coverage data, so the quality of immunization recording and reporting has a vital role in producing quality immunization coverage<sup>5</sup>. The over report immunization report data is evidence that midwives are not compliant in carrying out routine immunization recording and reporting. The most important determining factor in someone's behavior is the intention or intention (intention). According to Ajzen (1991), individual behavior is strongly influenced by the individual's own intention (behavioral intention) towards certain behaviors<sup>6</sup>.

This study aims to analyze the influence of age, work period, distance of residence, and intention of midwives on the behavior of implementing routine immunization recording and reporting.

## Materials and Method

This cross-sectional study is a research carried out at a time and is not limited to when it has been completed<sup>7</sup>. This study was conducted to determine the effect of age, work period, distance of residence, and intention of midwives on the behavior of implementing routine

immunization recording and reporting. This research was conducted in 21 Puskesmas in Sampang Regency.

In this study the sample is a midwife who has inclusion criteria which have worked for at least two years in the area, legally has a Registration Certificate and Work Permit there is no Independent Practice Midwife in her work area, and is willing to be a sample in this study voluntarily.

The sampling technique used in this study is proportionate stratified random sampling. Based on sample calculations, a minimum sample of 110 midwives was obtained. In this study the dependent variable is behavior and the independent variables are age, work period, residence, and intention.

Data collection techniques in this study were data collection in the field carried out using a questionnaire that was read to the midwife by visiting 'polindes,' or while attending the 'Posyandu' toddlers activities after that, a document study was conducted using the RCA form by comparing immunization records recorded in the MCH book owned by the community with recording immunization in a baby cohort book owned by a midwife.

Analysis of the data used logistic regression with the backward method to find out whether there is a relationship between the two variables studied. The significance test is done by comparing the significance value obtained with  $\alpha$ ; if  $p < \alpha$  ( $\alpha = 0.05$ ) there is a significant relationship.

## Results

Table 1 shows that respondents with age less than 30 years do not record and report routine immunizations in their cohort book following the community's MCH handbook. Statistical test results showed no significant effect between the age variables of midwives on the behavior in carrying out routine immunization recording and reporting.

**Table 1. Influence of midwife age on behavior**

Age	Behavior				Total (N = 110)		P-value
	Following the MCH Handbook		Not following the MCH Handbook		N	%	
	N	%	N	%			
<30 years	0	0,0	4	100	4	100	0.280
30 – 45 years	6	6,7	83	93.3	89	100	
>45 years	2	11.8	15	88.2	17	100	
<b>Total</b>	<b>8</b>	<b>7.3</b>	<b>102</b>	<b>92.7</b>	<b>110</b>	<b>100</b>	

**Table 2. Influence of midwives’ work period on behavior**

Work Period	Behavior				Total (N = 110)		P-value
	Following the MCH Handbook		Not following the MCH Handbook				
	N	%	N	%	N	%	
<6years	0	0,0	7	100	7	100	0.011
6 –10years	3	7.7	36	92.3	39	100	
>10 years	5	7.8	59	92.2	64	100	
<b>Total</b>	<b>8</b>	<b>7.3</b>	<b>102</b>	<b>92.7</b>	<b>110</b>	<b>100</b>	

Table 2 shows that respondents whose work period is <6 years do not record and report routine immunizations in their cohort book following the community’s MCH handbook. It supported by the results of statistical tests

showing a significant effect between the variable work period of midwives on the behavior in carrying out recording and reporting routine immunizations.

**Table 3. Influence of distance of residence midwives on behavior**

Distance of Residence	Behavior				Total (N = 110)		P-value
	Following the MCH Handbook		Not following the MCH Handbook				
	N	%	N	%	N	%	
0-2 km	8	10.7	67	89.3	75	100	0.996
2-4 km	0	0.0	11	100	11	100	
4-6 km	0	0.0	9	100	9	100	
6-8 km	0	0.0	7	100	7	100	
>8 km	0	0.0	8	100	8	100	
<b>Total</b>	<b>8</b>	<b>7.3</b>	<b>102</b>	<b>92.7</b>	<b>110</b>	<b>100</b>	

Based on table 3, respondents with a place to live (distance) more than two km all record and report routine immunizations in their cohort book following the community’s MCH handbook. Statistical test results

that showed no significant effect between the distance variables of the midwife’s residence to the behavior in implementing routine immunization recording and reporting.

**Table 4. Influence of Midwives’ Intention on Behavior**

Intention	Behavior				Total (N = 110)		P-value
	Following the MCH Handbook		Not following the MCH Handbook				
	N	%	N	%	N	%	
Lemah	1	12.5	7	87.5	8	100	0.031
Kuat	7	6.9	95	93.1	102	100	
<b>Total</b>	<b>8</b>	<b>7.3</b>	<b>102</b>	<b>92.7</b>	<b>110</b>	<b>100</b>	

Based on table 4, respondents who have strong intentions mostly record and report routine immunizations in their cohort books that are following the community's MCH handbook. Statistical test results show a significant effect between the intention variables of midwives on the behavior in recording and reporting routine immunizations.

## Discussion

The results showed that the length of the service variable had a significant effect on the behavior variable because officers with long working periods already have much experience and understand the impact if they do not do routine immunization recording and reporting on time and there is a high potential for errors which will result in an Extraordinary Event of immunization and others which are then implemented in the form of behavior by recording on time and following established procedures. The results of this study are not in line with the results of Nuraini's research in 2018, saying that the village midwife's tenure does not affect the intention of achieving the program<sup>8</sup>.

Behavior is an action. Attitudes toward actions are related to their impacts, values related to actions, ethics and traditions<sup>9</sup>. Behavior (behavior) is done because individuals have the interest or desire to do so<sup>10</sup>. It is in line with the results of Agus Suprpto's research in 2016 which states that the variable of the length of service and employment status both individually and together have an influence on midwife behavior in providing antenatal services with  $p$  values  $<0.05$ <sup>11</sup>.

The results of this study indicate that the majority of respondents intend to carry out recording and reporting of routine immunization programs following established standards. While the results of the logistic regression analysis of the intention variable affect the behavior variable of midwives, it is in line with the theory proposed by Ajzen in 2005, that intention will positively influence the implementation of a behavior. Where the higher or increasing one's intention will affect the implementation of behavior<sup>12</sup>.

The results of this study are also following the opinion that states the intention to perform a behavior is a person's tendency to choose to do or not do an action. Intentions are also determined by the extent to which individuals have positive attitudes towards certain behaviors and the extent to which a person chooses to do certain behaviors has the support of people who are

influential in his life, and individuals can overcome perceived behavioral control. The implementation of recording and reporting routine immunizations carried out by midwives begins with the intention or desire to do so but due to the lack of a sustainable monitoring system and the commitment of the leadership.

A person's actions can be determined from his intention so that the intention of the midwife very much determines the decision to record and report routine immunization programs in accordance with the standards. The intention according to Fishbein and Ajzen in 1975, is a probability or possibility that is subjective, namely someone's estimate of how likely it is to do something<sup>13</sup>.

## Conclusion

There is a significant influence between the work period and the intention of the midwife on the behavior of implementing routine immunization recording and reporting. Actions to record and report routine over-reporting immunizations are not only preceded by an intention or desire to record and report routine immunizations that are not following procedures, but also because of an unsustainable monitoring system from the leadership. As a suggestion, it is essential to pay attention to the factors and intention and behavior of midwives in recording and reporting routine immunizations. The Head of the Puskesmas must conduct a quality integrated monitoring and evaluation system as a behavioral control for midwives in carrying out routine immunization recording and reporting.

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# Decreasing Blood Sugar Levels Through Modification of Diabetes Exercise and Peer Group Support

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## Abstract

**Background:** The efforts to handle patients with type 2 diabetes mellitus need to consider both the physical and psychological aspects. A physical activity that can be done is diabetes exercise. To do this exercise regularly.

**Purpose:** This study aims to analyze the effect of modified diabetes exercise and peer group support in decreasing blood sugar levels in patients with type 2 diabetes mellitus.

**Method:** This study used a quasi-experimental design with a pre-test and post-test with 38 respondents, which consisted of 19 respondents for the intervention group and 19 respondents for the control group. They were selected by purposive sampling. Data was collected using aglucometer, observation sheets with a Standard Operating Procedure (SOP).

**Results:** The results of the paired t test showed decreasing blood sugar levels after modified diabetes exercise and peer group support in the intervention group with p value as much as  $0.001 < 0.05$ . Meanwhile, in the control group there was no decrease in blood sugar levels, with results of the paired t test with p value of  $0.453 > 0.05$ .

**Conclusion:** To control blood sugar levels through modified diabetes exercise and peer group support.

**Keywords:** *Diabetes Mellitus, Diabetes Exercise, Peer Group Support, Blood Sugar Levels.*

## Introduction

Diabetes mellitus is the inability of the body to metabolize carbohydrates, fats and proteins which leads to hyperglycemia (high blood glucose levels) which is a progressive chronic disease<sup>1</sup>. According to WHO data the number of diabetes mellitus cases in 2015 was 415 million. In 2040, it is estimated that the number will be 642 million. The prevalence of Diabetes Mellitus based on a doctor's diagnosis in residents aged  $\geq 15$  years old in South Sulawesi, Indonesia in 2013 was 1.6% and increased to 1.7% in 2018 which showed a 0.1% increase based on a doctor's diagnosis<sup>2</sup>. Based on this, blood sugar level problems need to be addressed.

Diabetes mellitus can be managed non-pharmacologically through meals' planning and physical

activities. There are 4 main pillars in the management of diabetes mellitus, namely meal planning, physical exercise, hypoglycemic efficacy drugs and counseling<sup>3</sup>. A physical activity that diabetics can do is diabetes exercise.

Diabetes exercise is a way to reduce blood glucose levels in people with diabetes mellitus, because during physical exercise such as diabetes exercise increases blood flow, making more insulin receptors available. This increase is caused by more capillary nets opening, and receptors becoming active that will decrease blood glucose levels in patients with type 2 diabetes mellitus<sup>4</sup>. Sharoh & Salmiyati (2019) stated that diabetes exercise influenced blood sugar levels in patients with type 2 diabetes mellitus. 10 out of 12 participants in their

intervention group experienced lower blood sugar levels compared to 2 participants who experienced increased blood sugar level after diabetes exercise<sup>5</sup>.

People with diabetes mellitus are affected by various psychological factors such as motivation, habits, goals and awareness when they undergo either pharmacological and/or non-pharmacological treatments. One way to make patients more enthusiastic to receive either treatment is getting social support from partners, families, as well as health workers and communities with diabetes mellitus.

Patients with diabetes mellitus can get support and assistance from various sources, one of them is peer group<sup>6</sup>. Peer group support provides an opportunity for people with the same painful experience to share knowledge and experience with others that cannot be obtained from health workers or family<sup>7</sup>. Doing activities together can increase motivation and foster interests and attitudes in managing diabetes, one activity being through physical exercise/diabetes exercise. Patients with type 2 diabetes mellitus may feel compelled to exercise because they are connected to social groups that are ready to listen to their complaints and share strategies to solve problems related to the illness<sup>8</sup>.

Aty (2014) researched the aerobic capacity of respondents that exercised less than 3 times/week for less than 30 minutes before peer group support. With peer group support the aerobic capacity of the majority of respondents increased. The respondents exercised between 4-6 times/week for 45-60 minutes<sup>9</sup>. This study tries to analyze the effect of modifying diabetes exercise and peer group support on decreasing blood sugar levels in patients with type 2 diabetes mellitus.

**Method**

This research used a quasi-experimental design with a pre-test and post-test with 38 respondents, with consisted of 19 respondents for the intervention group and 19 respondents for the control group which were selected using purposive sampling. The data was collected using a glucometer and observation.

The researchers used observation sheets for both the intervention group and the control group. The researchers measured blood sugar levels using a glucometer. The intervention group participated in physical exercise/diabetes exercise followed by peer group support for approximately 2 hours for 3 consecutive days. Their blood sugar levels were measured post-intervention (15 minutes after intervention).

The data was analyzed to determine the effect of modifying diabetes exercise with peer group support on decreasing blood sugar levels usingpaired t test with p <0.05.

**Results**

**Table 1. Characteristics of Frequency Distribution DM Type 2**

Variables	(n)	(%)
<b>Age</b>		
≤ 50	13	34.2
51 – 53	5	13.2
54 – 56	12	31.6
>57	8	21.1
<b>Gender</b>		
Male	7	18.4
Female	31	81.6
<b>Education</b>		
Low Education	30	78.9
Middle Education	6	15.8
High Education	2	5.3
<b>The Use of Oral Hypoglycemic Medicine</b>		
Consuming	13	34.2
Not Consuming	25	65.8
<b>Obedience to Taking Medicine</b>		
Low Obedience	7	53.8
High Obedience	3	23.1
Middle Obedience	3	23.1

Table 1 shows the characteristics of the respondents. 34.2% were less than 50 years old, 81.6% were women and in term of education, 78.9% had poor education. 65.8% did not consume oral hypoglycemic medicine, and for the ones who consumed medication, 53.8%had low obedience in term of taking medication.

**Table 2. Effect of Modifying Diabetes Exercise and Peer Group Support on Decreasing Blood Sugar Levels**

Variable of Blood Sugar Levels	Pre Intervention		Post Intervention		pvalue
	Mean	SD	Mean	SD	
Group of diabetes exercise modification and peer group support	284.4	99.8	239.8	94.7	0;001
Group of control	231.2	62.2	238.4	60.7	0.453

There were differences in blood sugar levels before and after intervention by modifying diabetes exercises and peer group support the paired t test results with p value (0.001).

## Discussion

The decrease in blood sugar levels after intervention via diabetes exercise and peer group support was caused by the respondents' motivations to take part in the exercises with peer group support. Bandura's social learning theory (2004) explained these results; the theory stated that if someone wants to act there must be motivation and encouragement from the environment. Here the motivation came from peers with the same disease<sup>10</sup>.

The difficulty of motivating respondents to participate in diabetes exercise was overcome by peer group support. Peer group activities affect both the group and individuals in the group. This is in accordance with Sarason (1994) who stated that the strategies to improve obedience include the support of health professionals, social support, health behaviors, and provision of information<sup>11</sup>.

Peer group members can share, exchange ideas, listen to suggestions or experiences from others and discuss various points of views. This helps them to understand each other's feelings, especially those who are struggling with the same problems, with similar emotions, and the same thoughts regarding the disease. Peer groups help the participants to increase their self-esteem and respect for each other. Peer groups encourage members to be more open to express their problems, it is a more practical and comfortable place to give and receive emotional support and can be an effective place to exchange information<sup>8</sup>.

The results of this research are supported by other research<sup>12</sup>. The research stated that patients who had peer group support achieved a more significant decrease in blood sugar levels due to increased knowledge related to insulin use and increased self-management abilities. Kusnanto (2009) stated that there was a significant difference between the treatment group and the control group that showed the influence of peer group support to increase exercise obedience in people with diabetes mellitus<sup>8</sup>. Yin et al. (2015) stated that diabetes mellitus patients with peer group support were better in terms of self-management and also more regularly checked their blood sugar levels over a period of 4 years<sup>13</sup>.

Peer groups make clients feel that they have a group that is ready to listen to complaints, and remind them to exercise regularly<sup>8</sup>. Feeling well and regular exercise help to increase blood flow to the muscles by opening the capillaries of small blood vessels to the muscles. Physical activity can control blood sugar levels since glucose will be converted into energy. Physical activity increases the production of insulin, which decreases blood sugar levels. People who lack exercise have difficulty to burn food that remains in the body as fat and sugar. If insulin is insufficient to convert glucose into energy, this may cause type 2 diabetes mellitus<sup>14</sup>.

This result is in line with Yulianto's (2015) research that showed decrease in blood sugar levels in the intervention group<sup>15</sup>. Hastuti W, Sonhaji, Abdillah Y (2017) stated that diabetes exercise had an effect on blood sugar levels in patients with type 2 diabetes mellitus<sup>16</sup>. Nugraha et al. (2016) showed that there were differences in blood sugar levels before and after diabetes exercise<sup>17</sup>.

## Conclusion

Blood sugar levels can be controlled by paying attention to physical and psychological aspects. The intervention group that implemented modification of diabetes exercise and peer group support showed decreasing blood sugar levels compared to the control group. There was a significant difference between blood sugar levels in the intervention group and the control group.

**Recommendation:** Modification of diabetes exercise and peer group support can be used as a non-pharmacological therapy in an effort to reduce blood sugar levels in patients with type 2 diabetes mellitus.

**Relevance of the Research:** This study highlighted the problem faced by diabetes mellitus patients of lack of motivation to exercise. Hence the modification of diabetes exercise and peer group support can increase their motivation to join diabetes mellitus handling programs.

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# Pre-Marriage Course Regarding Health Reproductive: Knowledge and Attitude of Bride and Groom Candidate in Preparing Health Status before Pregnant in Grobogan Regency

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## Abstract

**Background:** Maternal mortality, children mortality, stunting, and other health problems are still high in the world. One strategic to prevent this problem is to increase health knowledge in preparing for pregnancy to brides and grooms candidate. The aim of the study was to analyze differences in knowledge and attitudes of the brides and grooms candidate related to reproductive health before and after being given an intervention in Grobogan Regency.

**Method:** The quasi-experimental research with one group pre and posttest design was used to analyzed 31 bridegrooms as subject in the area of Grobogan Regency. The bridegrooms were given an intervention in the form of one-day pre-marriage course for 6-7 hours, wich is given by KUA officers (Office of Religious Affairs) and Health Service officers who have been trained. Knowledge and attitude were measured before and after a given intervention using a structured questionnaire and data gathered were analyzed using Wilcoxon Signed Rank Test.

**Result:** The results showed there was an effect of pre-marriage course intervention on knowledge ( $p=0.001$ ) but does not have a significant effect on the attitude of the bride and groom ( $p=0.209$ ).

**Conclusion:** One-day pre-marriage course can increase knowledge the brides and grooms candidate while the attitude doesn't.

**Keyword:** Knowledge, attitude, bride and groom candidate, pre-marriage course.

## Introduction

One of the development agendas of National Midterm Development Plan of Indonesia (RJPMN) 2020 - 2024 is to improve the quality and competitiveness of

human resources. Among the targeted development in 2015 – 2019 is the decreased prevalence of stunting (short and very short) of toddlers from 37.2% (2013) to 30.8% (2018), yet the anemia prevalence in pregnant women increased from 37.1% (2013) to 48.95% (2018) according to Indonesian Basic Health Research<sup>(1)</sup>. In fact, one of the policy guidelines listed in National Midterm Development Plan of Indonesia (RPJMN) 2020 - 2024 is the improved health of mother and child, family planning, and reproductive health, all of which include improving nutrition of adolescent girls and pregnant women, expanding access and quality services of family planning and reproductive health according to regional characteristics by optimizing the roles of private sectors and local governments through advocating information,

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education, communication (IEC) and counseling on population control, family planning and reproductive health, as well as increasing knowledge and access to health reproductive services for adolescent in a gender responsive cross-sector.<sup>(2)</sup>

According to Indonesian Demographic and Health Survey (SDKI) in 2012, maternal mortality rate (MMR) was relatively high; 359 per 100,000 live births. The higher number of the MMR suggests that the quality of the reproductive health and the ability to develop human resources of a country is still low.<sup>(3)</sup> Ministry of Health Republic of Indonesia, 2017). In this case, Indonesia is dealing with many problems and challenges in relation to providing reproductive health services and fulfilling reproductive rights, as the MMR, 305 per 100,000 live births, and the infant mortality rate (IMR), 22.23 per 1000 live births, are relatively high while the health status of women and children is still low.<sup>(4)</sup>

According to Indonesian Basic Health Research (Riskesmas) 2018, 30.8% of infants suffer from stunting, 36.3% of women aged 15-19 years and 17.3% of pregnant women suffer from chronic energy deficiency. Meanwhile, anemia in adolescent girls aged 13-18 years, pregnant women, and women of childbearing aged 15-49 remains to be the health problem in the community; besides, teenaged marriage and pregnancy are still relatively high. (1) Furthermore, SDKI 2017 reported that 10.5% of women aged 15-19 are married, 7% of women under 20 have become mothers or are pregnant for their first child, and teen pregnancy rate aged 15-19 years is 36 per 1,000 pregnancies. Apart from these problems, infectious and non-communicable diseases being considered as a special concern in the reproductive age group, especially women, are tuberculosis, hypertension, diabetes mellitus, and IMS including HIV AIDS.<sup>(5)</sup>

The higher number of the Maternal Mortality Rate (MMR) and all problems involved might be caused by lack of reproductive health education. As a matter of fact, reproductive health education has existed in various programs; such as, Youth Care Health Services (PKPR) program that contributes to knowledge, attitudes, and activities in maintaining reproductive health in Buleleng District.<sup>(6)</sup>

Moreover, young couples need sufficient information about various aspects of reproductive health early in their married life. For example, information about high-risk pregnancies the importance of family planning method

as well as the selection of appropriate method to prevent pregnancy in the early years of married life the use of genetic counseling to prevent genetic diseases are the main health problems in the early years of married life. Therefore, conducting pre-marriage counseling classes by experts is one of the important health services. The counseling program helps couples to get information about reproductive health issues and build their marriage on the right basis.<sup>(7)</sup>

In 2015, Ansah, *et al* pointed out that attending pre-marital counseling classes reduced risks of marital failure.<sup>(8)</sup> Couples attending counseling classes dealt with lower risks of marital problems and have a better marriage (In 2017, Parhizgar, *et al* found that premarital counseling increased marital satisfaction.<sup>(9)</sup> Therefore, an innovative premarital course is a form of a strategic intervention that has a significant influence to increase knowledge and attitudes of the bridegroom in order to reduce MMR, CMR, stunting, and other health problems.

Given this explanation the aim of this study was to analyze the differences in knowledge and attitudes of the bride and groom related to reproductive health before and after being given an intervention in Grobogan Regency.

## Method

This study applied a pre and posttest quasi-experimental research design in one group. The pre-marriage course discussing reproductive health as the intervention was conducted in one day for 6-7 hours at Office of Religious Affairs (KUA). The variables of knowledge and attitude of the subjects were measured before and after intervention using a structured questionnaire.

The sample was 31 bridegrooms of both the brides and the grooms registered at the Religious Affairs Office (KUA) in Grobogan Regency in January-July 2019. Samples were selected following the inclusion criteria, based on which the brides and the grooms were in the working area of the community health center (Puskesmas) of Grobogan District from January to July 2019 and willing to be the respondents. Data were collected by interviews using a set of questionnaire that its validity and reliability had been tested. Bivariate data analysis in this study was Wilcoxon Signed Rank-Test. Subjects' participation was voluntary proven by signing of informed consent.

## Results and Discussion

The characteristic of the sample, bridegrooms registered at KUA Grobogan Regency in January - July 2019, is presented in table 1. Most respondents are male (61.3%) the age of the bride and groom is in between 21 and 35 years (80.4%) the last education of the couples is junior high (35.5%), and the job of the bride and groom is mostly private sectors (54.5%).

**Table 1. Characteristics of respondents**

Characteristic	Newlyweds	
	n	%
Gender		
Female	12	38.7
Male	19	61.3
Age		
< 20 years	5	16.4
20 – 35 years	25	80.4
>35 years	0	0.0
Did not answer	1	3.2
Last Education		
No School	1	3.2
Elementary	2	6.5
Middle School	11	35.5
High School	10	32.3
University	5	16.1
Did not answer	2	6.5
Occupation		
Teacher	1	3.2
Nurse	1	3.2
Private Sector	17	54.8
Farmer	0	0.0
Entrepreneur	8	25.8
Does work	1	3.2
Did not answer	2	6.5

### Differences in Knowledge and Attitudes before and After the Intervention:

**1. Knowledge:** The Wilcoxon test showed that there was no significant differences in knowledge between before and after the intervention on premarital activities ( $p = 0.191$ ), while there were significant differences in knowledge between before and after the intervention on pregnancy planning ( $p = 0.001$ ), infant nutrition ( $p = 0.007$ ), disease prevention ( $p = 0.002$ ), and there was significant difference in knowledge between before and after the intervention on the total score of knowledge ( $p = 0.001$ ).

**Table 2. Difference Scores of Knowledge Regarding Premarital Activities, Pregnancy Planning, Infant Nutrition, Disease Prevention, and Total Knowledge Before and After Intervention of Newlyweds**

Knowledge	Newlyweds	
	Mean ± SD	Min-Max
<b>Premarital Activities</b>		
Pre test	3.03±1.16	0-4
Post test	3.41±1.32	0-4
p value	0.191 <sup>a</sup>	
<b>Pregnancy Planning</b>		
Pre test	13.42±3.20	3-18
Post test	15.87±3.22	6-18
p value	0.001 <sup>a</sup>	
<b>Infant Nutrition</b>		
Pre test	4.06±1.09	1-5
Post test	4.74±0.51	3-5
p value	0.007 <sup>a</sup>	
<b>Disease Prevention</b>		
Pre test	2.77±1.14	0-4
Post test	3.70±0.90	1-4
p value	0.002 <sup>a</sup>	
<b>Total Knowledge</b>		
Pre test	23.77±4.11	14-31
Post test	27.74±5.02	16-31
p value	0.001 <sup>a</sup>	

a = Wilcoxon Test

Table 2 shows that there is a significant increase in the knowledge score of the bridegroom, especially regarding pregnancy planning, infant nutrition, disease prevention and the total score of knowledge.

**2. Attitude:** The result of the normality test of the newlyweds showed significance value of 0.001 for the pretest and of 0.002 for the post test; thus, it could be concluded that the value was not normally distributed for both before (pretest) and after (posttest) intervention.

Table 3 presents the results of different test between pre-test and post-test of attitudes using Wilcoxon test. The result showed that there was no significant differences in attitude between before and after the intervention on premarital activities ( $p = 0.133$ ), pregnancy planning ( $p = 0.076$ ), infant nutrition ( $p = 0.594$ ), disease prevention ( $p = 0.298$ ), and there was no significant difference in the total score of the attitude ( $p = 0.209$ ).

**Table 3. Difference Scores in Attitude Regarding Premarital Activities, Pregnancy Planning, Infant Nutrition, Disease Prevention, and Total Attitudes Before and After Intervention of Newlyweds**

Attitude	Newlyweds	
	Mean±SD	Min-Max
<b>Premarital Activities</b>		
Pre test	10.65±2.44	2-14
Post test	11.54±2.12	8-14
p value	0.133 <sup>a</sup>	
<b>Pregnancy Planning</b>		
Pre test	9.87±3.01	1-14
Post test	11.03±2.41	6-14
p value	0.076 <sup>a</sup>	
<b>Mother and Infant Nutrition</b>		
Pre test	3.94±0.77	1-5
Post test	3.80±0.90	2-5
p value	0.594 <sup>a</sup>	
<b>Disease Prevention</b>		
Pre test	2.65±0.87	1-4
Post test	2.87±0.76	2-4
p value	0.298 <sup>a</sup>	
<b>Total Attitudes</b>		
Pre test	27.39±5.11	12-35
Post test	29.25±5.11	21-37
p value	0.209 <sup>a</sup>	

a = Wilcoxon Test

### Discussion

**1. Knowledge:** Bivariate analysis showed that there were significant differences in knowledge regarding pregnancy planning, infant nutrition, disease prevention, and total knowledge of the newlyweds before and after pre-marriage guidance intervention regarding reproductive health. However, statistical analysis showed that there was no significant difference in knowledge regarding premarital activities for newlyweds before and after intervention ( $p > 0.05$ ), meaning that the knowledge of the newlyweds increased after being treated with an intervention.

This result was in line with the one stated that premarital education/course can increase knowledge related to reproductive health<sup>(7,10,11)</sup>. As the knowledge of the respondents about pregnancy planning and infant nutrition increased the future generation would be expected to be having high quality considering the quality of health during 1000 First Day of Life is the

key to achieve optimal nutritional status in the next life cycle.<sup>(2)</sup>

The result of this study showed that the average score of knowledge increased by 4 points before and after the intervention. The knowledge of the bridegrooms was categorized into premarital activities, pregnancy planning, maternal and infant nutrition, and disease prevention. Researchers believed that premarital counseling has a significant influence on reproductive health and sexual health behaviors for adolescent/bridegrooms.<sup>(12-14)</sup>

**2. Attitude:** Statistical analysis showed that there was no significant relationship in the attitude of the bride and groom before and after the intervention, while the average score of the total attitudes did not increase significantly. Most respondents had a positive attitude (agree) regarding premarital activities, pregnancy planning, maternal and infant nutrition, and disease prevention. This finding was not in line with one of the research conducted on newlyweds in Brebes district concluded that there was a significant difference in attitude before and after the intervention was given.<sup>(15)</sup>

The low impact of the premarital counseling classes was caused by, among others, mixed participants in the training class, limited number of experts to review the educational content, inadequacy of time for question and answer, and speech emphasizing process as a method of education/one-way communication. Therefore, it is recommended that in addition to conducting counseling classes, more attention is given to class disaggregation by gender, using group discussion method, and educational films for active participation of the couples.<sup>(7)</sup>

### Conclusion

Premarital course interventions significantly affects the increased knowledge of both the bride and groom, but it does not have a significant effect on the attitude of the bride and groom. Further the increased knowledge of the bride and groom is expected to reduce indirectly the maternal and child mortality rates and improve the quality of the family health.

**Conflict of Interest:** The authors hereby declare that they have no conflict of interest within this research.

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# Correlation between 25-Hydroxyvitamin D Serum Levels with Telomere Length in Premenopausal Minangkabau Ethnicity Women

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## Abstract

**Background:** Aging is associated with an increased prevalence of non-communicable diseases. Premenopause is a phase in aging characterized by reducing the biological functions of cells. Aging can be measured by cell biomarker, namely telomeres. Telomere length can be influenced by various factors including vitamin D. Vitamin D acts as an anti-proliferation and anti-inflammatory cell. This study aimed to examine the relationship between 25-hydroxy vitamin D serum levels with telomere length of Minangkabau premenopausal women in Padang city.

**Method:** This cross-sectional study was recruited ninety-three Minangkabau premenopausal women in Padang city. The recruitment subject was using a multistage random sampling technique. 25-hydroxy vitamin D serum levels were measured by the ELISA method. Telomeres length was measured by qPCR using O'Challagan & Fennech method. The analysis was carried out by univariate and bivariate with Pearson correlation.

**Results:** The average serum 25-hydroxy vitamin D levels were  $27.79 \pm 1.38$  ng/ml. The average telomere length was  $474.13 \pm 2.02$  bp. There was a correlation between 25-hydroxy vitamin D serum levels with telomere length ( $r = 0.267$ ,  $p = 0.01$ ).

**Conclusion:** This study concluded that there was a correlation between 25-hydroxy vitamin D serum levels with telomere length of Minangkabau premenopausal women in Padang city. An increase of 1 ng/ml 25-hydroxy vitamin D serum levels slowed down telomere shortening 0,583 bp.

**Keywords:** *Vitamin D, Telomere, Premenopause, Minangkabau.*

## Introduction

Non-communicable diseases are a global and national problem faced today. Data from the World

Health Organization (WHO) Global Report on Non-Communicable Disease in 2017 states that non-communicable diseases cause 40 million deaths per year or around 70% of deaths worldwide. This figure is expected to increase to around 52 million deaths per year in 2030. More than 9 million of all deaths from non-communicable diseases occur at the age of 40 years and over<sup>1</sup>.

Data Riskesdas in 2013 showed an increase in the prevalence of non-communicable diseases from the previous year. Non-communicable diseases suffered

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by many people aged 40 years and over. Around 47% of the death rates due to noncommunicable disease in Indonesia are women<sup>2</sup>.

Pre-menopause is a phase in the aging process, which is a transition from reproductive to non-reproductive periods that occur at the age of 40-55 years. During this time biological and endocrine changes such as the occurrence of estrogen hormone fluctuations that affect the menstrual cycle<sup>3</sup>. The hormone estrogen has a role as an antioxidant and increases telomerase activity. Low estrogen levels at the end of pre-menopause will increase the risk of non-communicable diseases that will be encountered when entering menopause in the next 5 until 10 years<sup>4</sup>.

Aging at the cellular level can be measured by examining telomeres, which are cell aging biomarkers. Telomeres are structures that play a role in protecting and preventing the fusion and degradation of chromosomes located at the ends of chromosomes<sup>5</sup>. Telomeres experience a shortening of around 24.8-27.7 base pairs per year. This shortening process is in line with increasing age. Progressive shortening of telomeres causes aging, apoptosis or oncogenetic transformation of somatic cells<sup>6</sup>.

Telomere length can be influenced by various factors, including body mass index, hormone therapy, antioxidant intake, chronic diseases, multivitamins, minerals and sex. One vitamin that has a role in maintaining telomere length is vitamin D. Vitamin D is a fat-soluble vitamin that acts as a steroid hormone that has many vital roles in mineral metabolism, bone health, proliferation, cell differentiation and apoptosis as well as anti-inflammatory properties. Research shows that vitamin D plays a role in maintaining genomic and telomere stability. Vitamin D levels can affect telomere length through anti-inflammatory mechanisms and controlling the rate of cell proliferation<sup>7,8</sup>.

Indonesia is a tropical country that receives sun exposure throughout the year. Even though they are exposed to sunlight throughout the year the prevalence of vitamin D deficiency in Indonesia tends to be high at 50% in women aged 45-55 years<sup>9</sup>, and 35.5% in women aged 60-75 years<sup>10</sup>.

The high prevalence of vitamin D deficiency is associated with lifestyle and environmental factors, including the lifestyle of Indonesian women who tend to avoid sunlight, spend more time indoors, use of

sunscreen and low intake of food sources of vitamin D<sup>11</sup>. Besides, older women are more at risk of vitamin D deficiency because of the reduced ability of the skin to synthesize vitamin D<sup>12</sup>.

Vitamin D deficiency is associated with telomere shortening. This deficiency is related to the function of vitamin D in maintaining genomic stability<sup>13</sup>. However the effect of vitamin D on telomeres is still controversial. The purpose of this study was to examine the relationship between serum 25 (OH) D levels and telomere length of the Minangkabau premenopausal women.

## Material and Method

This research is a cross-sectional study of 93 ethnic Minangkabau premenopausal women aged 40-55 years. Subjects were selected by multistage random sampling. The inclusion criteria in this study were willing to enter the study by signing an informed consent, aged 40-55 years, Minangkabau ethnic, having menstrual disorders and not using hormonal contraception. The exclusion criteria in this study were not coming and not being found when collecting research data, suffering from chronic diseases such as diabetes mellitus, hypertension, cancer (obtained from anamnesis). This research has obtained approval from the Andalas University Ethics Committee.

Telomere length is measured using the O'Callaghan and Fenech method. Venous blood was taken in 5cc cubital fossa then stored in a vacutainer. Blood samples were carried out by DNA isolation in the Biomedical Laboratory of the Faculty of Medicine, Andalas University, Padang. Following procedures in the Pure Link genomic DNA isolation kit. The isolation process consists of blood lysis, DNA binding, washing and eluting. The DNA concentration was measured using nano drops. Examination of 25-hydroxy vitamin D serum levels was carried out according to the procedure using an ELISA kit from DBC Canada. Data were analyzed using Pearson correlation parametric analysis. Abnormal data were transformed into Log 10. Significant correlation if  $p < 0.01$ . Data analysis using SPSS 20.

## Results

The results of this study are shown in table 1. The average age of respondents was  $46.52 \pm 1.08$  years, with a minimum age of 40 years and a maximum age of 54 years. The mean serum 25 (OH) D level was  $27.79 \pm 1.38$  ng/ml with a minimum value of 10.96 ng/ml and a

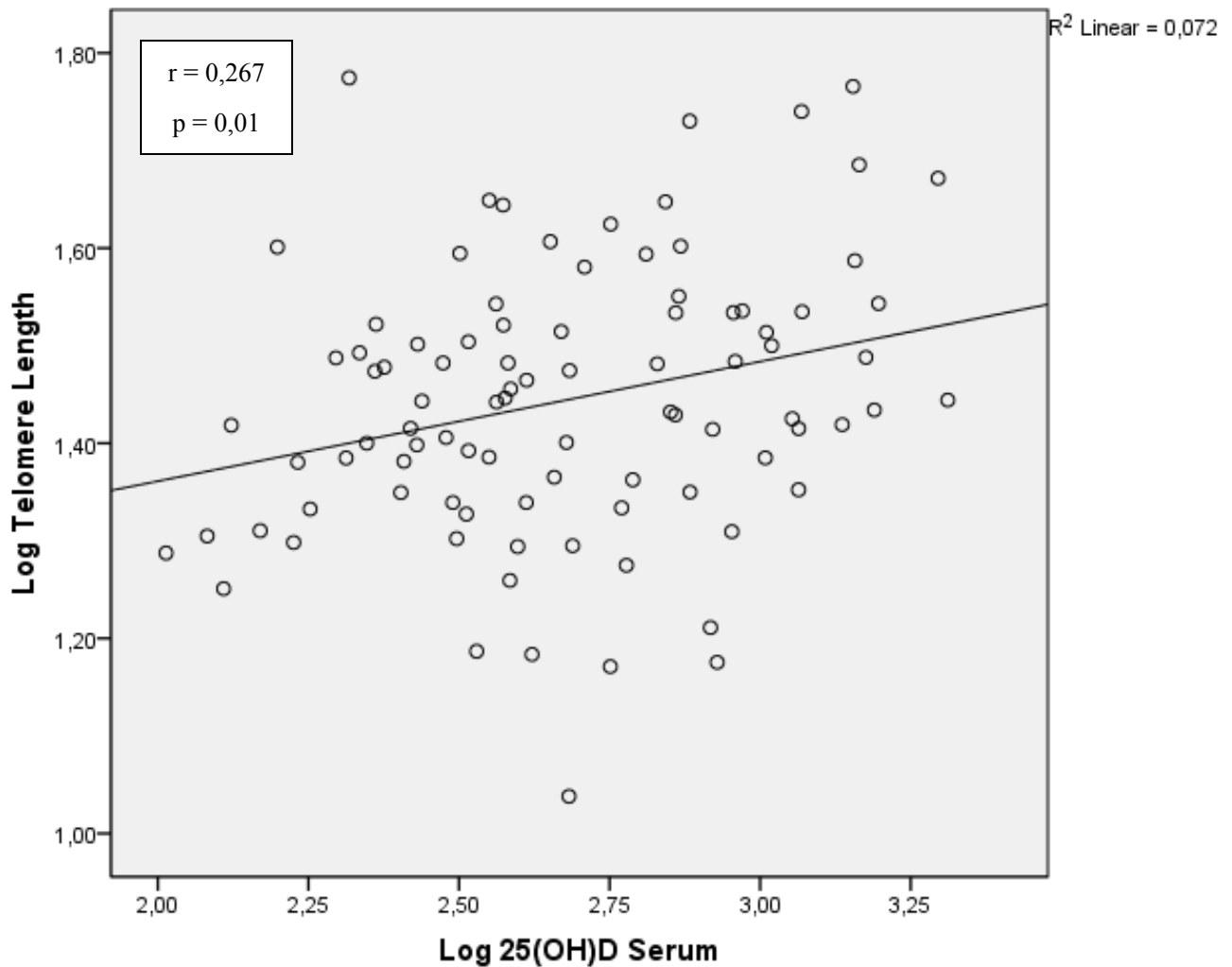
maximum value of 58.88 ng/ml. The average telomere length was  $474.13 \pm 2.02$  bp with a minimum telomere length of 102.32 bp and a maximum of 2041 bp.

**Table 1. Average of Age, 25-Hydroxyvitamin D Serum and Telomere Length**

Variables	Mean $\pm$ SD	Minimal value	Maximal Value
Age (year)	46,52 $\pm$ 1,08	40	54
25(OH)D Serum (ng/ml)	27,79 $\pm$ 1,38	10,96	58,88
Telomere Length (bp)	474,13 $\pm$ 2,02	102,32	2041

**Table 2. Regression Model for 25-Hydroxyvitamin D Serum and Telomere Length**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,833	,320		5,736	,000
	25(OH)D Serum	,583	,220	,267	2,648	,010



**Figure 1. Correlation between 25-Hydroxyvitamin D Serum levels and Telomere Length**

Figure 1 showed a significant correlation between serum 25 (OH) D levels and telomere length ( $p = 0.01$ ,  $r = 0.267$ ).  $R^2 = 0.072$  indicates that serum 25 (OH)

D levels affect telomere length by 7%. Regression prediction equation in this study obtained  $Y = 1.833 + 0.583 X$  or telomere length =  $1.833 + 0.583$  levels 25

(OH) D (ng/ml). This means that every 1 ng/ml increase in serum 25 (OH) D levels slows shortening of telomere 0.583 bp (table 2).

## Discussion

Telomeres are nucleoprotein structures at the ends of chromosomes that play a role in maintaining genomic stability and preventing fusion and degradation of chromosomes during the process of cell division. Telomeres consist of a sequence of 6 TTAGGG hexanucleotide base pairs that repeat hundreds or even thousands of times. Telomeres will experience a shortening with age. The length of human telomeres ranges from 4-15 kbp. Telomeres will experience a shortening of around 24.8-27.7 base pairs per year. Telomere length can be influenced by various factors, including body mass index, antioxidant intake, chronic diseases, physical activity and gender. Progressive shortening of telomeres will result in cell aging and an increased risk of degenerative diseases<sup>6,14</sup>.

This study found that the length of telomeres of premenopausal women of Minangkabau ethnicity with an age range of 40-55 years ranged from 102.32 bp to 2041 bp with an average of  $474.13 \pm 2.02$  bp. This study analyzes the telomere length using the O'Challagan & Fenech method, which measures the absolute length of the telomere. This result is lower than the results of a study by Dalgard in the Danish National Twin Registry of 405 women aged 18-64.3 years getting an average telomere length result of  $7,010 \pm 30$  bp<sup>15</sup>. The study of Shin on 54 middle-aged obese women in Korea also obtained longer telomeres with an average of 8,290  $\pm$  1970 bp in premenopausal women<sup>16</sup>. Richards's study obtained a mean telomere length in women in the United Kingdom of  $7,000 \pm 700$  bp<sup>13</sup>. Different telomere lengths can be caused by differences in telomere length at birth, different measurement method used, age, race, diet, physical activity, estrogen levels and body mass index<sup>17,18</sup>.

Serum 25 (OH) D levels are the best indicator of vitamin D status<sup>12</sup>. The results showed that serum 25 (OH) D levels of premenopausal women of Minangkabau ethnicity ranged from 10.96 ng/ml to 58.88 ng/ml with a mean of  $27, 79 \pm 1.38$  ng/ml. The results showed that the average Minangkabau premenopausal woman experienced vitamin D insufficiency. Vitamin D insufficiency was based on classification by the Endocrine Society if serum 25 (OH) D levels were

obtained between 21-29 ng/ml<sup>12</sup>. The research data showed that respondents who experienced vitamin D deficiency (level 25 (OH) D <20 ng/ml) were 18.3%, vitamin D insufficiency (levels 25 (OH) D 21-29 ng/ml) were 39.8 % and deficiency (25 (OH) D levels 30-100ng/ml) as much as 41.9%.

The results of this study are higher than the results of research conducted by Mazidi in 4347 participants in the National Health and Nutrition Examination Survey (NHANES) with an average level of 25 (OH) D  $23.3 \pm 9.4$  ng/ml on female subjects. This difference in results can be caused by differences in climate and exposure to sunlight, race and different method used in the measurement<sup>19</sup>.

25 (OH) D serum levels are related to telomere length. In this study the results obtained were significant and positive patterns with  $r = 0.267$  and  $p = 0.01$ . This result is in line with research by Richards of 2160 women in the United States with an average age of 49.4 years. Research by Beilfuss also shows a relationship between serum 25 (OH) D levels and telomere length. This study analyzed data from the National Health and Nutrition Examination Survey (NHANES) 2001-2002 involving 11,039 respondents who found an association of each increase of 10 nmol/L levels of 25 (OH) D increasing telomere length by 0.03 kbp in women aged 45-59 years<sup>20</sup>. Liu conducted a Nurse Health Study study of 1337 white women with an average age of 59 years also found the relationship between serum 25 (OH) D levels with telomere length with a  $p$ -value = 0.02<sup>21</sup>.

Williams in the Northern Finland Birth Cohort of 5096 respondents with an average age of 31 years, found no relationship between 25 (OH) D levels and telomere length<sup>22</sup>. Cassidy's studied also found no relationship between serum 25 (OH) D levels with telomere length. The difference in the results of this study can be due to differences in respondent's characteristics in terms of age, race, body mass index, intake and lifestyle patterns and climate conditions related to the amount of sun exposure<sup>17</sup>.

The mechanism of the relationship between vitamin D levels and telomere length can occur through anti-inflammatory and anti-proliferation mechanisms<sup>19</sup>. Vitamin D in its active form, decreases the number of systemic inflammatory mediators such as interleukin-2 and tumor necrosis factor. Reduced systemic inflammation can result in reduced reactive oxygen

species (ROS) production to prevent telomere erosion<sup>13</sup>. Vitamin D plays a role in reducing the rate of cell proliferation, especially for cells that have the potential for mutations such as cancer cells. Besides, vitamin D can increase telomerase activity which is an enzyme that plays a role in maintaining telomere length<sup>23</sup>.

### Conclusion and Suggestion

The conclusion from the results of this study there is a relationship between serum 25 (OH) D levels with the telomere length of the Minangkabau ethnic premenopausal women. Every 1 ng/ml increase in serum 25 (OH) D levels slowed the telomere shortening to 0.583 bp. Women should increase their serum 25 (OH) D levels to slowed the telomere shortening.

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# The Dynamics of Budget Fulfillment Policy in the Implementation of Minimum Service Standards in the Health Sector at Community Health Centers (Case Study in Sleman and Magelang Regencies, Indonesia)

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## Abstract

**Background:** Health is a basic need of every individual that must be met. The government is responsible for meeting the needs of public health services. Health service programs require adequate budget support. Central government budget policies tend to have differences in implementation between regions in implementing the Minimum Service Standards for Health Sector (MSS-HS) program.

**Research Objectives:** To determine the dynamics of budget fulfillment policies in the implementation of the MSS-HS in Sleman and Magelang Regencies.

**Research Method:** This research is qualitative research with a case study approach. Informants consist of officials or staff of local government who control information or influence policy making. Data collection techniques sourced from the study of policy documents, in-depth interviews, observation and focus group discussions by conducting triangulation. Results: Health budget policies in Sleman and Magelang districts were relatively similar, but differed in responding to regulations from the centre. The funding sources for the Community Health Centers (CHCs) in the two districts are different. CHCs in Sleman Regency come from Regional Public Service Agency (RPSA) funds, Health Operational Assistance and CHCs Operational Subsidies, while CHCs in Magelang District come from Health Operational Assistance and RPSA.

**Conclusion:** The implementation of the MSS-HS at the CHCs in Sleman and Magelang, in general there were no funding problems.

**Keywords:** Budget Policy, Minimum Service Standards for Health Sector, Local Government.

## Introduction

Health is a state of well-being that includes physical, mental and social as a whole, and not only free from

disease or weakness so that health is an important part of life<sup>[1]</sup>. Every Indonesian citizen has the right to receive health services<sup>[2]</sup>. The right to the highest health basis can be achieved based on a transparent, participatory, fair and balanced health system and attention to aspects of human rights<sup>[3]</sup>. Republic of Indonesia Law No. 23/2014 concerning Regional Government states that, among the six mandatory functions for Regional Government is health. Republic of Indonesia Law No. 36/2009 concerning Health confirms that efforts to implement health are based on the Minimum Service Standards in the Health Sector (MSS-HS). The law also stipulates

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that the central government health budget is allocated at 5% of the APBN Expenditure outside the region and at 10% of the Regional Revenue Expenditures excluding salaries, and at least 2/3 of the health budget is used for public services.

Sleman and Magelang districts are districts in Java, Indonesia. At the time of this study, two districts in implementing health services in the Community Health Center (CHC) were guided by Minister of Health Regulation No. 43 of 2016 concerning MSS-HS. Each district/city has its own uniqueness and problems to meet the needs of public health services. Local governments use district head regulations that govern implementation to complement the 12 MSS-HS indicators regulated by the central government.

CHC is a technical implementation unit of the district health office that has the responsibility for health development in the sub-district area so that it becomes CHC. The implementation of health services in CHC is guided by MSS-HS which is set by the central government as the minimum standard of service obtained by the community. Implementation of health services in community health centers requires adequate budget support, to achieve the target indicators of success for SPM-HS<sup>[5]</sup>. Based on this background, researchers are interested in knowing the dynamics of the SPM-HS budget policy in Sleman and Magelang Regencies.

### **Research Method**

This research uses a qualitative method with a case study approach. This case study approach focuses on one particular object that is raised as a case to be explored in depth to open the reality behind the phenomenon<sup>[6]</sup>. This research was carried out in early to mid-2019 at several CHCs located in Sleman and Magelang Regencies. The data used are primary and secondary. Selection of informants in this study using purposive sampling. The informants were determined based on criteria, namely those who were more in control of information and authority in the policy of fulfilling the MSS-HS in Sleman and Magelang Regencies. Policymaking and design of budget fulfilment MSS-HS to achieve performance MSS-HS is a collective process that involves many parties (complex responsive process) so that the method chosen is qualitative and participatory because it is expected to understand the ongoing process in organizations involved in the budget process and the implementation of regulations on MSS-HS for

Health<sup>[7]</sup>. Secondary data of this study were taken from various documents from the CHCs. The data collection techniques include documentation for the same data source simultaneously and observation of passive participation, in-depth interviews and or FGD.

### **Research Result**

The health budget exceeds 10%, Sleman regency began in 2016 and Magelang since 2017. There was a significant increase compared to previous years. The financing of regional health services comes from various sources, including from (1) the State Revenue and Expenditure Budget (SREB); (2) District and provincial Regional Revenue and Expenditures Budgets (RREB); (3) deconcentration, and (4) other legitimate sources. The RREB is the annual financial plan of the regional government which is discussed and approved jointly by the regional government the Regional House of Representatives, and determined by regional regulations.

The sources of the health budget can be classified into four, namely: (1) special allocation funds (2) health operational assistance, (3) operational subsidies for CHCs, and (4) revenue funds for CHCs. Data on budget sources in Sleman and Magelang Regencies, in this report the researchers took the most complete information from the Gamping and Salaman CHCs. Based on this research it is known that the public health centre budget source is not much different, namely: Revenue Budget and State expenditures received annually in the form of health operational assistance obtained from genuine income from public health centres. CHCs in Sleman receive additional regional income and expenditure in the form of operational subsidies for CHCs. The Gamping CHCs is in accordance with the following informants.

“If there are three sources of funds here. Namely the RPSA the and the HOA. The CHCs Operasional Subsies are from the RREB ... Revenue or the RPSA then regional revenue or the CHCs Operasional Subsies or the Regional Expenditure Budget ... Then from the HOA “(Resource person).

CHCs in Magelang, another budget source CHCs that come from the RREB are not used for the development of CHCs but are given directly to civil servants CHCs staff as monthly salaries. The results of this study note that the largest budget source for public health centres comes from the RPSA. In 2018 the Gamping CHCs received a budget from the Health Operational Assistance (HOA) 19% the Operational subsidies for CHCs (8%),

and the RPSA (72%). In 2018 the Salaman CHCs the source of the budget consists of revenue from HOA (10%) and RPSA (90%). The Gamping CHCs receives revenue from the RPSA from the capitation of the Social Security Organizing Agency (SSOA), non-public social

security administering bodies, internships, bank interest, competition prizes and research. Whereas the Salaman CHCs receives a RPSA budget from the capitation of the SSOA, non-capitation and public services as well as inpatients for patients not registered with the SSOA.



Source: CHCs of Gamping and Salaman, 2019

Graph 1. Comparison of CHCs Revenues

Source of Gamping CHCs budget obtained from the operational subsidies for CHCs, HOA and RPSA, while Salaman CHCs budget comes from HOA and RPSA, both have increased every year. Each increased sharply when starting the national health insurance policy in 2014. Based on the amount of revenue the Gamping and Salaman CHCs have differences. The total income of the Salaman CHCs is greater than the Gamping. CHCs. This is because the Salaman CHCs is CHCs that has a larger capitation amount and is an inpatient CHCs.

CHCs allocates 14% the Salaman CHCs allocates 26% of the total MSS-HS program.

### Discussion

**General Health Budget Policy:** Implementing a MSS-HS policy requires adequate funding. Law of the Republic of Indonesia No. 23/2014 concerning Regional Government states that regional expenditure is prioritized to fund Mandatory Government Affairs related to basic services determined by MSS-HS<sup>[4]</sup>. Law of the Republic of Indonesia No. 25/2009 concerning Public Services states that the organizer is entitled to get a budget allocation in accordance with the level of service needs. The state must allocate an adequate budget through the State SREB or RREB.

Based on the use and allocation of the budget, it shows the different formats of budget policy and the concentration of budgeting. The format of the Gamping CHCs uses broad budgetary allocations the CHCs Salaman with more detailed allocations in each indicator. The concentration of the use of the second budget CHCs show a striking difference. In the indicator group of maternal and child health services the Gamping CHCs allocates 38%, while Salaman allocates 59% of all MSS programs. In the indicator group for elderly and mental disorders the Gamping CHCs allocates 27%, while Salaman allocates 1%. In the indicator group of basic and productive age education services the Gamping

Some health budget sources, namely: first is a special allocation fund. Special allocation funds are funds allocated by the government at 5% of the SREB for health sector development. The 2016 special health allocation fund consists of physical special allocation funds used to increase access to basic health services, referral health services, and pharmaceutical services.

And non-physical specific allocations used to fund HOA, drugs and logistics, Family Planning programs, CHCs accreditation, hospital accreditation, and Delivery Assurance. The special allocation fund in the field of health is not the main fund in the implementation of health development in the regions.

The second source of the budget is the HOA fund. HOA is part of the special non-physical allocation fund in the health sector that funds priority programs in the health sector, using a minimum of 60% of the total HOA fund allocation for CHCs and other health programs. Where as the management of CHCs uses a maximum of 40% of the total allocation of funds for the operations of the CHCs for public health. The third is the source of operational subsidies for CHCs, originating from the RREB which is lowered by the regional government used to finance Public Health Efforts activities to strengthen the promotive and preventive sides.

The fourth source of funding is income from the CHCs in the form of capitation funds. According to the Minister of Health Regulation No. 21/2016 concerning the use of the national health insurance capitation fund, it is stated that capitation funds are monthly payment amounts paid in advance to first level health facilities based on the number of registered participants regardless of the type and number of health services provided. All capitation funds are used to pay for health services at least 60% and support operational costs for health services up to 40%. More capitation funds are used for efforts to improve individual health services.

The national health insurance for Indonesian people implemented a tiered health service system. This tiered health service system causes the decentralization of health services so that health services are concentrated in primary services such as CHCs and family doctors. This has resulted in a significant increase in the number of patients visiting primary care centres such as CHCs. The challenges in changing the health system include the decentralization of services that led to the need for the development of Human Resources to fill new posts in health care<sup>[8]</sup>. In research related to health care reform in the UK the decentralization of health services can lead to increased data requirements and labour costs<sup>[9]</sup>. In the era of National Health Insurance, synergy is needed related to financing and human resources.

RPSA is a regional apparatus work unit formed in regional governments to provide services to the

community in the form of goods and or services without expecting profit and in carrying out their duties upholding efficiency and productivity. Financial management patterns of RPSA are management patterns that provide flexibility in the form of flexibility to implement sound business practices to improve services to the community to advance public welfare and educate the nation's life as an exception to the provisions of regional financial management in general<sup>[8]</sup>. The Government of Sleman and Magelang Regencies have implemented the RPSA system so that the public health centres in both districts have their authority in managing their finances. The management of the system of RPSA in Sleman and Magelang Regencies is regulated in Regulations of the Regent<sup>[8][9]</sup>.

According to research in Pekalongan, it is known that the advantage of using the RPSA system is that the CHCs can independently manage the management system so that it can develop according to the characteristics of the region<sup>[10]</sup>. The concept of independence in the management of the CHCs RPSA for the better. The research has similarities with CHCs in the two districts which are the CHCs of the RPSA.

The HOA budget is used for activities that are community health efforts so that the allocation of HOA funds to the CHCs is mostly for the MSS-HC Program. In this study, it is seen that the comparison of budget allocations for HOA in the two CHCs the indicators of maternal and child health programs get the highest budget allocation, 38% and 33% while the indicators of health services for people with Tuberculosis and HIV have a low allocation of 6%-9% of the total budget allocation for MSS-HC. The amount of budget allocation can affect the achievement of the MSS-HC program indicators. If the budget allocation is adequate the implementation of the MSS-HC program will be more optimal which will impact on the achievement of the target indicators for the MSS-HC standard. Low budget allocation for indicators of health services for people with tuberculosis and HIV can be a factor in the low achievement of these indicators.

**Achievement of MSS-HC Indicators of CHCs:**  
To define the successes and failures of policy, several components are needed, among others, first the evaluation of policies to measure program achievements with initial targets. Second, related to public values that emphasize the role of bureaucracy. Third the process of policymaking and management must be done well.

Fourth, related to political aspects and fifth, an explicit treatment of policies that can determine whether policies will succeed or fail<sup>[11]</sup>.

Both districts have implemented a MSS-HC development policy. This shows that the decentralization of health services has paid attention to aspects of regional health security. Based on field data the two CHCs show that the results indicators with high achievements according to the target of 100% are indicators of maternal and child health and health services of people with severe mental disorders. While indicators that have low performance are health services for people with TB, 46% and 37.78%, respectively. Based on the allocation and achievement of the indicators, it shows that the budget is quite influential on the success of program outcome indicators. One parameter for assessing the success of a policy is to assess the success of the program through its indicators, such as. operational indicators, outcome indicators, resource indicators, and actor indicators<sup>[12]</sup>.

### Conclusion

The dynamics of budget policies to meet the needs of MSS-HC standards can affect the success or failure of the achievement of each indicator. After decentralization the fulfilment of the health budget depends on the policies of each region. The Sleman district government has allocated operational subsidies for the CHCs to support the achievement of minimum service targets in the CHCs, Magelang district. Since the national health insurance came into effect the revenue of the CHCs has risen sharply. In the MSS-HC, adjustments are made to budget allocations at the local level or CHCs.

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# The Development of the Aerobic Dance Leaders Training Program

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## Abstract

The aerobic dance leaders who high level of knowledge are very important to encourage and support people to be able to do aerobic dance continuously. Therefore the aerobic dance leaders should advise people on how to do aerobic dance correctly according to the principles of exercise. However, some aerobic dance leaders had insufficient knowledge on aerobic dance. The purpose of this research was to develop of aerobic dance leaders training program and to evaluate the effectiveness of the training program. The volunteers 30 people. It is action research including: phase 1 the development of aerobic dance leaders training program, phase 2 the training program for aerobic dance leaders, and phase 3 the aerobic dance leading in communities for 8 weeks. It found that phase 1 the development of aerobic dance leaders training program had CVI is 0.93. Phase 2 the knowledge in aerobic dance of participants has been increased the aerobic dance leadership the self-efficacy and outcome expectations were also increased. Phase 3 the overall physical fitness of male and female participants in aerobic dance was better the self-efficacy and outcome expectations were also increased and ability to be aerobic dance leaders in overall is at a very good level. Conclusion the training program for aerobic dance leaders was able to develop people who have never been aerobic dance leaders before to be aerobic dance leaders in the communit.

**Keywords:** Aerobic dance leaders training program, aerobic dance leadership, self-efficacy, outcome expectations.

## Introduction

If people do not have enough physical activities, it would be the main cause of death from non-communicable diseases.<sup>1</sup> Not having enough physical activities was a risk factor for deaths and incurred health expenses.<sup>2</sup> Over the past 10 years, one in three of Thai people have had insufficient physical activities. Aerobic dance exercise that is very popular. In Thailand, many organizations have campaigns for people to pay attention to their health with aerobic dance exercise such as department stores, and parks or even in the government and private sectors.

The good exercise leaders should inform knowledge in exercise to people properly according to the principles of exercise. However, it found that aerobic dance leaders in the community studied and learned aerobic dance from the purchased videotape by themselves<sup>3</sup>, so there is the raising of questions on what the quality of aerobic dance leaders is.

The purpose of this study was to develop the aerobic dance leaders training program, assess knowledge and ability to be aerobic dance leaders, self-efficacy and outcome expectations of being aerobic dance leaders. It also included follow up on the results of being aerobic dance leaders in the community by evaluating knowledge and ability of being a dance leader, physical fitness, self-efficacy, and outcome expectations for aerobic dance of the people who came to aerobic dance.

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## Method

This research is the action research which is divided into 3 phases below.

**Phase 1: The development of the aerobic dance leaders training program:** The researcher submitted the aerobic dance leaders training program to 3 experts in order to evaluate the content validity index (CVI). The research consisted of two main tools including the questionnaire for participants in the aerobic dance leaders training program (aerobic dance leadership, self-efficacy and outcome expectations, evaluation test on knowledge) and the questionnaire for participants in aerobic dance (aerobic dance leadership, self-efficacy and outcome expectations, physical fitness tests).

**Phase 2: The aerobic dance leaders training program:** The sample group was the undergraduate students from 3 departments including sport sciences, public health, and physical education at Roi Et Rajabhat University for 30 people calculated using WINPEPI Course Version 11.65 and added the size of sample for 20% to protect the withdrawal of sample group during the experiment. The inclusion criteria was that the participants haven't been aerobic dance leaders before, and the exclusion criteria was that the participants couldn't attend the research study as the schedule. Before and after training the sample answer questionnaire on aerobic dance leadership, self-efficacy and outcome expectations and evaluation test on knowledge in aerobic dance. The sample group attended the aerobic dance leaders training program for 20 hours.

**Phase 3: The aerobic dance leading in community:** The who passed the aerobic dance leaders training program will lead aerobic dance to people in the community. Before and after training the participants will be tested for physical fitness from the lecturer team from the Department of Sports Science, Roi Et Rajabhat University and answer questionnaires on self-efficacy, outcome expectations, and aerobic dance leadership. The aerobic dance leaders will lead aerobic dance to people in the community for an hour per day, 3 days per week within 8 weeks.

**Statistics:** Testing the differences within the group by analyzing the differences, using a pair t-test by SPSS Statistics 19.0 for Windows.

### Results

**Phase 1: The development of aerobic dance leaders training program:** The inspection results of the aerobic dance leaders training program outline were found that the CVI was 0.93.

**Phase 2: The aerobic dance leaders training program:** It was found that the trainees increased knowledge in aerobic dance ( $p < .000$ ), increased ability to be an aerobic dance leader ( $p < .001$ ), and increased self-efficacy ( $p < .002$ ) and outcome expectations ( $p < .000$ ) as shown in table 1.

**Table 1: The evaluation analysis of the aerobic dance leaders training program.**

Variables	$\bar{X}$	S.D.	95%CI	t	p-value
<b>Knowledge of dance aerobics</b>					
Pre-test	16.37	2.03	-3.89 to -2.25	-7.65	<.001***
Post-test	19.43	2.31			
<b>Ability to be an aerobic dance leader</b>					
Pre-test	3.33	.72	-.87 to -.35	-4.74	.001**
Post-test	3.94	.42			
<b>Self-efficacy</b>					
Pre-test	3.70	.58	-.57 to -.15	-3.50	.002**
Post-test	4.07	.40			
<b>Outcome Expectation</b>					
Pre-test	3.38	.58	-.91 to -.45	-6.07	<.001***
Post-test	4.06	.39			

**Note:** P-values are results of pair t-test for variables of knowledge of dance aerobics, ability to be an aerobic dance leader, self-efficacy, and outcome expectation. \*  $p < .05$ ., \*\*  $p < .01$ ., \*\*\*  $p < .001$ .

**Table 2: The evaluation analysis of people who came to do aerobic dance.**

Variables	$\bar{X}$	S. D.	95%CI	t	p-value
<b>Self-efficacy</b>					
Pre-test	42	3.7	-1.48 to -.37	-3.26	.001**
Post-test	42.92	3.57			
<b>Outcome Expectation</b>					
Pre-test	42.16	3.20	-1.60 to -.67	-4.79	<.001***
Post-test	43.30	2.97			

**Note:** P-values are results of pair t-test for variables of self-efficacy, and outcome expectation., \* p < .05., \*\* p < .01., \*\*\* p < .001.

**Phase 3: The aerobic dance leading in community:**

The aerobic dance leaders had the ability to be the leaders in aerobic dance at a high level (4.23, S. D.=.56). After training, it was found that the people who came to do aerobic dance increased the self-efficacy (p<.001) and outcome expectations (p<.000) as shown in table 2.

It was found that all lists of physical fitness test have been improved after training in which female participants. For male, it was found that the VO<sub>2</sub>max, grip strength, leg strengths as well as vital capacity higher than before aerobic dance with the statistical significance as shown in table 3.

**Table 3: The evaluation analysis of physical fitness test before and after participating in aerobic dance.**

Variables	Male (n=106)					Female (n=194)				
	$\bar{X}$	S. D.	95%CI	t	p-value	$\bar{X}$	S. D.	95%CI	t	p-value
<b>Weight (kg)</b>										
Pre-test	64.86	14.16	-1.63 to -.11	-2.27	.03*	54.03	9.11	.01 to .47	2.03	.04*
Post-test	65.74	13.58				53.78	9.13			
<b>Body fat (%)</b>										
Pre-test	15.97	6.15	-.62 to .70	.12	.90	29.78	4.35	1.29 to 2.38	6.62	<.01**
Post-test	15.93	5.91				27.94	5.20			
<b>Grip strength</b>										
Pre-test	.64	.12	-.06 to .02	-3.97	<.01**	.49	.10	-.05 to -.03	-8.66	<.01**
Post-test	.68	.12				.54	.10			
<b>Leg strength</b>										
Pre-test	1.79	.60	-.29 to -.15	-6.00	<.01**	1.16	.31	-.25 to -.15	-8.43	<.01**
Post-test	2.01	.52				1.36	.39			
<b>Sit and reach</b>										
Pre-test	11.60	7.13	-1.08 to .90	-.18	.86	8.55	7.29	-2.78 to -1.75	-8.64	<.01**
Post-test	11.69	6.64				10.81	6.87			
<b>Vital Capacity</b>										
Pre-test	56.48	17.29	-4.17 to -.12	-2.10	.04*	43.32	11.21	-11.35 to -7.51	-9.68	<.01**
Post-test	58.63	14.59				52.74	14.36			
<b>VO<sub>2</sub>max</b>										
Pre-test	15.84	3.82	.20 to 1.00	2.96	<.01**	22.16	4.58	1.15 to 2.07	6.93	<.01**
Post-test	15.24	3.14				20.55	4.51			

**Note:** P-values are results of pair t-test for variables of weight (kg), body fat (%),grip strength, leg strength, Sit and reach, vital capacity, and VO<sub>2</sub>max.\* p < .05., \*\* p < .01.



## Discussion and Conclusion

**Phase 1: The development of the aerobic dance leaders training program:** It was found that the content validity in CVI is 0.93. It shows that the components, principles and reasons, objectives, content, measurement and evaluation activities of the program outline are appropriate and passed all components. After the training program, had theoretical knowledge and practice. There is also an exchange of learning experience of aerobic dance leaders in order to encourage learners to have more experiences and support the trainees to apply the theoretical knowledge into the practice. Which the program should be designed by the participants themselves so that the program will be in line with the needs of the trainees and have training in the things that they can actually apply.<sup>4,5,6,7,8</sup>

**Phase 2: The aerobic dance leaders training program:**

- 2.1 The knowledge in aerobic dance, it was found that after the training program had more knowledge in aerobic dance with the statistical significance. The developed training program helped the trainees have knowledge and understand about dancing and aerobic dance leadership as well as movement skills and aerobic dance. However the exercise leaders should have knowledge about the test of physical fitness and suggest method and techniques for proper exercise to prevent injuries that may occur.<sup>9</sup>
- 2.2 The aerobic dance leadership, it was found that after the training program had more aerobic dance leadership with the statistical significance as the trainees participated and performed various activities by participatory training and from follow-up after training. Which the exercise and sports leaders promoted greater participation in sports and exercise which had an effect on the members' health.<sup>10,11</sup>
- 2.3 The self-efficacy, it was found that after the training program had more self-efficacy with the statistical significance. The trainees in the aerobic dance leaders training program received of the development of self-efficacy according to Bandura's concept.<sup>12</sup> This method will result in the changes of behaviors positively and determines the exercise goals and increase exercise.<sup>13</sup>
- 2.4 The outcome expectations, it was found that after the training program had more outcome expectations

with the statistical significance. In this research the trainees had high self-efficacy this also leads to increase the outcome expectations.<sup>14,15</sup> It's due to the training program for aerobic dance leaders provided knowledge, advice about aerobic dance leaders and exchanged learning together. There was practical training to gain confidence and able to be an aerobic dance leader.

**Phase 3: The aerobic dance leading in communities:**

- 3.1 The physical fitness of the people who came to aerobic dance, found that all lists of physical fitness test have been improved after training in which female participants. For male, found that the VO<sub>2</sub>max was increased, grip strengths and leg strengths as well as vital capacity higher than before aerobic dance. It shows that the results were caused by the aerobic dance that uses energy, and there are movements for both the upper and lower parts of the body. Which, it increases the heart rate and muscle functions and the subcutaneous fat was reduced, so it increases the endurance performance of the respiratory and circulatory systems, this may be a result of increased nervous system function. Therefore, aerobic dance program as a suitable program for losing weight and the development of aerobic abilities.<sup>19</sup>
- 3.2 The self-efficacy, it was found that after aerobic dance had more self-efficacy with the statistical significance. It may be the results used method of the development of self-efficacy according to Bandura's concept as follow:<sup>12</sup> used inspirational and persuasive words to show that everyone can be an aerobic dance leader, see other people's experiences by the role model from the people who came to aerobic dance, used emotional stimulation by talking to reduce anxiety and use simulation scenarios to reduce their stress,<sup>20</sup> and use of successful experiences. These method will result in the changes of behaviors positively.<sup>21</sup>
- 3.3 The outcome expectations, it was found that after aerobic dance had more outcome expectations with the statistical significance. It can be seen that the aerobic dance people knew the positive effects of aerobic dance and increased self-efficacy in exercise, so it is the factor that encouraged aerobic people to expect the outcome of aerobic dance increasingly.<sup>15, 22</sup> The outcome expectations in aerobic dance can

explain exercise behaviors. It also included a short-term goals such as doing aerobic dance will help you have better health with a better shape or weight loss in order to encourage people who came to exercise can do aerobic exercise regularly and sustainably.

3.4 The who passed the aerobic dance leaders training program had knowledge and can be an aerobic dance leaders in their community, it was found that had aerobic dance leaders at a very good level. Being a good aerobic dance leader the dance leaders should have basic knowledge of correct aerobic dance, be able to provide first aid and be a good example of health care.<sup>11</sup> This is for the benefits and safety of those who do exercise.<sup>23</sup>

### Conclusion

It can be seen that the tools for the training program the researcher have created can be used as the aerobic dance leaders training program and the trainees who passed the training course have the ability to be aerobic dance leaders.

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# The Impact of the Use of Sports Centre Facilities (Teamsport) towards Student's Mental Health: A Pilot Study

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## Abstract

The purpose of this pilot study is to investigate the impact of sport centre facilities (teamsport) usage towards mental health among university's students. Fifty-nine students from different majors have participated in this study. This study adopted a quantitative approach using the survey for collecting data. The data was analyzed using SPSS 23.0. Analyses involved frequency, percentage, score level, correlation and regression. The results demonstrated that the reliability test for Sport Centre Facilities Inventory ( $\alpha = 0.722$ ) and Mental Health Scale ( $\alpha = 0.831$ ) were acceptable. The level score of satisfaction for sport centre facilities among students showed that more than 50% (37 participants) considered the facilities provided by sport centre were moderate. The level of mental health found high. There was a positive correlation between the quantity of the facilities for teamsport ( $r=0.284$ ,  $p<0.05$ ) and mental health. However there were no significant relationships between variety of the facilities for teamsport and mental health. The regression analysis showed that the contribution of teamsport facilities on mental health student was 18.5% ( $R^2 = 0.185$ ). The findings have implications for future research regarding the instrumentation and the usage enhancement of facilities for the better results of mental health of students.

**Keywords:** *Teamsport, mental health, student, sport facilities.*

## Introduction

In the university, Sports Centre is a unit entrusted to enhance the level of health and wellbeing of students<sup>12</sup>. The Sports Centre usually provides facilities for a variety of sports such as individual sports and teamsport. The current study is focusing on teamsport which can be defined as a sport that involves two or more players and shares the same goal<sup>1</sup>. It is believed that with adequate facilities, students can fulfil their leisure time and improve their physical, emotional and mental

health<sup>8</sup>. Further, teamsport is a good alternative among most fitness exercises because of its extensive health effects such as improving cardiac health and reducing blood pressure<sup>7</sup>. In addition to physical health effects, teamsport activities can also help overcome mental health problems such as loneliness or lack of socializing skills. For example, teamsport such as a tennis game can assist in controlling the feeling of anger and disappointment<sup>10</sup>. Besides the research also found that taking part in sport activities led to a physiological adaptation such as respiratory adaptation, musculoskeletal, cardiovascular and hormone so as to encourage individual capability in increasing physical and mental tolerance and eventually prevents the occurrence of mental disorder<sup>8</sup>. Research also showed the direct association of sports benefits to mental health among students where there is consistent evidence that participation in teamsport can enhance social and psychological health<sup>3</sup>. However, recent studies found that university students were riskier with mental health problems than those in the general population or

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other individual groups<sup>4</sup>. The study report also showed the probability of graduate students suffering from depression and panic were six times higher than the general population. Therefore, this study attempts to investigate whether involvement in teamsport have any impact towards mental health.

## Method

This is a quantitative study that involved survey using questionnaires. The following is the description of the methodology of this study.

**Participants:** The participants of the study were opportunity sample, which consisted of students in Universiti Utara Malaysia (UUM). In order to be eligible to participate in this study the participants must be involved in at least one of the teamsport activities at the UUM Sports Centre.

**Sample:** The pilot test involved 59 undergraduate and postgraduate students that have used the teamsport facilities in UUM's Sport Centre. The sample of this study also focused on student's involvement in team sports such as hockey, softball, futsal, and basketball.

**Instruments:** All the measures in the questionnaire used two versions; Malay and English. The questionnaire is divided into three parts; A, B and C. Part A was focusing on personal information, such as age, gender and types of teamsport activities involved. Part B contained five items about the usage of teamsport facilities, for example, "*Variety of the facilities for teamsport are well adequate at the Sport Center*" in five points scale from strongly disagree to strongly agree. Higher score in these items indicated higher levels of satisfaction towards team sports facilities. This instrument was adapted from the questionnaire of the use of sports facilities by Hong Kong University of Science and Technology. The reliability of this instrument was satisfactory with 0.72. Part C contained twelve items adapted from the General Health Questionnaire (GHQ-12)<sup>5</sup>. This instrument measured the wellness of psychological and to identify individuals with higher risk of developing psychiatric disorders, such as particular symptom and behaviour they experienced recently. This also includes psychological problems of depression, anxiety and social withdrawal. The example of these items was "*able to concentrate*" and "*losing confidence*". Each item was rated on a five-point scale from strongly disagree to strongly agree. The total score of GHQ-12 was 60 with higher score indicates greater psychological problems. The reliability

of this instrument is 0.83 Cronbach Alpha.

Since there were no available Malay version of the usage of teamsport facilities and GHQ-12, this pilot study applied a back-to-back translation procedure from English-Malay-English for both instruments. Two independent language professionals first translated this questionnaire into Malay. Then, another two independent translators subsequently back translated all the items into English. The original and the back-translated English version were compared to identify any differences of items before finally providing a final version.

**Procedure:** This study used cross-sectional and correlational design. All the data in this study was collected in April 2019 at UUM Sport Centre. The data collection was conducted by a trained research assistant (RA), who was then distributed packs of questionnaires to the teamsport participants. The RA then waited for the participants to complete the questionnaires and attended any questions from the participants.

**Data Analysis:** The data from 59 respondents was analyzed using Statistical Package for Social Sciences (23.0). We first used mean score to examine the participants' information. Cronbach's alpha coefficients were then calculated to examine the internal consistency of two questionnaires. Moreover, this study conducted two main analyses; correlation and regression. Correlation was conducted to observe the relationships between the usage of teamsport facilities and mental health while regression was done to examine the impact of usage of team sports facilities towards mental health.

## Results

**Reliability of the Instruments:** The reliability test for all scales were acceptable as shown in Table 1.

**Table 1: Result of reliability test for the research instruments**

Instrument	Cronbach Alpha Value ( $\alpha$ )
Sport Centre Facilities	0.722
Mental Health	0.831

**Demographic Data of Participants:** The demographic information was presented in Table 2. Overall there were 24 males (40.7 %) and 35 females (59.3 %). Most of the participants were aged between 21 to 25 years old (55 participants) and only 3 participants aged between 17 to 20 years old. Participants in this study consists of 57 undergraduate students (96.6 %)

and 2 post-graduate students (0.4 %). There were four types of teamsport involved which were hockey - 25 students (42.4%), softball - 15 students (25.4%), futsal - 10 students (16.9%) and basketball - 9 students (15.3%).

**Table 2: Demographic Information of the Participants**

Demographic Information		Frequency (f)	Percentage (%)
Gender	Male	24	40.7
	Female	35	59.3
Age	17-20	3	5.1
	21-25	55	93.2
	26-30	0	0
	31-35	0	0
	36-40	1	1.7
Teamsport	Hockey	25	42.4
	Softball	15	25.4
	Basketball	9	15.3
	Futsal	10	16.9
Types of Student	Undergraduate	57	96.6
	Post-graduate	2	3.4

**Level of Sport Centre Facilities and Mental Health:**

**a. Level of sport centre facilities satisfaction:** The findings revealed that the level of sport centre facilities were low and moderate. More than 50% (37 participants) considered the facilities provided by sport centre as moderate. The summary of the result was depicted in Table 3.

**Table 3: Level of sport centre facilities satisfaction**

Level of Sport Centre Facilities	f	Percent (%)
Low	22	37.3
Moderate	37	62.7
High	0	0
<b>Total</b>	<b>59</b>	<b>100</b>

**b. Level of Mental Health:** Table 4 displayed percentage of participants found with high level of mental health. Only 10 participants were identified at the moderate level.

**Table 4: Level of Mental Health**

Level of Mental Health	f	Percent (%)
Low	0	0
Moderate	10	16.9
High	49	83.1
<b>Total</b>	<b>59</b>	<b>100</b>

**The relationship between sport centre facilities and mental health:** Table 5 displayed the correlation between sport centre facilities and mental health among participants in this study. Mean scores found to be moderate on the quantity of the facilities for teamsport, variety of the facilities for team sports, lighting glare, toilet and changing room and the services provided by staff at sports centre. There was a positive relationship between quantity of the facilities for teamsport ( $r=0.284$ ,  $p<0.05$ ), cleanliness of toilet and changing room (0.271,  $p<0.05$ ) the services given by the staffs (0.273,  $p<0.05$ ) and mental health. However there was no significant relationship between variety of the facilities for teamsport and mental health. Results also found that there were no significant relationships between the lighting glare at the sport centre and mental health. Overall the results in this study showed positive correlation between sport centre facilities and mental health levels.

**Table 5: Correlation between sport centre facilities and mental health**

No.	Variables	Mean	SD	Mental Health (r)	Sig.
1	Quantity of the facilities for teamsport are well adequate at the Sport Center	3.4237	0.98617	0.284*	0.029
2	Variety of the facilities for teamsport are well adequate at the Sport Center	3.4237	0.87501	0.004	0.976
3	Lighting glare at the Sport Center are satisfied	3.6271	0.90779	0.006	0.963
4	Toilet and changing rooms cleanness are satisfied	3.8814	0.69691	0.271*	0.038
5	The services given by the staff at the Sport Center are good	3.8814	0.74475	0.273*	0.037

\*Correlation is significant at the 0.05 level (2-tailed).

**Effect of sport centre facilities on mental health levels:** The linear regression was used to identify the effect of sport centre facilities on mental health among students. The results in Table 6 demonstrated five dimensions of teamsport facilities that could contribute

to the mental health among participants. The regression analysis showed that the value of r square was 0.185 which indicated that the contribution of teamsport facilities on mental health was 18.5%.

**Table 6: The effect of sport centre facilities on mental health**

Variables	Standardized coefficients Beta (β)	Sig.	R <sup>2</sup>
Quantity of the facilities for teamsport are well adequate at the Sport Center	0.274	0.150	0.185
Variety of the facilities for teamsport are well adequate at the Sport Center	-0.222	0.150	
Lighting glare at the Sport Center are satisfied	-0.150	0.275	
Toilet and changing rooms cleanliness are satisfied	0.236	0.089	
The services given by the staff at the Sport Center are good	0.166	0.336	

### Discussion

According to the results, it is shown that the new version of the instruments demonstrated a high internal consistency. Both instruments have strong reliability in the range of 0.70 to 0.80. The study has established a psychometrically sound measure for Malaysian in regards to the use of sport facilities and mental health for university student’s population. Both instruments were well-translated from English into Malay Language which employed a back-to back translation procedure. It is valid and reliable measure to use in the future studies. Also, it was a breakthrough study with all items in Malay Language that can be used particularly in the area of teamsport and mental health at the university. In addition these instruments may be used for some South East Asian Countries such as Singapore, Indonesian, Brunei and Timor Leste. These countries are normally using Malay language as a medium of communication

with the community and it is understandable to them. The new Malay Version instruments can be used as tools for future studies to measure the students’ satisfaction in sport activity and college mental health across the region.

Moreover the students which participated in teamsport at university sports centre showed a good standing mental health levels and a moderate level of students that used sport facilities at the university. However the results displayed a moderate relationship between the two variables the value is still acceptable to observe and discuss the connections between the usage of the facilities and mental health dimensions. In other words, if students were actively participating the teamsport activities, it may result the good levels of psychological well-being of the students. To sustain psychological wellbeing of the students, this potentially could be a reason for the university administrations to

make extra efforts on encouraging sport events, especially teamsport games at the university and improving sport facilities and engagements with students. It is worth to discuss in further since the involvement in sports and recreational activities has numerous positive effects on emotional wellbeing among teenager groups<sup>11</sup>. Some studies have proved that when people always engaging to sports and physical activities, it may help people to control emotions, manage dysfunctional behaviors and reduce suicidal thoughts<sup>2,9</sup>. It makes this topic invaluable to study as it is certainly show unique relations to the human awareness to stay healthy.

In addition to the study the effects between the use of sports center and mental health among UUM students demonstrated a very small effect. The result is not quite promising and it may cause due to other personal factors such as the students' intention to sporting the frequency of attending the sport centre, and talent and interest in one particular teamsport. It may produce different results if the students are attending the sport center for the purpose of socializing, coping with stress, and improving self-confidence. For future studies, it is desirable to investigate about the human motivation and emotion when participating in the teamsports as a preferable choice for their recreational pursuits. Many people are unaware that physical activity during sports may amplify the aspects of psychosocial health, especially on the teamsport which involve group work in the game. Certainly, joint activity and work together as a group or team members could promote a better way to get healthier than individual activities while considering the nature of the social participation<sup>3</sup>. A mutual participation in the team members will encourage the sport spirits, commitment and attitude to win the game than individual participation which focuses on personal goals with no interactions during the game<sup>1</sup>. Surprisingly, participation in teamsport activities were associated with a good intervention to control substance and alcohol addictions<sup>6</sup>. Attending sport activity is exceptional for university students to prevent them from the addiction behaviors which may lead them to poor academic performances and dropout from the schools.

In conclusion, this pilot study provides some directions and information for future studies. It is also an effort to link between students who are engaged with teamsports and their coping strategies to predict from mental health issues. It is hope that students will engage more in the teamsport as their coping strategies to avert them from the illnesses. In the future the researchers

suggested that more studies could be conducted to bridge the gaps between sports facilities, particularly in teamsport in relation to university students' mental health. Also, it will develop effective strategies and approaches to motivate university students for participating in the teamsport at the university levels.

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# The Relationship between Adolescent Pregnancy and Stunting among Toddlers Aged 12-36 Months in Bogor District, Indonesia

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## Abstract

**Background:** Stunting is a serious problem that needs to be handled both in Indonesia and globally. Approximately 151 million, or 22.2%, of toddlers in the world are currently stunted. The purpose of this study is to assess the relationship between adolescent pregnancy and stunting in toddlers aged 12-36 months in Bogor District, Indonesia.

**Method:** A cross-sectional study design was employed, with primary data from a total sample of 500 toddlers in the District. Stunting status was assessed based on the height-for-age indicator  $<-2$  z-score, while the categorization of adolescent pregnancies related to pregnant women age  $<20$  years. The analysis of the relationship between adolescent pregnancies and stunting applied multivariate Cox regression analysis and the effect is expressed by the prevalence ratio (PR) with a 95% confidence interval (CI).

**Result:** Our study shows that the prevalence of stunting in toddlers aged 12-36 months in Bogor District is 39.2%. The Cox regression test results of the relationship between adolescent pregnancy and stunting show a PR of 1.42 (95% CI: 1.01-1.98), which means that pregnant women who are still teenagers ( $<20$  years) display a prevalence of stunted toddlers 1.4 times higher than those who are adult ( $\geq 20$  years), after being controlled by the “mother’s education” and “mother’s parenting pattern” variables.

**Conclusion:** Stunting can be prevented by raising the maternal gestational age by increasing the minimum marriage age in accordance with Indonesian marriage law limitations at age of 19 years and get first time pregnant at age of 20 years.

**Keywords:** *Stunting, 12–36 months, Toddlers, Adolescent Pregnancy, Bogor District Indonesia.*

## Introduction

Stunting is a problem that must be prevented given its very broad impact. The most serious impacts are a decrease in children’s intelligence level, vulnerability to disease, a decline in productivity and reduced economic growth, which ultimately increase poverty in Indonesia<sup>1</sup>. In more detail the impacts of stunting are divided into

short- and long-term effects. Short-term impacts include decreased cognitive abilities, motor skills and language development, as well as increased morbidity and mortality, while examples of long-term ones are declining reproductive health, small stature when adult, obesity, decreased learning ability and reduced productivity and work capacity<sup>2</sup>. Stunting in toddlers is a serious problem in Indonesia. The prevalence of stunting in the world in children aged below five has reached 22.2%, or about 151 million toddlers<sup>3</sup>. Basic Health Research 2018 reported that the prevalence of stunting in toddlers in Indonesia in 2018 had reached 30.8%<sup>4</sup>. Similar results from the Monitoring Nutritional Status (PSG) survey conducted by the Director of Public Nutrition of the Indonesian

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Ministry of Health show that the prevalence of stunting in Indonesia increased from 29% in 2015 and 27.5% in 2016, to 29.6% in 2017<sup>5,6,7</sup>. One of the provinces in Indonesia that has a high prevalence of stunting is West Java, with a significant increase in cases from 25.1% in 2016 to 29.2% in 2017<sup>6,7</sup>. One District in West Java with a high number of stunting cases is Bogor, at 28.5%<sup>7</sup>.

Factors causing stunting are grouped into three categories: immediate causes, underlying causes and basic causes. Basic causes are a result of aspects of the quantity and quality of human resources, such as caregiver education, social economic status and adolescent pregnancy<sup>8</sup>. Adolescent pregnancy has adverse effects on the mother's reproductive health; the nutritional adequacy condition of mothers who are still teenagers is not optimal to deal with pregnancy, leading to the risk of higher anthropometric failure, such as stunted growth of the child at birth<sup>8,9</sup>. Teenagers are at a vulnerable age in terms of education level, knowledge and the parenting of mothers of their children. A lack of these skills can lead to insufficient nutritional intake amongst toddlers and ultimately result in stunting. This study is highly recommended to look at the relationship between adolescent pregnancy and stunting among toddlers and to reach important conclusions in the efforts to reduce stunting in Indonesia.

## Method

The type of research is a cross sectional design<sup>10</sup>, using primary data taken from Tamansari District, Bogor District, Indonesia which was chosen as one of the districts with the highest prevalence of stunting. Tamansari has three community health centers, with 111 posyandu (integrated service posts)<sup>11</sup>. 46 of these were selected as sampling locations because of their active and routine carrying out of activities compared to other posyandu<sup>12</sup>. The study population was 10,447 toddlers aged 12-36 months<sup>12</sup>, and the research sample 500 toddlers aged 12-36 months from 46 posyandu in Tamansari district, that were randomly probability proportional to size (PPS). The inclusion criteria were the availability of complete data according to the variables to be studied, that the toddlers lived with their parents, and had lived at the research area for at least one year. We excluded toddlers with abnormalities (disabilities), which hampered the process of anthropometric measurement, and mothers who refused to participate. Data collection was conducted from 2 to 18 July 2019 using questionnaires and by recruiting trained enumerators from Nutrition and Epidemiology Master's students. The data collected were

verified by checking the instrument that has been filled in. The dependent variable was stunting status, while the independent variable was adolescent pregnancy, with the birth weight of toddlers, parents' income, mother's education, mother's parenting pattern, body mass index, and calorie and protein intake covariate. Anthropometric data for toddler height were measured using a Length Measuring Board (LMB) for those aged 12-24 months, and a microtoise for those aged 25-36 months. Toddlers' age data were obtained by checking birth certificates or maternal and child health books (MCH), while calorie intake data were based on a 24 hour recall questionnaire. Data on the age of adolescent pregnant mothers were obtained from the MCH handbook. Other data for the covariate variables were obtained from interviews using questionnaires. Data analysis was performed using the Stata program (v.13, StataCorp). Determination of stunting status was based on height-for-age z-scores using WHO Anthro software; calorie and protein intake status was based on Nutrisurvey software; and data on adolescent pregnancy variables were grouped into two categories, namely adult pregnancy if pregnant at age  $\geq 20$  years, and adolescent pregnancy if pregnant at age  $< 20$  years. Relationship analysis of the independent and dependent variables employed multivariate Cox regression analysis, and the interpretation of the effects was expressed by PR and a confidence interval of 95%<sup>13</sup>.

## Results

**Table 1. Characteristics of the study sample**

Variable	Frekuensi n=500	Proportion (%)
<b>Stunting Status</b>		
Stunting	196	39.2
Normal	304	60.8
<b>Adolescent Pregnancy</b>		
Adolescent Pregnancy (age <20 years)	81	16.2
Adult Pregnancy (age $\geq 20$ years)	419	83.8
<b>Toddler's Birth Weight</b>		
LBW	49	9.80
Normal	451	90.2
<b>Parents' Income</b>		
Low (<2 million rupiah)	177	35.4
High ( $\geq 2$ million rupiah)	323	64.6
<b>Mother's Education</b>		
Elementary School	262	52.4
Junior High School	114	22.8
Senior High School	115	23.0
University or College	9	1.8

Variable	Frekuensi n=500	Proportion (%)
<b>Mother's Parenting Pattern</b>		
Bad	277	55.4
Good	223	44.6
<b>Maternal Body Mass Index</b>		
Underweight (BMI <17.0)	54	10.8
Normal (BMI 18.5.0-25.0)	295	59.0
Overweight (BMI >25.0)	151	30.2
<b>Toddler's Calorie Intake</b>		
Poor	287	57.4
Satisfactory	213	42.6

Variable	Frekuensi n=500	Proportion (%)
<b>Toddler's Protein Intake</b>		
Poor	293	58.6
Satisfactory	207	41.4

The study involved 500 participants from Taman Sari District, Bogor District, Indonesia. Table 1 shows a description of the characteristics of some of the variables. The proportion of stunted toddlers aged 12-36 months was 39.20%, while the proportion of mothers who became pregnant in their teens was 16.20%.

**Table 2. Bivariate analysis of adolescent pregnancy with stunting in toddlers aged 12-36 months**

Variable	Stunting		Normal		Total	PR	95%CI	P-value
	n=500	%	n=500	%				
<b>Adolescent Pregnancy</b>								
Adolescent Pregnancy (age <20)	47	58.02	34	41.98	81	1.63	(1.30-2.04)	0.0002*
Adult Pregnancy (age ≥20)	149	35.56	270	64.44	419	[ref]		

**Note:** PR = Prevalence Ratio; \*significant statistic  $p < 0.05$

Table 2 shows the bivariate analysis of adolescent pregnancy and stunting. The prevalence of mothers who had teenage pregnancies and stunted toddlers was 58.02%, while those without stunted toddlers was 41.98%. In comparison, adult pregnancies resulting in stunted toddlers was 35.56%, while those without

stunting was 64.44%. From the bivariate analysis the results have a PR value of 1.63, with p-value of  $0.0002 < 0.05$  (95% CI 1.30 – 2.04), which means that the prevalence of stunting in toddlers resulting from teenage pregnancies was 1.63 times higher than from adult pregnancies.

**Table 3. Full multivariate model**

Stunting Risk Factors	PR	95%CI	P-Value
Adolescent Pregnancy	1.41	1.00 – 1.98	0.048*
Parents' Income	1.28	0.95 – 1.71	0.099
Mother's Education	1.46	0.98 – 2.16	0.058
Toddler's Birth weight	1.41	0.94 – 2.11	0.090
Mother's Parenting pattern	1.41	1.04 – 1.90	0.025
Maternal Body Mass Index	1.14	0.90 – 0.44	0.254
Calorie Intake	1.02	0.68 – 1.51	0.911
Protein Intake	0.85	0.57 – 1.27	0.447

**Note:** PR = Prevalence Ratio; \*significant statistic  $p < 0.05$

Table 3 shows the full multivariate model consisting of the main variables, namely adolescent pregnancy and

the other covariate variables that have the potential to be confounders.

**Table 4. Final multivariate model**

Stunting Risk Factors	PR	95%CI	P-Value
Adolescent Pregnancy	1.42	1.01 – 1.98	0.042*
Mother's Education	1.53	1.04 – 2.25	0.031*
Mother's Parenting Pattern	1.42	1.05 – 1.91	0.021*

**Note:** PR = Prevalence Ratio; \*significant statistic  $p < 0.05$

The final multivariate model can be seen in Table 4 the PR result is 1.42 (95% CI 1.01-1.98), which means that the prevalence of stunting resulting from adolescent pregnancy is 1.42 times higher than that from adult pregnancy, after being controlled by the “mother’s education” and “mother’s parenting pattern” variables.

### Discussion

From this cross-sectional study, we have evaluated that adolescent pregnancies, controlled by mother’s education and parenting pattern, pose a significant risk of stunting in Bogor District, West Java, Indonesia, with a result of 1.42 (95% CI 1.01-1.98). This is in line with research in Nepal, which found that teenage mothers had a prevalence of stunted toddlers 2.12 times higher than adult mothers (POR = 2.12 95% CI 1.01-4.44)<sup>14</sup>. In Indonesia, 54.01% of women pregnant for the first time are older than 20, but the remainder are under 20. This shows that half of the women who have been pregnant in Indonesia experience their first pregnancy at the age of <20 years<sup>15</sup>. Adolescent pregnancy is also inseparable from the high level of child marriage among adolescents in Indonesia. Early marriage in West Java is 30.5%. This makes West Java the province with the highest prevalence of early marriage on the island of Java and is ranked ninth nationally, while Tamansari, as the research location, is one of seven sub-districts in Bogor District which has a high prevalence of early marriage in West Java<sup>16</sup>. Research in India concluded that the prevalence of stunted toddlers with mothers who married at the age of <18 was 1.2 times higher than adult mothers (POR = 1.22 95% CI 1.12-1.33)<sup>17</sup>, while research at Tamale Metropolis, Ghana, also concluded that mothers who were married at the age of > 18 years had a stunting prevalence 0.76 times higher than those aged <18 (POR = 0.76 95% CI 0.59-0.99)<sup>18</sup>. Adolescent pregnancy causes adverse effects on reproductive health and mothers are at great risk of giving birth to babies with a stunting condition. Maternal nutrition at that age (<20 years) has not developed optimally, and if it is

forced nutrition it will result in higher anthropometric failures later, such as stunted growth of the child’s body. Teenage pregnancy also has the potential to lead to babies with a low birth weight (LBW), which accounts for around 20% of stunting<sup>15</sup>.

In this study, two confounder variables cause stunting: mother’s education and mother’s parenting pattern. Educational factors play a major role amongst mothers in terms of fulfillment of toddler nutrition intake during the growth process. Mothers with a low education are also at risk of having stunted children due to their lack of experience and correct knowledge about feeding intake. Studies in Brazil concluded that mothers with low education (<9 years) had a prevalence of stunted toddlers 1.7 times higher than mothers with higher education ( $\geq 9$  years) (PR = 1.77 95% CI 1.10-2.86)<sup>19</sup>. In other studies in Rwanda, it was concluded that mothers with poor education had a prevalence of stunted toddlers 1.7 times higher than mothers with higher education (POR = 1.71 95% CI 1.25-2.34)<sup>20</sup>. while mothers’ parenting patterns played an important role in terms of toddlers’ food intake, personal hygiene practices and the environment; seeking treatment was also very relevant when associated with stunting<sup>21</sup>. Research in West Nusa Tenggara (NTB), Indonesia, concluded that mothers who had poor knowledge of malnutrition had a prevalence of stunted toddlers 2.2 times higher than those with good knowledge (p value = 0.001 PR = 2.28), and that children raised by two parents had a prevalence of stunted toddlers 1.6 times higher than those raised by big families (p value = 0.003 PR = 1.64)<sup>22</sup>.

These overall results indicate that there are interrelated variables between adolescent pregnancy, education and mothers’ parenting pattern. Promotes a woman to get pregnant for the first time in adulthood will open up opportunities for adolescents to study at a higher level. This is what will ultimately increase the knowledge and parenting of mothers related to toddlers. For further research, it would be beneficial to add other

variables related to wider maternal characteristics, such as the length of the mother's marriage, status of the mother's occupation, mother's height and mother's knowledge of how to care for toddlers. In addition, we recommend that future research be conducted on a wider population, not limited to the District.

### Conclusions

Based on the results of the study, stunting can be prevented by increasing the maternal gestational age by raising the minimum age of marriage in accordance with Indonesian marriage law limitations at age of 19 years<sup>23</sup> and get first time pregnant at age of 20 years, because from this study there are still 16.2% of mothers who are pregnant aged <20 years. Moreover, it is also necessary to improve the education of adolescent girls, giving them knowledge about proper parenting before they get married and become pregnant.

**Ethical Considerations:** This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Universitas Indonesia (Ket-560/UN2. F10/PPM.00.02/2019).

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# Factors of Acute Diarrhoea among Children of Under Five Years Old in Sabah, Malaysia: A Case-Control Study

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## Abstract

Acute diarrhoea is a major public health problem and is the second leading cause of death in children. It has implications in terms of morbidity and mortality especially in the under five years old age group. The purpose of this study was to determine the factors associated with acute diarrhoea among children under 5 years old in Sabah. This was a case-control study involving 584 samples in four districts in Sabah. Analysis with multiple logistic regression discovered the associated factors of acute diarrhoea among under 5 years old were child's age, single parents aOR5.209 (95%CI 1.09-25.01), Peribumi Sabah mother aOR1.542 (95%CI 1.01-2.34), unemployed mother aOR1.783 (95%CI 1.16-2.75), less than RM2,000 monthly household income aOR1.643 (95%CI 1.08-2.49), no garbage collection aOR1.923 (95%CI 1.24-2.98), adjacent open garbage aOR1.888 (95%CI 1.23-2.91), average rainfall of 151mm or more aOR1.768 (95%CI 1.22-2.56) and less than 1 year of breastfeeding aOR1.685 (95%CI 1.11-2.55). The study has revealed the need to improve the overall level of hygiene and sanitation in the population.

**Keywords:** *Diarrhoea, children, Sabah, factors, case-control.*

## Introduction

Diarrhoea is still a major public health problem, causing notable numbers of morbidity and mortality worldwide. It is the second leading cause of death in children under five years old. Around 1.8 million people die each year from diarrhoeal disease, with 90% are children who are under 5 years old from developing countries<sup>1</sup>. The outcome of the infection may have effects in electrolyte loss, dehydration, shock and sometimes

death. Diarrhoea has morbidity effects, which include stunting of growth, delay in neurological development, concomitant infections, diarrhoea recurrence and failure to thrive<sup>2</sup> worldwide. The present study was undertaken to further define research priorities for the prevention and treatment of diarrhoea in low and middle income countries. We used the Child Health and Nutrition Research Initiative (CHNRI).

In Malaysia, diarrhoea persistently contributes to the national's public health issue, with at least 13 million episodes of acute diarrhoea occurring annually. Acute diarrhoea is under reported with only less than 0.1% of cases actually being captured by the national surveillance program. Gastrointestinal infection is the second most common cause for hospital admissions to public hospitals and with more hospitalizations; there is a significant burden placed on health care costs. For example the cost for inpatient care of childhood rotavirus

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diarrhoea alone in Malaysia was estimated to be up to US\$1.8 million annually<sup>3</sup>.

Hospitalizations for acute diarrhoea were found to be higher in East Malaysia and were particularly high in the indigenous minority. It may represent a true prevalence of hospitalization but in East Malaysia there is proportionately less access to private medical facilities and a higher preference to hospitalize patients because of the patients' travel distances. Besides that, many children who have mild illnesses do not seek medical treatment and this can indicate that thousands more in Malaysia are unreported<sup>4</sup>. This study was conducted to determine the factors associated with acute diarrhoea among those under 5 years old in four districts of Sabah.

### Material and Method

This study was conducted in four districts of Sabah which are Kota Kinabalu, Penampang, Putatan and Papar. The major ethnic groups here are Kadazan/Dusun, Bajau, Murut, Malay, Chinese, Indian and other Bumiputera. This is a case-control study involving 584 respondents, which consisted of 292 in each group of case and control. The cases were children under 5 years old with acute diarrhoea selected randomly from public health centres in the four districts of Sabah over the period of 11 months. Acute diarrhoea is defined as having three or more episodes of loose stools in any 24-hour period within the past four weeks (28 days) before the interview. The controls were respondents under 5 years old who attended the same health care centres for problems other than gastrointestinal diseases.

A questionnaire was adapted and then modified to suit the local context with permission from authors in a previous study done in Brazil, which looked at risk factors for diarrhoea in a middle income country<sup>5</sup>. It underwent forward translation to Malay and was

reviewed by experts for content and language. A pre-test was conducted, and the comments and discussion were taken into account for the final adjustments in the questionnaire. The questionnaire incorporates demographic, socioeconomic, food preparation, disease contact and environmental variables. The data was analysed with SPSS 20.0 for bivariate analysis then with logistic regression. Respondents who voluntarily agreed to take part had to give their written consent and they were given full information regarding the research. There were no invasive procedures involved.

**Findings:** There were 614 respondents interviewed and 30 were rejected. Out of the rejected respondents, 18 did not have a complete address or had missing data while 12 attended the health centres but did not originally stay in the four districts. The final sample size were 584 respondents, which consisted of 292 in each group of case and control. A total of 584 samples, which were 292 cases and 292 controls which included from Kota Kinabalu with 182 (62.3%) respondents, 48 (16.4%) from Penampang, 53 (18.2%) from Putatan and 9 (3.1%) from Papar for each case and control group. In terms of the child's age the mean age was 2 years old for cases and 1 year 8 months for controls. The variables were then analysed with multiple logistic regression.

The main factors that influence acute diarrhoea among those under 5 years old were child's age, single parents aOR5.209 (95%CI 1.09-25.01), Peribumi Sabah mother aOR1.542 (95%CI 1.01-2.34), unemployed mother aOR1.783 (95%CI 1.16-2.75), less than RM2,000 monthly household income aOR1.643 (95%CI 1.08-2.49), no garbage collection aOR1.923 (95%CI 1.24-2.98), adjacent open garbage aOR1.888 (95%CI 1.23-2.91), average rainfall of 151mm or more aOR1.768 (95%CI 1.22-2.56) and less than 1 year of breastfeeding aOR1.685 (95%CI 1.11-2.55).

**Table: Multiple logistic regression analysis of cases and controls**

Risk factor	$\beta$	Standard error	Wald	P	Adjusted odds ratio (aOR)	95% CI
<b>Child's age</b>						
<6 (0)						
6-11 (1)	-0.896	0.556	2.598	0.11	0.408	0.14-1.21
12-23 (2)	-1.769	0.503	12.369	<0.001*	0.171	0.06-0.46
24-35 (3)	-1.747	0.493	12.546	<0.001*	0.174	0.07-0.46
36-47 (4)	-1.949	0.497	15.400	<0.001*	0.142	0.05-0.38
48-59 (5)	-2.427	0.513	22.363	<0.001*	0.088	0.03-0.24

Risk factor	$\beta$	Standard error	Wald	P	Adjusted odds ratio (aOR)	95% CI
<b>Parent's marital status</b>						
Single (1)	1.650	0.800	4.251	0.04*	5.209	1.09-25.01
Married (0)						
<b>Mother's Ethnicity</b>						
Peribumi Sabah (1)	0.433	0.214	4.097	0.04*	1.542	1.01-2.34
Others (0)						
<b>Mother's Occupation</b>						
Unemployed (1)	0.578	0.220	6.886	0.01*	1.783	1.16-2.75
Employed (0)						
<b>Households income per month</b>						
<RM 2000 (1)	0.497	0.212	5.486	0.02*	1.643	1.08-2.49
≥RM 2000 (0)						
<b>Garbage collection</b>						
No (1)	0.654	0.223	8.599	0.003*	1.923	1.24-2.98
Yes (0)						
<b>Open garbage</b>						
Yes (1)	0.636	0.220	8.353	0.004*	1.888	1.23-2.91
No (0)						
<b>Average rainfall</b>						
151mm≥ (1)	0.570	0.188	9.192	0.002*	1.768	1.22-2.56
≤150mm (0)						
<b>Breastfeeding</b>						
<1 year (1)	0.522	0.212	6.053	0.01*	1.685	1.11-2.55
≥1 year (0)						
Constant	-4.479	0.882	25.799	<0.001*	0.011	

\*significant OR

Nagelkerke R<sup>2</sup> = 0.234

Forward LR Multiple Logistic Regression model was applied.

Multicollinearity and interaction term were checked and not found.

Hosmer-Lemeshow test, (p=0.893), classification table (overall correctly classified percentage =70.1%) and area under the ROC curve (73.6%) were applied to check the model fitness.

## Discussion

In a previous Malaysian study on acute diarrhoea, young adults had the highest incidence of acute diarrhoea while children of under five years had a slightly lower incidence <sup>6</sup>. This may be due to their active lifestyle and tendency to be eating outside rather than at home. Meanwhile, in a cross-sectional study among 274 children aged 12–59 months in low socioeconomic city areas of East Jakarta, it was shown that the possibility of getting diarrhoea was amplified in children aged less than 2 years old, and they were more susceptible if they had mothers with poor food hygiene practices, and the risk was extremely high during the weaning period <sup>7</sup> food preparation, cleanliness of utensils, water source and safe drinking water, habits of buying cooked food, child's bottle feeding hygiene, and housing and environmental

condition were collected through home visit interviews and observations by fieldworkers. Thirty-six practices were scored and classified into poor (median and below). The most common age in most diarrhoea studies in children was 6 to 11 months, which can be due to tainted weaning sustenance. Furthermore, crawling begins at this time and the hazard of ingesting tainted materials may cause diarrhoea. However the risk declines after 6 to 11 months; most likely due to strengthened immunity after repeated exposure to pathogens <sup>8</sup>.

There is a high incidence of poverty in rural and urban Sabah as well as in rural Sarawak. Various method for measurement were used, with almost similar findings <sup>9</sup>. In most underdeveloped nations the prevalence of diarrhoea was found to be higher among rural children than among urban children. This could be due to

inadequate access to clean, safe water and sanitation infrastructures in the rural areas<sup>8</sup>. Socioeconomic status and parental care also play a part. Single motherhood is an important risk factor for children's nutritional status and survival before the age of 5 years. It puts a family at disadvantage, especially in terms of the child's health and survival chances but could be reduced when these mothers have access to a better economy, improvements in parental help and healthy behaviour. This could come in the form of welfare benefits and other family-based interventions. Interventions that focuses on single mother families may help reduce under-5 mortality<sup>10</sup>.

Our study findings of Pribumi Sabah as the ethnic group with the highest number of acute diarrhoea cases echoes similar findings from other studies<sup>6</sup>. As we know, sociocultural status does play a part in foodborne illness<sup>11</sup>. In terms of ethnicity, Malaysia is regarded as a diverse, multi-ethnic country. The government is trying to close the gap by relocating the deprived groups to new settlements at the fringe of towns<sup>12</sup>. In other countries like Nepal, ethnicity is found in relation to caste, adding to customary social class categories. Some ethnic groups are usually underprivileged. The underprivileged are at a disadvantage in terms of socioeconomic status<sup>13</sup>. It is important for ethnicity data be included in studies, as this data can contribute to analysis of social and economic disparities. Ethnicity is related to a range of other cultural, demographic, socioeconomic, and ecological variables<sup>14</sup>.

In a cross-sectional study done in Ethiopia on 768 households, it was found that children who were partly receiving breast milk were twice more likely to get diarrhoea compared to those exclusively receiving breast milk. The risk was three times higher for those who received less than 1-year duration of breastfeeding. During this period there is inborn immunity and less exposure to pathogens. Once the child has lost inborn immunity, starts to wean, and is exposed to various pathogens from eating contaminated food, diarrhoeal cases will start to increase<sup>15</sup>. Interventions such as exclusive breastfeeding, continuation of breastfeeding until 24 months of age, complementary feeding to improve nutrition, along with improved sanitation, are positive ways to influence the prevention and outcome of diarrhoea. There is also recommendation for routine zinc supplements in managing childhood diarrhoea, but it is not currently practiced in many countries<sup>16</sup>. Breastfeeding is vital and it should be continued even during diarrhoeal episode<sup>17</sup> the objective of this study

was to examine household management of childhood diarrhoea. A simple random sample of households was selected from the Health and Demographic Surveillance Site-León. Parents or caretakers of children below five years of age, who developed diarrhoea (n = 232. In addition, special health education programs should cater for mothers or caretakers to promote proper feeding practices, in consideration of nutritional status according to standard policies<sup>18</sup>.

Households that are located adjacent to drainage openings are likely to experience diarrhoea because of waste collection that carry diarrhoea pathogens<sup>19</sup>. In managing daily waste, some households either tend to keep their trash bins in the house or around the perimeter of their homes. Trash bins that are not covered tend to draw houseflies. Food may be contaminated by these flies through the action of poor waste handling, and this may thus increase the incidence of diarrhoea in children<sup>20</sup>. Open disposals are also breeding site for insects, which may carry diarrhoea pathogens to water and food<sup>8</sup>.

There is a strong relationship between diarrhoea infections and climate<sup>7</sup> food preparation, cleanliness of utensils, water source and safe drinking water, habits of buying cooked food, child's bottle feeding hygiene, and housing and environmental condition were collected through home visit interviews and observations by fieldworkers. Thirty-six practices were scored and classified into poor (median and below. A study in Congo which used 20 years of historical data on temperature and rainfall found that increased rainfall indirectly promotes an increase in new cholera cases which causes acute diarrhoea. A reduction in cholera cases could be seen when there is an increase in average temperature that promotes a reduction in rainfall<sup>21</sup>.

## Conclusion

The significant factors elicited in this study shows the need to improve the overall hygiene and sanitation in the affected areas. A long-term plan in developing these necessities would surely benefit the population and elevate in general the status of public health in the region.

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# Effect of Visfatin on Insulin Resistance in Non-Obese Adolescents

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## Abstract

**Background:** Evidence base indicate that insulin resistance (IR) is common among adolescents and related to Diabetes Mellitus (DM). The serum visfatin is adipocytokine derived from visceral fat that may represent a novel IR of metabolic syndrome include DM type II. Therefore, it is necessary to determine the role of serum visfatin and IR in non-obese adolescent. Also this role could help to illustrated more effective early detection for DM type II in non-obese adolescents.

**Objective:** The current study aimed to evaluate serum visfatin and IR in non-obese adolescents and determine its association.

**Method:** In cross-sectional study we recruited 155 normal weights between aged 13-18 years. Laboratory measurements were included triglyceride, fasting blood sugar, insulin and visfatin, also IR index calculated by homeostasis model assessment (HOMA). Anthropometric measurements were included height, weight, bicep and tricep skinfold thickness.

**Results:** Most of subjects were girl 114 (73.55 %). The mean of serum visfatin level was 57.72 ng/ml (range: 0.26-876.2 ng/ml) and HOMA level was 2.26 (range: 0.13-13.4). Non-obese adolescents were found IR. Serum visfatin was not statistical significant with IR ( $OR_{adj} = 3.23$  (95%CI: 0.84–12.45),  $p = 0.098$ ). All lipid profile (bicep, tricep skin fold thickness and triglyceride) were not affected to IR in non-obese adolescent.

**Conclusions:** Serum visfatin in non-obese adolescent is independent to IR. IR usually occurred with obese adolescent, but in this study also occurs with non-obese. The key point is lipid profile does not affect to IR status.

**Keyword:** *Visfatin, insulin resistance, non-obese, adolescent, homeostasis model assessment.*

## Introduction

The increasing of insulin resistance (IR) is an important problem during adolescent. Also, adolescent is associated with decreased sensitivity to insulin.<sup>(1,2)</sup> Furthermore the IR appears to be associated with an increased risk factors of metabolic syndrome especially Diabetes Mellitus (DM) type II.<sup>(1,2)</sup> IR as well as insulin

deficiency have been shown to be strong predictors in the future development of DM type II.<sup>(3-5)</sup> A clear definition of normal physiologic changes in IR that occur during puberty is necessary before an etiologic association between IR and metabolic syndrome can be considered in this age-group.<sup>(6-8)</sup> Hence research about IR in adolescent is paramount importance in preventing DM type II related mortality and morbidity in adults.<sup>(9,10)</sup>

Visfatin, is an adipocytokine that was highly expressed in visceral fat and was originally isolated as a secreted factor that synergizes with interleukin-7.<sup>(11)</sup> Visfatin is proposed as significant pro-inflammatory mediators, which also interfere with the regulation of insulin sensitivity.<sup>(12)</sup> Visfatin directly binds to and stimulates the insulin receptor, exerting insulin-

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mimetic affects in vitro and in vivo.<sup>(13)</sup> In addition, some research reported that visfatin is pro-inflammatory in the pathogenesis of beta-thalassemia major and its association with markers of endothelial function.<sup>(14)</sup> So, visfatin may be found in diseases not associated with obesity.

An initial study showed that IR and visfatin, as a significant positive association with total fat mass and body mass index (BMI), especially focus on obesity children and adolescent.<sup>(15,16)</sup> It was found that serum visfatin was markedly elevated in obesity (17), and obesity induces IR by fat tissue.<sup>(18)</sup> Furthermore, some recently research found that IR is high prevalence in South-Asian adolescents with normal BMI.<sup>(19)</sup> Since the hypothesis to describe the pathology of IR can find in normal weight<sup>(20)</sup> In addition, newly identify cutoff points of HOMA established in adolescents for the diagnosis of IR, which use of the HOMA cutoff > 2.5 for both genders.<sup>(21)</sup>

Although, a study between visfatin and metabolic syndrome parameters, such as IR in obese adolescent has recently been undertaken. However the association between visfatin level and IR in normal weight adolescents have not been investigated. In this study, we aimed to evaluate serum visfatin and IR, and associations between serum visfatin and IR in normal weight adolescents.

## Materials and Method

**Design study and sample:** The cross-sectional study in non-obese adolescents aged 13-18 years. The inclusion criteria included adolescent with normal weight as per International Obesity Taskforce (IOTF) criteria.<sup>(22)</sup> The exclusion criteria included subjects with diagnosed diabetes mellitus or taking metformin or any weight reducing drugs, subjects with any known systemic illness or endocrine or metabolic disorders, known to be associated with obesity, or subjects with symptoms to suggest hypothalamic obesity were excluded from the study. A total of 155 non-obese adolescent were recruited from 5 of 18 high schools in Mahasarakham province, Northeast Thailand. Informed consent was obtained from the adolescent and their parents before launching the study. The research protocol was approved by the ethical committee of Mahasarakham University.

**Anthropometry:** The weight of individual dressed in light clothing was measured using a carefully calibrated beam balance (Detecto®). Height measurement was

taken by means of a vertical measuring rod. BMI in kilogram divided by height in square meter was calculated for each subject. Standard techniques were applied in measuring of triceps and biceps skin fold thickness.

**Laboratory determination:** Blood samples were collected about 10 mL from individual subject that was taken in the morning after an overnight fast. All of blood samples were immediately processed in divide into aliquots and stored at -80°C until further determination. For triglycerides levels were determined using a commercially available test kit that obtained from Siemens Healthcare Diagnostic Inc. An enzymatic test was applied for measuring plasma glucose level by a test kit from Dade Behring Inc. Serum insulin was assessed by a commercially available radioimmunoassay test from Linco Research, Inc. The HOMA calculation was applied the formula fasting insulin (mU L<sup>-1</sup>) x fasting glucose (mmol L<sup>-1</sup>) divided by 22.5.<sup>(23, 24)</sup> A commercially available radioimmunoassay test was used to determine serum visfatin levels (LINCO Research, Inc, St., Charles, Missouri, USA). The cut-off point of serum visfatin for DM which was 9.55 ng/ml.<sup>(25)</sup>

**Statistical analysis:** The data were analyzed using Stata version 13.0. Continuous variables were expressed as minimum, maximum, standard deviation (SD) and median. Categorical variables were expressed as number and percentage. The associations of serum visfatin and IR, and the factors associated with IR were using multiple logistic regression analysis. A p-value < 0.05 was considered statistically significant. The classification of IR and non-IR group divided by HOMA cutoff > 2.5.<sup>(21)</sup>

## Results

**Demographic Characteristics:** The 155 subjects non-obese adolescent were recruited in this study. The demographic, anthropometry and laboratory data showed that the ratio of boy and girl are 41/114. The serum levels of visfatin, insulin and fasting blood sugar were 57.72 (0.26-876.2) ng/mL, 19.05 (4.50: 143.9) mU/L and 87.57 (72-126) mg/mL, respectively. As, average value of HOMA was found 2.6 in non-obese adolescent. IR subject was 34.84 percentages and HOMA levels were showed higher than non-IR (1.71 vs. 3.18,  $P < 0.05$ ). The serum visfatin levels were found to be elevated in IR group (15.63 vs. 38.62 ng/mL,  $P < 0.05$ ).

**The effect between visfatin and other variables, with IR in non-obese adolescent:** The variables effected with IR in non-obese adolescent included visfatin,

gender, bicep, tricep skinfold thickness and triglyceride (shown in Table 1). All of 155 subjects found that subject with IR was 34.84%. The effect between visfatin and IR from univariate analysis using simple logistic regression was not statistical significance (OR=3.44 (95%CI: 0.96–12.31), p=0.034).

The results of the multiple logistic regression analysis showed that after controlling for gender, bicep skinfold thickness, tricep skinfold thickness and triglyceride, merely the OR of visfatin (OR<sub>adj</sub>= 3.23 (95%CI: 0.84–12.45), p = 0.098) was not significant. Furthermore the research found that tricep skinfold thickness (OR<sub>adj</sub>= 1.05 (95%CI: 0.99–1.11), p=0.072) was likely to affect with IR. Therefore, serum visfatin is independent to IR in non-obese adoles-cent.

### Discussions

In the present study, it has been reported that 1) serum visfatin is independent to IR in non-obese adolescent 2) all lipid profile are independent to IR in non-obese adolescent and 3) some adolescents with IR are non-obese.

These finding displayed that visfatin is independent with IR in non-obese adolescents. The previous knowledge explained that serum visfatin level which is activated in obesity, is correlated with BMI, and HDL-c in obese adolescents. (15) Visfatin is highly enriched in the visceral fat and bind to insulin receptor.(13) Although, some research reported high visfatin level was occurred with non-obese, it did not found in this study. However,

visfatin was not marker role of metabolic syndrome development in normal weight adolescent that support by Oki *et al.* (26) found that serum visfatin is not correlated with IR and suggested that the serum visfatin are not associated with parameters of body composition or IR.(26) Other results we found that 34.84% of subjects was IR. So indicated that during puberty in children develop a transient state of IR. It is speculated that this physiologic, rather than pathologic, state of IR may allow for the accelerated growth that occurs during pubertal maturation.(16) And new research in 2016 is so interesting they found that low-birth-weight was correlated with insulin resistance at 12 months in non-obese infants. (27) Seem from some review revealed that high and low birth weights and followed by rapid postnatal growth were linked to increased risks of obesity, insulin resistance and high blood pressure in later life. (28) Thus, low-birth-weight may affect to IR status in non-obese adolescent.

Our finding that non-obese adolescent with IR and corresponding with Baba *et al.* (20) found that non-obese adolescents with impaired insulin sensitivity had higher systolic blood pressure and IR is associated with cardiovascular risk factors. However, IR in non-obese adolescent may utility for prevents them from developing real metabolic syndrome in the future.

Some limitations of this study need to be regarded, which we used a cross-sectional study for our design. Cross-sectional study provide information at a single point in time, cannot explain the cause and effect relationship of variables.

**Table 1: Odds ratios (ORs) of having IR and their 95% confidence intervals for visfatin and each factor adjusted for all other factors**

Variable	Number	% IR	Crude OR	Adjust OR	95%CI	p-value
Overall	155	34.84	NA**	NA**	NA**	NA**
<b>Visfatin (ng/mL)</b>						<b>0.098</b>
≤ 9.55	3	15.00	1	1		
>9.55	51	37.78	3.44	3.23	0.84-12.45	
<b>Gender</b>						<b>0.306</b>
Boy	41	36.59	1	1		
Girl	114	34.21	0.90	0.66	0.29-1.47	
<b>Bicep skinfold thickness (mm)</b>						<b>0.139</b>
≤ 19	81	25.93	1	1		
>19	74	44.59	2.30	1.74	0.83-3.66	
<b>Tricep skinfold thickness (mm)</b>	155	NA**	1.05	1.05	0.99-1.11	0.072
<b>Triglyceride (mg/mL)</b>	155	NA**	1.00	1.00	0.99-1.01	0.098

\*p < 0.05, \*\*Not applicable



## Conclusions

This study shown that the visfatin in non-obese adolescent is independent to IR, and IR can found in non-obese adolescent. Further investigation is needed to determine tricep skinfold thickness level in non-obese adolescent for approach of clinicians toward prevention IR in future.

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# ***Escherichia Coli* in *Musca Domestica* Flies toward the Incidence of Diarrhoea in Children Under Five Years in around the Location of Traditional Fish Processing in the North Jakarta**

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## **Abstract**

Poor environmental sanitation can cause diarrhoea. Transmission of diarrhoea can occur with faecal to oral transmission. For example, faeces that contain bacteria, viruses, protozoa and worms transferred to food or drinks either with zoonotic or anthroponotic cycles depending on the pathogen. Faecal to oral transmission in infectious diarrhoea carried out by an intermediary zoonotic cycle has considered the insect fly as a potential mechanical agent for the transmission of diarrhoeal disease. This study aims to assess the relationship of *Escherichia coli* (*E. coli*) in *Musca domestica* flies to the incidence of diarrhoea in children under five in a residential area around a traditional fish processing location in North Jakarta. This research used a cross-sectional design; the study conducted from May to June 2019. The study population was children under-fives with a total sample of 97 respondents. Interviews and observations were carried out on mothers of children under-fives as respondents about characteristics of children under-fives, mothers and basic sanitation factors. The study also was done by measuring the density of flies using the Scudder technique with the Fly Grill tool. The existence of *E. coli* measured by examining samples of *Musca domestica* flies caught by the Most Probable Number (MPN) technique. There were significant results by statistical testing for independent variables, which are high levels of fly density, incomplete childhood immunization, maternal education, basic sanitation factors that did not include eligible for clean water supply facilities, household waste disposal, wastewater management, and drinking water sources. Bivariate analysis revealed that there was a significant relationship in positive *E. coli* sample of *Musca domestica* flies to diarrhoea in infants with p-value=0,007. While non-exclusive breastfeeding and family toilet that did not eligible significantly related to the incidence of children under five diarrhoea in the region.

**Keywords:** *Diarrhoea; E. coli; children under five; flies; sanitation, North Jakarta.*

## **Introduction**

Until now, diarrhoea is an environmental-based disease that is still a problem in the world, especially in developing countries. It is the second leading

cause of death in the world after pneumonia<sup>[1][2]</sup>, causing morbidity and mortality in all regions and ages<sup>[3][4][5]</sup>. WHO and UNICEF, say around 2 billion cases of diarrhoea occur worldwide every year, as many as 1.9 million attack children aged younger than five years, even causing death. Developing countries are the countries with the most cases<sup>[1][6]</sup>. In Indonesia, diarrhoeal disease is still a health problem in the community. The spread of diarrhoea can be through contaminated food/drinks, or from person to person as a result of poor sanitation. The magnitude of the number of incidents in infants is due to the vulnerability of infants the immunity that is still weak so it is easier to cause

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fluid loss<sup>[8][9][10]</sup>. Poor environmental sanitation can also cause diarrhoea. Transmission of diarrhoea can occur by faecal to oral transmission, where diarrhoea occurs due to contamination of food drinks by poor environmental sanitation, for example, due to faeces containing bacteria, viruses, protozoa and worms transferred to food or drinks both with zoonotic and or anthroponotic cycles depending on the pathogen<sup>[11]</sup>. Faecal to oral transmission in infectious diarrhoea carried out by an intermediary zoonotic cycle has considered the insect fly as a potential mechanical agent for the transmission of diarrhoeal disease.<sup>[12][13][14]</sup>

The location of traditional fish processing in North Jakarta is a place for processing various types of fish that traditionally done. The processing location is not far from residential areas. Based on data from health service facilities in the region the incidence of diarrhoea ranks second out of the ten most extensive types of diseases in the region. Diarrhoea attacks many children under-fives in the area. It suspected that the cause of diarrhoea is due to a large amount of garbage that causes the density of flies. The ability of flies as a mechanical vector can carry pathogenic agents that cause diarrhoea, especially *E. coli*. Based on the above background, researchers are interested in examining the relationship of the presence of *E. coli* in the *Musca domestica* flies to the incidence of children under five diarrhoea in a residential area around a traditional fish processing location in Jakarta. This study aimed to analyze the relationship between the presence of *E. coli* in *Musca domestica* flies and the incidence of children under five diarrhoea around traditional fish processing locations in North Jakarta.

### Method

The study design uses a quantitative approach to a cross-sectional study design. The study population was mothers who have children under five. The sample size of this study obtained through the calculation of the proportion <sup>[15]</sup> binomial formula with the results of 97 mothers. The sample selection uses a multi-stage sampling technique with a simple random sampling method. Interviews and observations were carried out with a questionnaire. The measurement of the density of the respondent’s house flies was done inside the house as many as five points and outside the house of the respondent as many as five points using the Scudder technique using the Fly grill, Thermo hygrometer, hand counter, and stopwatch. The sampling of *Musca domestica* flies carried out after measurements taken. Identification of the presence of *E. coli* in flies was carried out using the Most Probable Number (MPN) technique. Data analysis performed with the chi-square test ( $X^2$ ) with a value of  $p \leq 0.05$ . The interpretation of fly density on the fly grill is 0-2: low and >2: high/dense. The dependent variable of this study is the incidence of diarrhoea in children under five with independent variables of the presence of *E. coli* in *Musca domestica* flies, as well as covariable levels of fly density, children under five factors exclusive breastfeeding and completeness of immunization, maternal factors in the form of education level and basic sanitation factors such as clean water supply facilities, management of household garbage, sewage disposal, faeces disposal and drinking water sources for children under-fives.

### Results

The results of the bivariate analysis can be illustrated in the table below (Table. 1)

**Table 1. Bivariate analysis between Laboratory Results, Flies density, Exclusive breastfeeding, Complete Immunization, Mother’s Education, Water supply facilities, Waste processing facilities, Family toilet facilities, Wastewater disposal facilities, Children under five’s drinking water facilities to *E. coli* in *Musca domestica* flies to the incidence of children under five diarrhoea in a residential area around traditional fish processing locations in North Jakarta**

Variable	The Incident of Diarrhoea					OR (95%)	p Value
	n	%	n	%	N		
<b>Laboratory Results</b>							
Positive	20	69	9	31	29	3.822 (1.511-9.672)	0,007
Negative	25	36,8	43	63,2	68		

Variable	The Incident of Diarrhoea					OR (95%)	p Value
	n	%	n	%	N		
<b>Flies density</b>							
Low	31	88.6	4	11.4	35	26.571 (8.007-88.173)	0.000
High	14	22.6	48	77.4	66		
<b>Exclusive Breastfeeding</b>							
No	17	56.3	21	43.8	48	2.214 (.981-4.9447)	0.085
Yes	18	36.7	31	63.3	49		
<b>Complete Immunization</b>							
No	12	80	3	20	15	5.939 (1.555-22.681)	0.011
Yes	33	40.2	49	59.8	82		
<b>Mother's Education</b>							
Low	20	64.5	11	35.5	31	2.982 (1.227-7.247)	0.025
High	25	37.9	41	62.1	66		
<b>Water supply facilities</b>							
No	27	64.3	15	35.7	42	3.700 (1.588-6.220)	0.004
Yes	18	32.7	37	67.3	55		
<b>Waste processing facilities</b>							
No	28	59.6	19	40.4	47	2.861 (1.253-6.532)	0.020
Yes	17	34	33	66	50		
<b>Family toilet facilities</b>							
No	34	54	29	46	63	2.451 (1.024-5.867)	0.068
Yes	11	32.4	23	67.6	34		
<b>Wastewater disposal facilities</b>							
No	35	55.6	38	44.4	63	3.000 (1.233-7.032)	0.024
Yes	10	29.4	24	70.6	34		
<b>Children under five's drinking water facilities</b>							
No	30	56.6	23	43.3	53	2.522 (1.103-5.765)	0.045
Yes	15	34.1	29	65.9	44		

## Discussion

*E. coli* is known as the lower intestine inhabitants of warm-blooded animal channels, including humans, and often discharged into the environment through faeces<sup>[16][17]</sup>. *E. coli* bacteria in faeces can move to water or food with the help or through animal contact (faecal to oral). Flies can carry *E. coli* obtained from rubbish, household waste and other sources of sewage and then transmitted from the mouth through vomit drops, faeces and other body parts. *E. coli* can be carried by flies on the exoskeleton, legs, in the mouth and the intestinal tract<sup>[18]</sup>. Proboscis and the six feet of the fly equipped with fine hairs and the feet release sticky fluid making the fly easily carry the pathogen *E. coli*<sup>[19]</sup>. The results of laboratory tests conducted of 97 samples of flies from the respondent's house were found as many as 29 samples found positive *E. coli* (29.9%) and 68 negative samples of *E. coli* (70.1%).

The high density of flies has a significant relationship to the occurrence of diarrhoea in infants, has a potential of 26,571 times the risk of causing diarrhoea in infants. This study is in line with the study of Manalu et al. (2012) that there is a significant relationship between high fly density and the incidence of diarrhoea in infants living around the Namo Bintang Garbage Landfill. Flies are one of the Diptera orders that are closed to human settlements and can affect public health<sup>[20]</sup>; the population is very high. The morphology of the body of a small fly the ability to fly away, as well as a short life cycle, and includes omnivorous animals (all-eaters). Besides that, this insect also has high reproductive power and is a multivoltine (several generations in one year)<sup>[20]</sup>. Fly control has been linked to diarrhoea prevention. Efforts to reduce the population of *Musca domestica* is by vector control including physical, chemical and biological control which is carried out comprehensively by improving environmental cleanliness in settlements.

Diarrhoea caused by pathogenic germ transmission is oral-faecal. Risk factors for the spread of this disease are the means of disposal of faeces that do not meet the requirements and the process of washing hands that are not good after defecation and contact with faeces before processing food. Bandages (diapers) thrown directly into the trash, invites the arrival of flies. The habit of flies looking for food in dirty places causes bacterial germs to stick to the body and the hairs of their feet so that germs carried by flies can pollute food and cause pain.

Clean water supply facilities, waste management facilities, wastewater disposal facilities, and drinking water sources have a significant relationship with the incidence of children under five diarrhoea. Wastewater disposal has a significant relationship with the incidence of children under five diarrhoea. This study is in line with Hariyanto (2015) that there is a significant relationship between waste management and the incidence of diarrhoea in Bogor Regency ( $p=0,000$ ). The study is also in line with Wilar (2017) stating that there is a significant relationship between waste disposal facilities and the incidence of diarrhoea in infants in the Banggai Community Health Center in Banggai Lau Regency. Household waste is rubbish generated from daily activities in the household that do not include faeces. Trash is a source of diseases such as breeding grounds for flies, mice and cockroaches. Garbage can invite flies to perch for food and lay eggs in a pile of garbage. The flies then fly and descend the food so that the food can be contaminated with germs carried by flies. Based on the behaviour of flies, at the adult stage the fly chooses a habitat with much organic material that is undergoing decomposition, for example, organic waste that is wet and during the day the fly rests on the edge of the food and electric wire.

The presence of *E. coli* in the *Musca domestica* house fly has a significant relationship with the incidence of children under five diarrhoea. This relationship is in line with research conducted by Venti in Surabaya, which states that *E. coli*, Salmonella, Shigella and Staphylococcus found in *Musca domestica*. Nevertheless, of the three flies, *Musca domestica* is a species that has more potential as a mechanical vector of the disease caused<sup>[21]</sup>. The same thing was also expressed by Putri in her research that, bacteria found in the body of flies divided into six isolates, including genus Salmonella, Providencia, Escherichia and Vibrio<sup>[22]</sup>.

## Conclusion

The variables that show a significant relationship to the incidence of diarrhoea under five years are positive *E. coli* examination results on *Musca domestica* flies, fly density, education, complete immunization status, clean water supply facilities, household waste management facilities, water disposal facilities waste, and sources of drinking water for children under-fives at the location. Efforts made between related agencies jointly carry out inspection and supervision of clean and healthy environmental conditions in the region, especially regarding basic sanitation conditions in addition to increasing public knowledge of the importance of clean and healthy living behaviour by carrying out health promotion activities. It is recommended to collect, sort waste and dispose of garbage every day in a place that does not pollute the environment.

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**Completing Interest:** Authors declare no conflict of interest in this study.

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# Effects of Benzene Exposure on Respiratory Symptoms to Workers in the Informal Footwear Industry

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## Abstract

**Background:** Benzene is a volatile organic solvent. Benzene has been designated as a carcinogen in humans or a cause of cancer by the International Agency for Research on Cancer. The entry of organic solvent vapors into the body can cause various main reactions in the respiratory tract. The purpose of this study was to determine the relationship between benzene exposure intake and respiratory symptoms. Displace to method, here in abstract.

**Method:** This type of research used cross-sectional design and risk assessment approach. It is conducted in four footwear workshops in Bogor, West Java, during September 2017. This study involved 96 footwear workers.

**Results:** The most symptoms experienced were cough 50% they were quickly tired or tightness during activity 39.6%, sore throat 33.3%, runny nose 31.3%, issued phlegm or reak 18.8%, shortness of breath 14.6%, snorting nouse 6.3%. The result of the risk assessment was 11.5% of workers had real time non-cancer risk as well as 21.9% of workers who had cancer risk.

**Conclusion:** There was no correlation between non-carcinogen intakes, carcinogen intakes and respiratory symptoms ( $p$  value > 0.05). The findings suggest vigilance against the risk of continuous benzene exposure because it can trigger symptoms of carcinogens or non carcinogens.

**Keywords:** *Benzene exposure intake, respiratory symptoms, risk assessment.*

## Introduction

In Indonesia, industrial development is progressing along with the demands of various product needs. To meet these needs, many large and small scale industries have been established, such as the home industry of Small and Medium Enterprises (SMEs). SMEs have

a very important role as a strong and flexible group, and still persist to contribute to the national economy significantly<sup>(1)</sup>. The Ministry of Industry noted the creation of foreign exchange by the footwear industry amounted to USD 4.11 billion or 2.33% of total national exports in 2014, indicating that the footwear industry has the opportunity to continue to increase exports<sup>(2)</sup>. The footwear industry is one of the labor-intensive export commodities where the success of the craftsmen to maintain the presence of the products produced is often not matched by adequate health protection for the risk of their work related to dangerous equipment and materials. Long hours worked and not supported by the required working conditions, often forcing manufacturers to work with fewer ergonomic body positions so they are vulnerable to injury.

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In addition, 70-80% of the workforce engaged in the informal sector generally work in an unfavorable work environment, not organized and the level of welfare is low<sup>(3)</sup>. Studies<sup>(4)(5)(6)</sup> show estimates of carcinogenic and non-carcinogenic health risks due to the exposure of benzene in the process of making primary shoes in the use of glue, because in the process, exposure to organic solvent vapors, especially the benzene contained in the glue can allow health effects if inhaled continuously.

Air pollution in the footwear manufacturing industry has been reported to worsen respiratory and lung function disorders especially in workers who have a long duration of organic solvent exposure<sup>(7)</sup>. The existence of organic solvents which its use is still widespread, especially in the informal sector, is a challenge to public health. There needs to be ongoing monitoring that can be done through a risk assessment to anticipate the effects that can be caused. This study aims to determine the effect of benzene exposure intake on respiratory symptoms.

### Materials and Method

This study was used a cross-sectional study design to describe the effects of individual health due to benzene exposure and risk analysis approaches to obtain benzene exposure intake and risk assessment<sup>(8)(9)(10)</sup>.

This study involved 96 workers and sampling was carried out using a purposive sampling method. The location of the study was conducted in 4 home footwear industry in Bogor, West Java, in September 2017. The data was processed and presented through a descriptive analysis, Chi square analysis was used to identify the association between carcinogen intake, non carcinogen intake and symptoms of respiratory disorder.

Determining the sample of workers was used by purposive sampling method because the study population in general has characteristics, demographics, socio-economic and certain types of activities. Especially workers in the footwear industry. The calculations of the risk assessment was used by microsoft excel application.

### Findings:

**Symptoms of Respiratory Disorder:** The most symptoms experienced were cough (50%), following sequentially according to their presentation they were quickly tired/tightness during activity (39.6%), sore throat (33.3%), runny nose (31.3%), issued phlegm/reak (18.8%), shortness of breath (14.6%), snorting nose (6.3%).

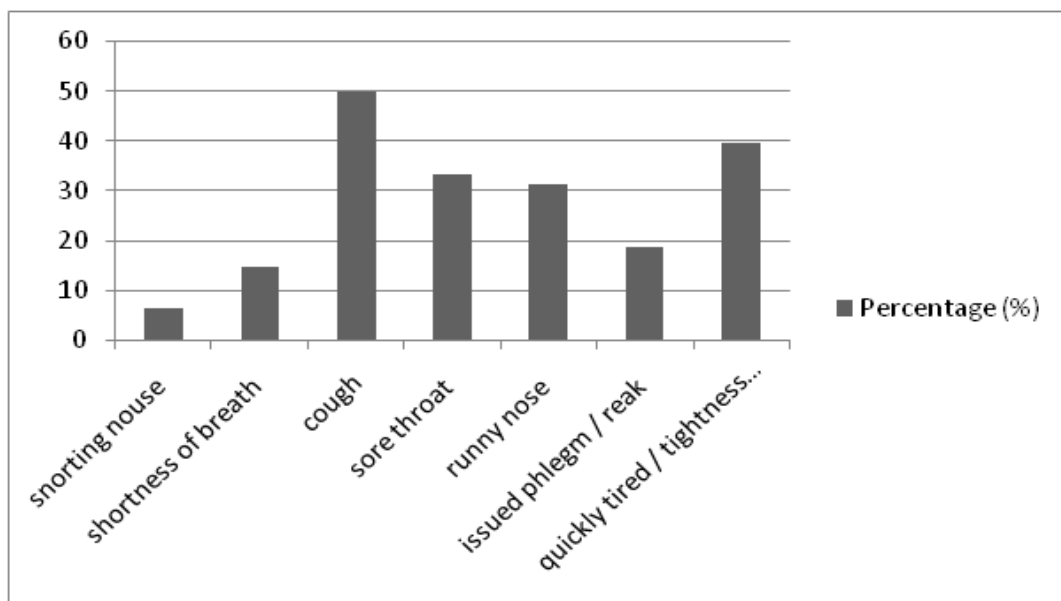


Figure 1. Percentage of Respiratory Symptoms

The entry of organic solvent vapors into the body can cause a variety of reactions, ranging from mild irritation, addiction, kidney disorders, pulmonary edema reactions

and disorders of the central nervous system<sup>(11)</sup>. The main route of exposure is through inhalation, dermal (skin) and oral administration as well as possible<sup>(12)</sup>.

Glue that contains organic solvents in footwear home industry can cause irritation symptoms in the respiratory tract<sup>(13)</sup>, because exposure to volatile organic compound vapors is most important through inhalation<sup>(14)</sup>. In this study the only organic solvent analyzed was benzene. Absorption through breathing and digestion is faster than absorption through the skin, it is because benzene evaporates faster. About 50% of benzene is inhaled and absorbed after 4 hours exposure at a concentration of about 50 ppm benzene in the air. An in vivo study in humans showed that there was an absorption of about 0.05% of the dose of benzene applied to the skin, whereas in an in vitro study of human skin, benzene absorption was consistently as much as 0.2% after exposure to doses between 0.01-520 microliters per square centimeter<sup>(15)</sup>.

The effect of benzene exposure on the respiratory tract was supported by conditions in the workplace in the room that makes the air more polluted if the window circulation of air is inadequate. Indoor air pollution can worsen the condition of the respiratory tract of workers especially those who have a history of diseases such as asthma, allergies etc. because with these working conditions can support the growth of bacteria<sup>(16)</sup>. But the results of the review suggested that dietary or nutritional supplements might be somewhat helpful to protect against water pollution-induced respiratory damage<sup>(17)</sup>

Benzene (C6H6) is a type of chemical that is polycyclic aromatic hydrocarbons (PAH). The nature of benzene which quickly evaporates in the air and is flammable then inhaled through the respiratory tract can irritate the mucous membrane, furthermore it can cause interference with the movement of the cilia so that it cannot clean the airways and due to this irritation also increases mucus production which can cause narrowing of the airways so that respiratory function can be disrupted based on the duration and duration of exposure<sup>(18)</sup>. Benzene with relatively high instability and solubility,

benzene exposure through inhalation poses a greater risk than through skin contact. It has been estimated that size because 60% of the amount inhaled is absorbed in the bloodstream while 1% is absorbed through the skin<sup>(19)</sup> so that the damaged mucosa and submucosa components of the trachea can reflect its function and predispose to lower respiratory tract disease<sup>(20)</sup>.

**Intake of Non Carcinogen and Carcinogen:** In this study the concept of exposure assessment was used to measure the amount of exposure carried out to analyze the amount of exposure, it is by calculating the amount of benzene intake that enters to the body.

The calculation of intake of benzene concentration in the work environment is obtained by using the following equation:

$$I = \frac{C \cdot R \cdot t_e \cdot f_e \cdot D_t}{W_b \cdot t_{avg}}$$

Where, I is intake of benzene exposure the number of risk agents received by an individual per unit of body weight every day (m<sup>3</sup>/kg/day); C is Risk agent concentration, Benzene in the air (mg/m<sup>3</sup>); R is intake rate (m<sup>3</sup>/hour), Normal inhalation rate (EPA, 1997 in Abrianto, 2004)<sup>(21)</sup>:  $y = 5.3 \ln(x) - 6.9$  with  $y = R$  (m<sup>3</sup>/day) and  $x = W_b$  (Kg) the inhalation rate can be estimated according to Indonesian anthropometry characteristics;  $t_e$  is Exposure time per day (hours/day) for inhalation;  $f_e$  is Frequency of annual exposure (days/years (365 days));  $D_t$  is duration of exposure (years), i.e. a long of the respondent lived in the study location until the time of the study, which is stated in real time or 30 years of projected residential default exposure or 25 years for the projected exposure to industrial environment defaults;  $W_b$  is weight (kg);  $t_{avg}$  is average time period, 30 years x 365 days/year (non-carcinogenic) or 70 years x 365 days/year (carcinogenic).

**Table 1. Overview of Workers according to Non-Carcinogen and Carcinogen Intake**

Variable	N	Minimum	Maximum	Median	Std. Dev.
Intake Non karsinogen	96	0,00002	0,40597	0,00048	0,083
Intake Karsinogen	96	0,00001	0,17399	0,0002	0,035

The results was obtained from the intake of benzene exposure in respondents ranging from 0,00001 to 0.40597 mg/kg/day have the potential to have a risk of carcinogens and non-carcinogens, so recommending

risk management by controlling exposure time, duration of exposure and frequency of exposure and the expected ventilation factors in space a risk factor for increasing pollutant exposure. Whereas Habeebullah<sup>(22)</sup> obtained

an average respondent intake of 1.83E-02 with a risk quotient of 3.04E-04 and excess risk cancer of 0.53. Habeebullah has also projected that benzene has been shown to have a greater risk of cancer and suggested to improve the pattern of activities that could be a risk factor for example in the work environment.

Result was obtained from a health risk assessment reveals that there was a significant potential cancer risk by inhaling doses of benzene at the study site because the levels at all locations exceed the acceptable risk then recommend to improve the quality of fuel by reducing the content of benzene<sup>(23)</sup>.

**Risk Characterization:** Risk characteristics was obtained from calculating the estimated risk level with the non-carcinogenic risk calculation equation (RQ)<sup>(9)</sup> as follows:

$$\text{Risk Quotients (RQ)} = \frac{\text{Intake}}{\text{RfC}}$$

The reference concentration (RfC) value for the real time RQ is 8.6 x 10-3 (mg/kg)/day<sup>(24)</sup>

**Excess Cancer Risk (ECR)for Carcinogenic Effects:** The calculation of the level of carcinogenic risk stated by the ECR was calculated by multiplying the Cancer Slope Factor (CSF) with the carcinogenic assumption of each risk agent according to the equation<sup>(9)</sup>:

$$\text{ECR} = \text{Intake}_{\text{Cancer}} \times \text{CSF}$$

Where, ECR is Excess Cancer Risk (Risiko Kanker); Intake<sub>Cancer</sub> is Total chronic intake (lifetime, ie 70 years); CSF is *Cancer Slope Factor*

Cancer Slope Factor is defined as a quantitative relationship between dose and response, which is an estimate (estimation) of the chances of a person (individual) developing into cancer due to exposure (lifetime) by a potential cancer agent. The acceptable cancer risk threshold was adopted from the US-EPA, which is one case of cancer per ten thousand inhabitants<sup>(9)</sup>.

**Table 2. Results of Non-Carcinogen and Carcinogen Risk Assessments for Workers**

Risk	Frequency	Percentage (%)
<b>Non cancer Risk</b>		
RQ > 1	11	11,5
RQ ≤ 1	85	88,5
<b>Cancer Risk</b>		
ECR > 1·10-4	21	21,9
ECR ≤ 1·10-4	75	78,1

The result of the risk assessment 11.5% of workers had real time non-cancer risk as well as 21.9% of workers who had cancer risk. It can be seen that benzene inhalation exposure in the informal footwear industry has described risks that will harm health (cancer and non-cancer) through the calculation of RQ (Risk Quotient) and ECR (Excess Cancer Risk) values that exceed the reference level of benzene exposure. If the value RQ ≤ 1 shows an indication that there is no risk of an adverse effect. While RQ > 1 indicates an indication of possibility of the risk of adverse effect and needs to be controlled<sup>(25)</sup>. Where this value projects a risk of insecurity if exposure continues. Its indications can be assessed by estimating the risk of cancer and non cancer as well as the symptoms of respiratory disorders that will worsen if exposure continues for long periods without risk control.

**Analysis of the Relationship between Non-Carcinogen Intake and Respiratory Symptoms:**

**Table 3. Mann Whitney Test Results between Non-Carcinogen Intake and Respiratory Symptoms in Workers**

	n	Mean Rank	Median (Min-Maks)	p*
Non carcinogenic intake and have symptoms	68	49,68	0,00048(0,00002- 0,40597)	0,519
Non carcinogenic intake and did not have symptoms	28	45,64	0,00052(0,00003 - 0,33706)	
carcinogenic intake and have symptoms	68	49,23	0,000195(0,00001- 0,17399)	0,690
carcinogenic intake and did not have symptoms	28	46,73	0,00022(0,00001- 0,14445)	

\*2-independen sample (significant value : P-Value < 0,05)

Analysis of the relationship of non-carcinogen intake with symptoms of respiratory disorders was analyzed by using the Mann-Whitney test. The results of the analysis obtained was 68 workers who have respiratory symptoms have a median non-carcinogen intake of 0,00048 (mg/kg)/day and 28 workers who did not experience respiratory symptoms have a median value of non-carcinogen intakes of 0,00052 (mg/kg)/day. P value 0.519 (p value > 0.05) which means that statistically there was no relationship between non-carcinogen intake and respiratory symptoms.

The results of the analysis obtained was 68 workers who solved respiratory problems had a mean carcinogen intake of 0,000195 (mg/kg)/day and 28 workers who did not experience respiratory disorders had a carcinogen intake of 0,00022 (mg/kg)/day. Value of p = 0.690 (p value > 0.05) which means that statistically there was no relationship between carcinogenic intakes and respiratory symptoms.

The results of this study indicate that there is no significant association between non-carcinogen intake and respiratory symptoms. The concentration of benzene in the working environment in this study was still below 0.5 ppm as the TLV (Thresold limit value) can be one of the factors supporting the insignificant relationship between benzene intake with respiratory symptoms and can be compared with Avis and Hutton data (1993) recorded in ATSDR (2007)<sup>(12)</sup> that acute exposure of 33 and 59 ppm of benzene vapor which irritates mucous membranes, nose can cause sore throat and cough symptoms. However, previous studies conducted by Kurniawidjaja et al.,<sup>(13)</sup> at 1.40 ppm exposure, have described respiratory complaints in workers associated with benzene exposure in informal footwear workshops where the average value of benzene vapor levels in all workshop sample has more than TLV 0.5 ppm.

### Conclusions

The finding of this study shows no correlation between non-carcinogen intakes and carcinogen intakes with respiratory symptoms. The risk assessment result suggest alertness to the risk of continuous benzene exposure because it can trigger symptoms of disease promoted carcinogenesis and non-carcinogenesis.

**Conflict of Interest:** The authors report no competing interest.

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**Ethical Clearance:** Taken from Universitas Indonesia Ethics Commission.

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# Factors Associated with Limited Level of Health Literacy on Application of Health Information Related to Opioid Use in Kachin State, Myanmar

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## Abstract

**Introduction:** Opioid abuse has caused immense suffering for people in Myanmar especially in Kachin and Shan States. Promoting health literacy relevant to opioid use can lessen those problems but little is known about opioid literacy level of general population. Thus, objectives of this study were to find out the prevalence of literacy level on application of health information relevant to opioid use and the factors affecting the limited level of opioid literacy among adult males in Kachin State, Myanmar.

**Method and Materials:** A total of 327 adult males in Kachin State who had never used illicit drugs were selected for this cross-sectional study. A sub-scale of the European Health Literacy Questionnaire, HLS-EU-Q47, was adapted to assess the level of application on opioid-related health information. Data were collected from July to August 2019 through face to face interview with the participants. Multiple logistic analysis was performed to find out the association.

**Result:** 61.47% of the participants had limited level of literacy in terms of application of opioid-related health information. The findings indicated that not being Bamar (AOR= 3.61, 95% CI = 1.97-6.63,  $p < 0.001$ ), being unemployed (AOR=2.44, 95% CI= 1.38-4.30,  $p < 0.01$ ) and not having siblings who used opioids (AOR=2.47, 95% CI= 1.10-5.56,  $p < 0.05$ ) were more likely to have limited level of literacy in terms of applying opioid-related health information.

**Discussion:** Socioeconomic and environmental factors had influence on health literacy especially application of health information relevant to opioid use. It is important to take appropriate measures to improve opioid-related health literacy particularly among the vulnerable groups to help prevent them from drug use and its problems.

**Keywords:** *Opioids, Health Literacy, Males, Kachin, Myanmar.*

## Introduction

Opioid abuse is a serious public health and safety concern around the world which has significant impact on health and welfare of human<sup>[1]</sup>. Myanmar stood second in producing opium around the world and bore the heavy brunt of opioid abuse<sup>[2]</sup>. Kachin was one of the most opium producing states in Myanmar and had socioeconomic burden of drug use. A qualitative study of Oo and Doe<sup>[3]</sup> stated that not only drug users but also the family members suffered health, socioeconomic and marital problems such as acquiring HIV/AIDS,

discrimination from their communities and domestic violence. Moreover, drug use also caused a real predicament for the whole society<sup>[4]</sup>.

Health literacy is one of the fundamentals for health system where more active role of individuals in decisions and management is required<sup>[5]</sup>. As it is a strong indicator for measuring people's health<sup>[6]</sup>, promoting it relevant to opioid use would be helpful to lessen the drug abuse problems. As stated by Shuja et al<sup>[7]</sup>, an increase in health literacy of people could enhance their knowledge on consequences of illicit drugs which could then resulted

in not using those substances. In fact, health literacy is way beyond being able to read health information and understand them. It empowers people by developing their capacity to apply the information effectively<sup>[8]</sup>.

Until now, little is known about opioid-related health literacy in general population. Therefore, this study aimed to find out the prevalence of literacy level on application of health information relevant to opioid use and the factors affecting the limited level of opioid literacy among adult males in Kachin State, Myanmar. By knowing these factors related to opium literacy, it would be helpful for local authorities and civil society organizations to implement effective interventions to promote health literacy in order to reduce drug use problems.

## Methodology

**Study Design:** This cross-sectional study was conducted to identify factors associated with limited literacy on application of opioid-related health information among adult males in Kachin State, Myanmar. Only adult males were included in this study because it was part of an Independent Study, namely, “a case-control study on risk factors of opioid use”, which was carried out among adult male opioid users and non-drug users.

**Study Subjects:** The sample size in this study was 327 which was estimated from the method of Fleiss with a continuity correction for the above-mentioned case-control study<sup>[9]</sup>. Participants were adult males (18 years or above) who had never used illicit drugs. They were simple randomly selected from general population in Kachin State, Myanmar through local government’s household registration. The exclusion criteria were the people with serious physical and mental problems as well as those who were not able to verbally communicate with interviewers.

**Data collection:** A structured questionnaire which contained socioeconomic and demographic characteristics, opioid-related information (environmental factors) and index of health literacy on applying opioid-related health information was used to collect data from the adult males. Face to face interviews were carried out by the trained interviewers with written guideline. Verbal consent was obtained from the participants before the interview.

**Data analysis:** Data analysis was carried out by using Stata 14.2. The categorical data were described by using frequency and percentage whereas the continuous data were reported as mean and median. For inferential statistics, bivariate analysis was conducted to identify the factors associated with limited level of literacy in terms of applying opioid-related health. The factors with  $p < 0.25$  were continued into the final model or multivariate analysis<sup>[10]</sup>.

**Ethical Approval:** This research was approved by Khon Kean University Ethics Committee in Human research, (Approval number HE622140 4.3.03: 20/2019).

## Results

**Descriptive Analysis:** The study contained 327 adult males who had never used illicit drugs. Most of the participants were between the age of 20 to 39 years (45.57%) with the average age of 35 years. Half of them (50.76%) were single whereas 44.34% were married. Regarding educational level, 57.49% were in secondary education and 30.58% were in university level. Majority of participants were Kachin (70.64%) and Christians (76.76%), and Bamar and Buddhists constituted 19.27% and 21.1% respectively. Most of the participants (85.32%) believed and practised their religions. More than 30% were unemployed and about 14% were unskilled workers. Over half of the respondents earned 100,000 kyats or less monthly. Only about 18% lived in rural areas and about 35% migrated from other places. Alcohol (43.12%) was the most consumed substance for respondents followed by smoking cigarettes or cheroots (30.58%) and chewing betel nuts (10.70%).

**Prevalence of limited health literacy level on applying opioid-related health information:** Opioid-related health literacy on applying the information was assessed by modifying 11 questions of HLS-EU-Q47 (only “apply information” sub-scale). A four-point Likert scale was used for the answers – very difficult, fairly difficult, fairly easy and very easy with the score of 1 to 4 respectively. Recommended scoring system from the formula:  $\text{Index} = (\text{mean} - 1) \times 50/3$  which score ranged from 0 to 50 was utilized<sup>(11)</sup>. According to the score, the participants were categorized into four groups: inadequate (0 to 25), problematic (26 to 33), sufficient (34 to 42) and excellent (43 to 50). To explore the vulnerable group, the first two levels were combined as a group and named as limited health literacy<sup>(11,12,13)</sup>. As shown in Table 1, more than 60% had limited literacy.

**Table 1. Prevalence of Limited Health Literacy Level on Applying Information Relevant to Opioids among the Participants (n = 327)**

Apply information relevant to Opioid-related Health Information	Frequency	Percentage
Limited (0-33)	201	61.47
Sufficient (34-42)	90	27.52
Excellent (43-50)	36	11.01

**Factors associated with limited level of literacy on applying opioid-related health information among adult males: A bivariate analysis:** In the simple logistic regression analysis, eight factors were found to be associated with the limited opioid literacy ( $p < 0.25$ ). They were young and old aged people (COR= 2.27, 95% CI= 1.34 to 3.86), ethnic groups other than Bamar (COR= 4.29, 95% CI= 2.39 to 7.69), not being Buddhists (COR=

3.49, 95% CI= 2.01 to 6.06), being unemployed (COR= 2.90, 95% CI= 1.70 to 4.94), earning inadequate income (COR= 1.62, 95% CI= 1.02 to 2.58), not chewing betel quid (COR= 4.06, 95% CI= 1.91 to 8.63), being born in the study place (COR= 1.61, 95% CI= 1.01 to 2.57) and not having siblings who used drugs (COR= 1.68, 95% CI= 0.79 to 3.56). Table 2 shows the crude association between these variables and limited opioid literacy.

**Table 2. Odds Ratio for each category of factors associated with limited level of literacy on application of health information on opioid use: a bivariate analysis (n= 327)**

Characteristics	Number	% of people with limited health literacy	Crude OR	95%CI	p-value
<b>1. Age</b>					<b>0.0018</b>
Middle age (20-59)	233	56.22	1		
Young and old age	94	74.47	2.27	1.34 to 3.86	
<b>2. Ethnicity</b>					<b>0.0000</b>
Bamar	63	33.33	1		
Other ethnic groups	264	68.18	4.29	2.39 to 7.69	
<b>3. Religion</b>					<b>0.0000</b>
Buddhist	69	37.68	1		
Christian and others	258	67.83	3.49	2.01 to 6.06	
<b>4. Employment Status</b>					<b>0.0000</b>
Employed	225	54.22	1		
Unemployed	102	77.45	2.90	1.70 to 4.94	
<b>5. Financial Situation</b>					<b>0.0391</b>
Enough	195	56.92	1		
Not enough	132	68.18	1.62	1.02 to 2.58	
<b>6. Betel quid</b>					<b>0.0001</b>
Yes	35	31.43	1		
No	292	65.07	4.06	1.91 to 8.63	
<b>7. Migration status</b>					<b>0.0441</b>
Move from other places	113	53.98	1		
Born here	214	65.42	1.61	1.01 to 2.57	
<b>8. Opioids use by siblings</b>					<b>0.1809</b>
Yes	30	50.00	1		
No	297	62.63	1.68	0.79 to 3.56	



**Factors associated with limited level of literacy on applying opioid-related health information among adult males: A multivariate analysis:** Eight variables from bivariate analysis were proceeded to multivariable analysis by using multiple logistic regression with backward elimination. After the analysis, three factors:

being ethnic groups other than Bamar (AOR= 3.61, 95%CI= 1.97-6.63,  $p < 0.001$ ), being unemployed (AOR= 2.44, 95% CI= 1.38-4.30,  $p < 0.01$ ) and not having siblings who used opioids (AOR= 2.47, 95% CI= 1.10-5.56,  $p < 0.05$ ) were significantly associated with the limited opioid literacy, see Table 3.

**Table 3. Odds Ratio for each category of factors associated with limited level of literacy on application of health information on opioid use: a multivariable analysis (n= 327)**

Characteristics	Number	% of people with limited health literacy	Crude OR (95%CI)	Adjusted OR (95%CI)	p-value
<b>1. Ethnicity</b>					<b>&lt; 0.001</b>
Bamar	63	33.33	1		
Other ethnic groups	264	68.18	4.29(2.39 to 7.69)	3.61(1.97 to 6.63)	
<b>2. Employment status</b>					<b>&lt; 0.01</b>
Employed	225	54.22	1		
Unemployed	102	77.45	2.90(1.70 to 4.94)	2.44(1.38 to 4.30)	
<b>3. Opioid use by siblings</b>					<b>&lt; 0.05</b>
Yes	30	50.00	1		
No	297	62.63	1.68(0.79 to 3.56)	2.47(1.10 to 5.56)	

## Discussion

The study observed that limited level of health literacy on application of opioid-related health information was more than 60% which was 10% higher than the finding in a cross-sectional study among 1367 participants from 35 townships<sup>(14)</sup> The latter conducted in different areas but not included Kachin State. Another study reported that limited health literacy in healthcare settings of Southeast Asia countries was found to be higher, with 67.5%<sup>(15)</sup>. Thus, the reason why Kachin State had lower level of satisfactory health literacy may be due to inaccessibility of health services, but it may also be because of the low sample size of the study. The review study in Southeast Asia<sup>(15)</sup> also reported the high discrepancies in showing prevalence of limited literacy by the studies, varied from 1.6% to 99.5%.

The study also found out that socioeconomic (ethnicity, unemployment) and environmental factors (not having siblings who used illicit drugs) had significant associations with the limited level of opium literacy on applying health information. Kachin and other ethnic groups were likelier to have limited health literacy than Bamar (AOR= 3.61, 95%CI= 1.97-6.63,  $p < 0.001$ ). Bamar constituted the most proportion of ethnic groups in the whole country, meaning that ethnic groups

with less proportion had limited literacy. Unemployed persons were more prone to have limited literacy than employed people (AOR= 2.44, 95% CI= 1.38-4.30,  $p < 0.01$ ). A health survey in Catalonia also reported that limited literacy was associated with low socioeconomic status which included unemployment (AOR= 2.11, CI 95%= 1.42–3.15,  $p < 0.001$ )<sup>(16)</sup>. Pedro, Amaral and Escoval<sup>(17)</sup> also mentioned that unemployed people were among vulnerable groups to have limited literacy. As students were also included in unemployed status, they should also be considered in providing health education. The last factor associated with limited application on health information was not having siblings who used opioids (AOR= 2.47, 95% CI= 1.10-5.56,  $p < 0.05$ ). They might not understand well about opioid issues as they may not see the problem around them.

**Limitation of the Study:** This study covers Kachin state only so the similar studies should be conducted in other states such as Shan State where opioid problems are prominent. As general limitation, this cross-sectional study measured exposures and the outcome at the same time and thus, causal relationship between them could not be identified. Moreover, as it included adult males only, other populations such as females, adolescents and the drug users were not represented in this research.

## Conclusion

It was observed that limited level of opium literacy on applying health information was associated with the vulnerable members of the community – ethnic groups rather than Bamar, unemployed people and those who did not have drug user siblings. It is important to take appropriate measures to improve opioid-related health literacy particularly among the vulnerable groups to help prevent them from drug use and its problems. When providing health education, languages that different ethnic groups can understand should be used so that they can understand the drug problems and their adverse effects.

## Conflicting Interest

The authors declare that there is no conflict of interest in this research.

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# Evaluation of Serum Lipid Profile after Different Chemotherapeutic Regimens in Iraqi Patients with Breast Cancer

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## Abstract

**Objective:** To investigate the effect of doxorubicin, cyclophosphamide and taxane chemotherapy on the lipid profile in Iraqi patients with breast cancer.

**Method:** This cohort prospective study was carried out at the Biochemistry Department, Baghdad College of Medical Sciences, and at the Oncology Clinic, Oncology Teaching Hospital, Baghdad, Iraq, during the period from May 2019 to October 2019. It included 56 women with regular menstrual cycle (25-45 years) classified into 3 groups: GI: 29 women with primary breast cancer (before starting chemotherapy), GII: the same 29 women of GI who were finished 4 cycles of anthracycline chemotherapy (course 1) and GIII: which involved another 27 women who had finished both courses of chemotherapy, (course 1) and 4 cycles of taxanes (course 2). Serum cholesterol, LDL, HDL and TG were measured using colorimetric method.

**Results:** The results of the present study showed that the (mean±SEM) of the serum cholesterol was decreased significantly ( $p<0.05$ ) in GIII compared to GI and highly significantly ( $p<0.01$ ) compared to GII. While, the serum HDL level was significantly ( $p<0.05$ ) lower in GIII compared to GI. Concerning the serum LDL level, it was increased significantly ( $p<0.05$ ) in GII compared to both GI and GIII. While; the serum TG level shows no significant difference between all groups.

**Conclusion:** Iraqi women with breast cancer had an abnormal state of dyslipidemia that become worsened after chemotherapy.

**Keywords:** Breast cancer, chemotherapy, cholesterol, HDL, LDL, TG.

## Introduction

Carcinoma of breast is a widely common neoplasm among women around the industrialized world. It was increased steadily over the past 40 years. It is considered the second cause of mortality among women ages

between 20-59<sup>(1)</sup>. In Iraq, it is the first in ranking among cancers<sup>(2)</sup>. The cause of the disease is unknown but it could be hormonal, environmental, genetic, radiation, oncogenic viruses and dietary factors<sup>(3)</sup>. Many factors affect the relation of lipid changes with breast cancer and this relationship is still a subject of controversy. Lipids are the major component of membranes integrity in the biological cells, it plays roles in cell growth and development; both for normal and malignant ones. Lipids are richly present in the mammary tissue. Some studies had found that changes of plasma lipids and lipoproteins are associated with the proliferation of malignant cells in the breast tissue. Recently, they had studied the role of both the endogenous and dietary lipids in the etiology and prognosis of cancer<sup>(4)</sup>. The

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unbalanced lipid parameters including raised total cholesterol [TCh], low-density lipoprotein-cholesterol (LDL-C) and triglycerides [TG] along with decreased high density lipoprotein-cholesterol [HDL-C] could be a risk factor of cardiovascular diseases<sup>(5)</sup>.

## Subjects and Method

This cross sectional study was conducted at the Department of Biochemistry, Baghdad College of Medical sciences and at the Oncology Hospital, Medical City Hospital, Baghdad, Iraq, during the period from May 2019 to October 2019. It involved 56 Iraqi women diagnosed by Consultant Clinical Oncologist to have had primary carcinoma of breast; their ages range was 25-45 years. The included women were categorized into groups according to their status of treatment: group 1 [G1] included 29 women with primary breast carcinoma who never subjected to chemotherapy treatment, group 2 [G2] consisted of the same 29 women of G1 but after finishing the first course of treatment [4 cycles of anthracycline chemotherapy including Doxorubicin 60mg/m<sup>2</sup> and Cyclophosphamide 600mg/m<sup>2</sup> chemotherapy], and group 3 [G3] which involved different 27 women who completed full regimen of chemotherapy treatment [(course 1) and 4 cycles of Taxane including (Docetaxel) 100mg/m<sup>2</sup>; (course 2)]. Exclusion criteria included pregnant woman, chronic diseases (diabetes mellitus, hypertension), alcoholics, smokers, and women used anti-inflammatory drugs. Formal consent was taken from each woman. Authors obtained ethical approval from the Scientific Committee of the Department of Biochemistry of Baghdad College of Medical sciences. Serum cholesterol, LDL-cholesterol (LDL-C), HDL-cholesterol (HDL-C) and TG were measured using colorimetric method. Five milliliters of blood sample was collected by venipuncture of the peripheral vein from each included woman, transferred into plain tube, allow to clot and the serum was separated immediately by centrifugation at 2500–3000 rpm for a period of 10 min. Investigations included serum measurements of cholesterol, HDL, LDL and TG by colorimetric method. All material kits for the measured parameters were provided from Human GmbH.65205 Wiesbaden, Germany. The statistical analysis including ANOVA

and Student's t-tests were applied to test for significance differences among the studied groups with respect to lipid parameters. Correlation among different studied parameters in each studied group was investigated by linear regression test [r] and the significance of the r-value was examined by related t-test. P-values of less than 0.05 were considered significant.

## Results

The demographic data in table 1 depicts that there was no significant difference in mean values of age between G1 (38.79±0.91 years) and G3 (39.59±0.95 years). Similarly, mean values of BMI were comparable and did not differ significantly between G1 (30.04±0.94 Kg/m<sup>2</sup>) and G3 (31.78±1.24 Kg/m<sup>2</sup>).

**Table 1: Mean (±SEM) Values of Age and Body Mass Index (BMI) in G1 and G3**

Parameters	G1 (n=29)	G3 (n=27)
Age <sup>NS</sup> (Years)	38.79±0.91	39.59±0.95
BMI <sup>NS</sup> (kg/m <sup>2</sup> )	30.04±0.94	31.78±1.24

BMI: body mass index; ANOVA test revealed a non-significant difference between groups (NS)

Table 2 reveals the mean values of the serum measured lipid parameters. It shows that the serum levels of cholesterol was found to be increased in women who finished the first course of chemotherapy treatment [G2; 208.37±8.62 mg/dl] when compared to their levels before treatment [G1; 193.75±6.83 mg/dl], but did not reach the significant level. However, the level of serum cholesterol was then significantly declined in women who had finished complete courses of treatment [G3; 168.30±8.14 mg/dl] when compared to that of G1 [P < 0.05] and G2 [p < 0.01]. Similarly, serum LDL-C was significantly elevated in G2 [125.89±8.88 mg/dl] in comparison with each of G1 [104.24±7.17 mg/dl, p<0.05] and G3 [91.02±7.64 mg/dl, p<0.05]. Regarding serum HDL-C level, it was decreased in post treatment groups compared to that before treatment, but with only significant difference between G3 and G1 [p < 0.05]. Serum TG level showed no significant differences among all groups.

**Table 2: Values of Serum Cholesterol, HDL-C, LDL-C and TG in G1, G2 and G3**

Parameter	G1 (n=29)	G2 (n=29)	G3 (n=27)
Cholesterol mg/dl	193.75±6.83*	208.37±8.62*	168.30±8.14
LDL-C mg/dl	104.24±7.17	125.89±8.88**	91.02±7.64
HDL-C mg/dl	58.60±2.34	52.94±3.71	47.61±1.47***
TG mg/dl <sup>NS</sup>	154.37±7.80	147.68±7.16	148.33±9.55

LDL: low density lipoprotein-cholesterol, HDL: high density lipoprotein-cholesterol, TG: triglycerides. Data are expressed as mean ( $\pm$ SEM). ANOVA and t-test revealed \* significant increase of total cholesterol in G1 [ $p < 0.05$ ] and G2 [ $p < 0.01$ ] than in G3, \*\*significant increase of LDL-C in G2 than in G1 [ $p < 0.05$ ] and G3 [ $p < 0.05$ ], \*\*\*significant decrease of HDL-C in G3 compared to G1 [ $p < 0.05$ ], NS: non- significant differences.

The present study showed that women of G1 exhibited significant direct relationship between serum levels of cholesterol and LDL-C in G1 ( $r=0.95$ ,  $p < 0.01$ ). Also, serum levels of TG and HDL-C showed significant inverse correlation ( $r= -0.394$ ,  $p < 0.05$ ). Furthermore significant negative correlation was observed between serum LDL-C and serum HDL-C ( $r= -0.44$ ,  $p < 0.05$ ) in G1. With respect to G2, there was a significant inverse relationship between age values and serum HDL-C levels ( $r= -0.376$ ,  $p < 0.05$ ) with significant positive relationship between serum levels of cholesterol and LDL-C ( $r= 0.912$ ,  $p < 0.01$ ). Regarding G3; there were a significant direct relationship between BMI and serum TG ( $r= 0.437$ ,  $p < 0.05$ ) and between serum levels of cholesterol and LDL-C ( $r=0.964$ ,  $p < 0.01$ ).

## Discussion

Iso et al. (2009) reported that malignancy was associated with decrease plasma cholesterol levels, and certain types of cancer had a significant effect. The enhanced utilization of cholesterol by carcinoma tissues was culprit in reducing plasma cholesterol<sup>(6)</sup>. One of the important causes in development of breast cancer is increased exposure to estrogen hormone which plays a vital role in metabolism of cholesterol and may reflect the association of breast cancer and increased HDL-C<sup>(7)</sup>. Although adjuvant chemotherapy may improve the survival of breast cancer patients, they had suggested that chemotherapy cause significant changes in the metabolism of lipids in cancer survivors<sup>(8)</sup>.

Alexopoulos et al. (1992); found that breast cancer patients undergoing chemotherapy had a non- significant decrease in both serum total cholesterol and serum LDL. Serum HDL did not show any significance while serum TG showed a significant increase. They had attributed these results to the low number of patients involved

in the study and they had indicated that these lipid disorders could be reversed with the effective treatment of the tumor<sup>(9)</sup>.

Rzymowska et al. (1999) studied 70 women with breast cancer and observed that both types of carrier cholesterol, HDL and LDL levels were declined after treatment of chemotherapy accompanied by significant elevation of triglycerides in women with malignant breast irrespective of being menstruated or menopausal. They had stated that the mechanisms interpreting the chemotherapy associated dyslipidemia could be related to the type of therapy used<sup>(10)</sup>.

Other previous studies reported that HDL-C levels were significantly reduced after chemotherapy and they had found that doxorubicin downregulates the expression PPAR $\gamma$  (peroxisomal proliferator-activated receptor  $\gamma$ ), liver X receptor  $\alpha$  (LXR $\alpha$ ), and ATP binding cassette transporter A1 (ABCA1). While, cyclophosphamide or paclitaxel did not affect the ABCA1 level<sup>(11,12)</sup>

Recent studies reported that taxane-containing chemotherapy has been proven to induce dyslipidemia, which reduces the plasma HDL-C level and increases the plasma hydroperoxide level<sup>(13,14)</sup>.

Alacacioglu et al. (2010) had observed that breast cancer patients treated with taxane, epirubicin and cyclophosphamide showed no significant changes in blood cholesterol, HDL, LDL and TG at baseline and after six cycles of the treatment<sup>(15)</sup>.

Another study examined the metabolic changes in breast cancer patients who received chemotherapy and they had shown significant increases in TC, TG and LDL-C levels<sup>(16)</sup>.

In a study done by Simin et al. (2016) who found

that patients treated with adriamycin, cyclophosphamide and taxane showed no significant changes in the serum lipid profile although slight changes were recorded in each item<sup>(17)</sup>.

Xin et al. (2018) reported certain metabolic abnormalities during adjuvant chemotherapy treatment of women with breast cancer including hypercholesterolemia, hypertriglyceridemia; elevated LDL-C and Apo B along with decrease in HDL-C and Apo A1. They suggested that carcinoma of breast is accompanied by overt dyslipidemia which worsen after chemotherapy<sup>(5)</sup>. These differences in the results may be due to progression of cancer and side effects of the chemotherapeutic agents in addition to genetic, environmental and behavioral differences<sup>(18)</sup>.

The decrease in LDL-C in carcinoma could be attributed to increased uptake of cholesterol by these cells, with consequent elevation in LDL removal through the enhancement of LDL receptor activity. These derangement in lipid metabolism and parameters may be due to release of pro inflammatory cytokines from the inflammatory cells which could be part of an acute-phase reactant against tumor or which may be itself participate in tumor development and also from the tumor itself<sup>(5)</sup>. The significant decrease in the serum HDL in this study was in agreement with that observed by Monika et al. (2016) who concluded that lipid changes that happened with chemotherapy are specific to the chemotherapeutic type used. Doxorubicin lowered HDL-C while paclitaxel increased apoB. In opposite, cyclophosphamide appears to have no significant effect on HDL or apoB metabolism<sup>(19)</sup>. Some hypotheses indicate that chemotherapy may cause dysfunction of the endothelial cells which leads to cytokine alterations, and hence lipids abnormalities<sup>(20,21)</sup>. Other stated that adipocytes associated with cancer will modify the phenotype of the cancer cells<sup>(22)</sup>.

Owiredu et al. (2009); had observed that there was a significant positive correlation between the BMI and both serum total cholesterol and LDL- cholesterol which is more susceptible to lipid peroxidation. They had attributed this to the oxidative stress leading to an increase in cell proliferation of the malignant cells. Also, they had noticed that there was a significant negative correlation between age and serum HDL. All these results were in concordance with the results of the present study<sup>(3)</sup>.

On the other hand; Delgobo et al 2019 found that

Chemotherapy appeared to exert a greater effect on younger breast cancer patients and that lipid metabolism is associated with sex hormones<sup>(23)</sup>.

They had explained that changes in lipid levels after chemotherapy correlate with changes in menstruation. they had concluded that plasma lipid levels are more sensitive to chemotherapy agents since young patients have higher levels of sex hormones and a better lipid metabolism status<sup>(20)</sup>.

## Conclusion

Iraqi women with breast cancer had mild increased in LDL-C which exacerbated during chemotherapy treatment and resolved then after with finishing the complete courses of treatment. These women showed gradual decrease of HDL-C after treatment even its value still within expected level.

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# Escherichia Coli as a Biological Model for Reduction of Graphene Oxide

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## Abstract

The present study was conducted to investigate the ability of bacteria to reduce Graphene Oxide (GO) sheets. Out of 82 bacterial isolates screened, one isolate was selected as a biological model for biosynthesis of reduced graphene oxide (RGO) nanosheets. This isolate was identified by morphological, biochemical tests, VITEK2 System, and 16S rRNA gene sequencing, aligned and submitted to the NCBI, and confirmed as *Escherichia coli* strain E-NO.7 (accession no. MK685205). The UV-vis. absorption peak was around 284 nm. The SEM images revealed thin, wrinkled, closely associated nanosheets. The weight percentage of carbon was 82.00% and oxygen was 18.00%. XRD analysis exhibited a broad diffraction peak at  $2\theta = 26.5^\circ$  corresponding to the interlayer spacing of 0.34 nm. The FTIR spectrum showed decrease in peaks associated to oxygen functional groups, while other peaks vanished completely.

**Keywords:** *Escherichia coli*, Bacterial reduction of Graphene Oxide, Nanobiotechnology.

## Introduction

Graphene is a novel nanomaterial (NM) that has revolutionized the field of nanobiotechnology and emerged as a promising new tool for a variety of applications due to its outstanding physical, chemical, and biological properties as in drug and gene delivery, tissue engineering, biosensing, bioimaging, as well as antibacterial agents<sup>(1)</sup>. Graphene is a monolayer- thick NM composed of carbon atoms arranged in 2D sheet. Each carbon atom is connected to three other carbon atoms in the sheet by covalent bonds resulting in tightly packed honeycomb-like structure<sup>(2)</sup>.

Oxygen functional groups in GO are removed when exposed to reducing conditions. Frequently, GO reduction is carried out to restore the electrical

conductivity, thermal stability, and change many other GO properties<sup>(3)</sup>. Several routes have been reported for reduction of GO nanosheets such as chemical, thermal, electro- chemical and biological method<sup>(4,5)</sup>. Biological reduction of GO has received interest of researchers working on bionanotechnology as such strategy is efficient and eco-friendly in nature thereby decreasing the high cost and risks of toxic chemicals involved in the conventional chemical method. Most of biological reduction method work at moderate conditions like room temperature and atmospheric pressure making them effective, affordable, and easy to handle<sup>(6)</sup>. Different types of biomolecules, microorganisms, and plants can be used as alternatives for reduction of GO. These reducing agents are also called “green reducers” as they are free from corrosion, carcinogenicity, and toxicity<sup>(4)</sup>.

## Experimental Part:

**Screening the bacterial isolates:** A total of 82 bacterial isolates from different sources were screened for ability to reduce GO at concentration of 0.5 mg/ml. Graphene oxide powder was purchased from Graphitene (UK).

**Activation of the isolates:** Each bacterial isolate

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was activated according to<sup>(7)</sup> by inoculation of 10ml of BHI broth medium with a single colony and incubated for 24 hr. in shaking incubator at 120 rpm and 37°C. The second preculture was inoculated with the first preculture (1% v/v) and incubated on shaking incubator at 37°C for 24 hr. in 500ml flasks. Cells were harvested by centrifugation of broth culture using large scale centrifuge at 6000 rpm for 25min, 4°C. Cell free supernatant was collected in a sterile flask for use in reduction of GO experiment<sup>(8)</sup>.

**Bacterial reduction of GO:** Reduction experiment was conducted according to the method described by<sup>(9)</sup> with some modification. The GO solution (0.5 mg/ml) was mixed with cell free supernatant in a ratio 1:1 (volume ratio) in 500 ml flask, pH was adjusted to 7, and the mixture was stirred at 37°C for 72 hr. Reduction of GO was checked by visual examination of the solution for change in color of the medium from a clear, brown to black graphene with precipitate. The stable black dispersion centrifuged for 25min at 10,000 rpm, 4°C to remove the supernatant. The supernatant replaced with deionized D.W. and recentrifuged three times at the same speed and time to remove remained supernatant. The black pellet deposited at bottom of tubes then dried in oven at 40°C for 24 hr. The dried powder was collected carefully and stored in sample vials for characterization.

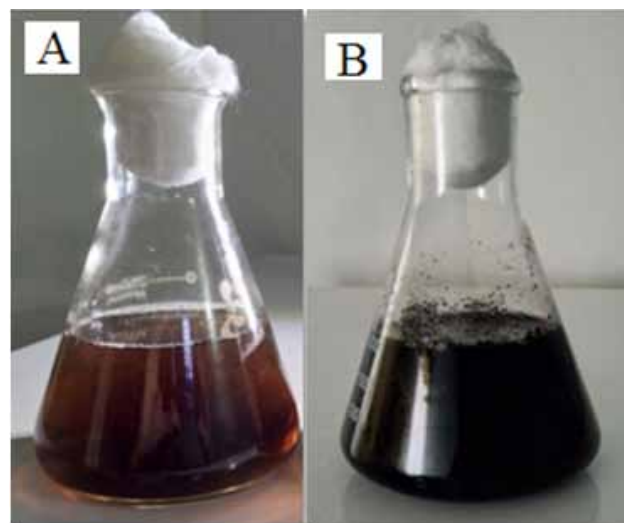
**Identification of the efficient isolate:** The bacterial isolate was identified by morphological and biochemical tests according to<sup>(10)</sup>, VITEK2 System, and by 16S rRNA gene sequencing. Favor Prep Genomic DNA Mini Kit (Geneaid, USA) was used to extract genomic DNA following the manufacturer's protocol. Concentration and purity of DNA was determined using Nanodrop (THERMO, USA). Universal bacterial primers of 16S rRNA gene (F GGAAGTGGACACGGTCCAG) and (R TTAAACCTTGCGGCCGTACT) were provided by (Bioneer, Korea). PCR mixture was prepared by using (Maxime PCR PreMix kit) and was done according to manufacturer's company instructions. DNA sequences were analyzed for sequence similarity to the existing DNA sequences available in the database at National Center for Biotechnology Information (NCBI). The DNA sequences were used to perform BLAST search against sequence database<sup>(11)</sup>.

**Characterization of BRGO:** UV-vis Spectroscopy of the aqueous suspension of BRGO was obtained using Mega 2100 Double Beam UV. visible spectrophotometer (Scinco, Korea). FTIR (ALPHA- BRUKER, Germany)

was used to characterize the functional groups on the surface of the BRGO sample. SEM (FEI NOVA NANOSEM 450I, Netherlands) was used to characterize the surface morphology and thickness of nanosheets. The occurrence of elemental carbon and oxygen was quantified by EDS (BRUKER X FLASH6I 10 (Germany). XRD diffractometer (RIGAKU, Japan) used to recorded  $2\theta$  value in order to characterize the interlayer spacing.

## Results

**Screening the bacterial isolates for biosynthesis of RGO:** Results revealed that one isolate *Z14* was able to reduce GO and selected as a biological model for biosynthesis of RGO. Changing the color of reaction mixture from a clear, brown to black with precipitate represents indicator for biosynthesis of RGO<sup>(12,13)</sup> (Fig. 1).



**Fig. 1- Bacterial reduction of GO. A: Supernatant and GO dispersion, B: BRGO obtained with Z14.**

**Identification of the isolate (Z14):** The bacterial isolate *Z14* was identified and confirmed as *E. coli* by the morphological, biochemical tests, VITEK2 System with probability of 99%. Concentration of extracted genomic DNA checked by Nanodrop was 195.8 ng/ $\mu$ l and the purity was 1.8. From comparison of the 16S rRNA gene sequencing with that in the database in Gene Bank by BLAST program, the microorganism was identified as *Escherichia coli* strain E-NO.7 (accession no. MK685205).

**Characterization of BRGO nanosheets:** After the visibility check, the reduction of GO was proved using UV-vis absorption spectroscopy. The absorption

spectrum showed that the peak of the BRGO suspension was around 284 nm indicating that RGO was successfully synthesized.

The BRGO powder was dropped on double tape and SEM images were taken randomly for the sample. The SEM images revealed that the BRGO material consists of thin, individual sheets closely associated with each other with wrinkled morphology and range of thickness (15-35nm) (Fig. 2) caused by the stacking of individual sheets by various self assembly techniques.

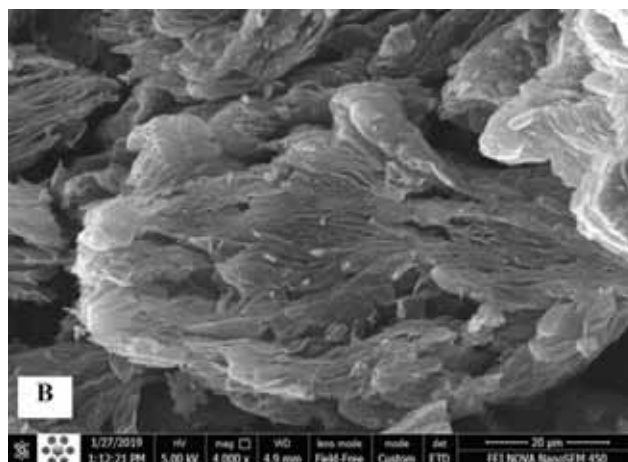
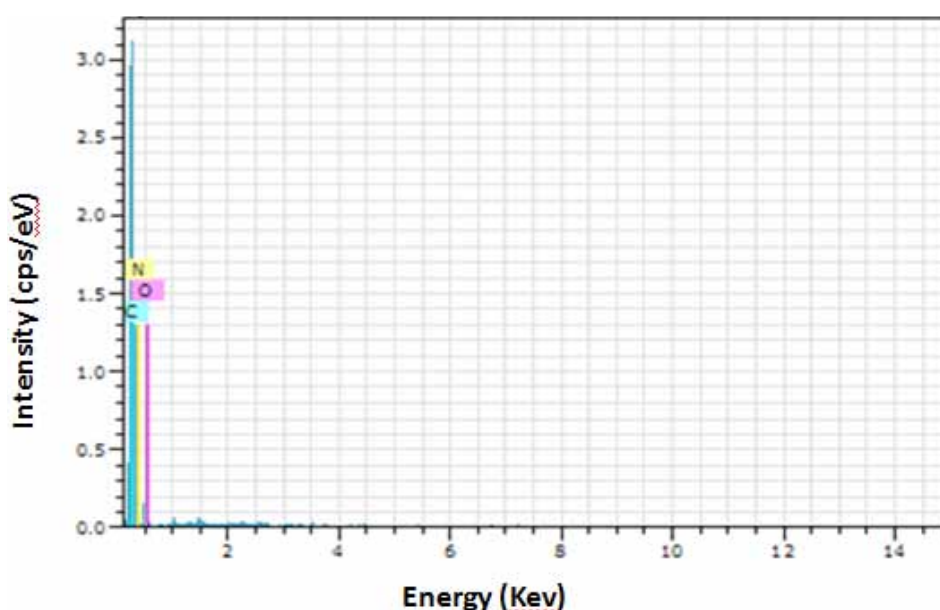


Fig. 2-SEM micrograph of BRGO nanosheets.



Element	Series	Atom (wt. %)
Carbon	K-series	82.00
Oxygen	K-series	18.00

Strong signals from the carbon atoms were observed while medium signals from oxygen and weaker signals from other atoms. The weight percentage of carbon was 82.00% and oxygen was 18.00% which suggesting the partial removal of oxygen containing functional groups as shown in EDS analysis (Fig. 3) and Mapping analysis (Fig. 4).

Fig. 3-EDS analysis of BRGO nanosheets.

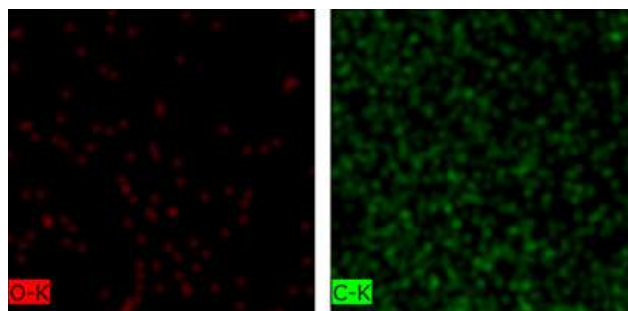


Fig. 4-Mapping EDS analysis of BRGO nanosheets shows the distribution of Oxygen (red) and Carbon (green).

The FTIR spectrum showed that the characteristic peaks associated to oxygen functional groups decreased to a great extent, while hydroxyl and alkoxy peaks vanished completely. The absorption peaks were observed at 2915.79  $\text{cm}^{-1}$  (C–H stretching vibrations),

1633.56  $\text{cm}^{-1}$  (C=O stretching vibrations from carbonyl groups), 1526.15  $\text{cm}^{-1}$  (C=C configurable vibrations from the aromatics), and 1035.06  $\text{cm}^{-1}$  (C–O vibrations from epoxy groups, and C–O vibrations from alkoxy groups)(Fig.5).

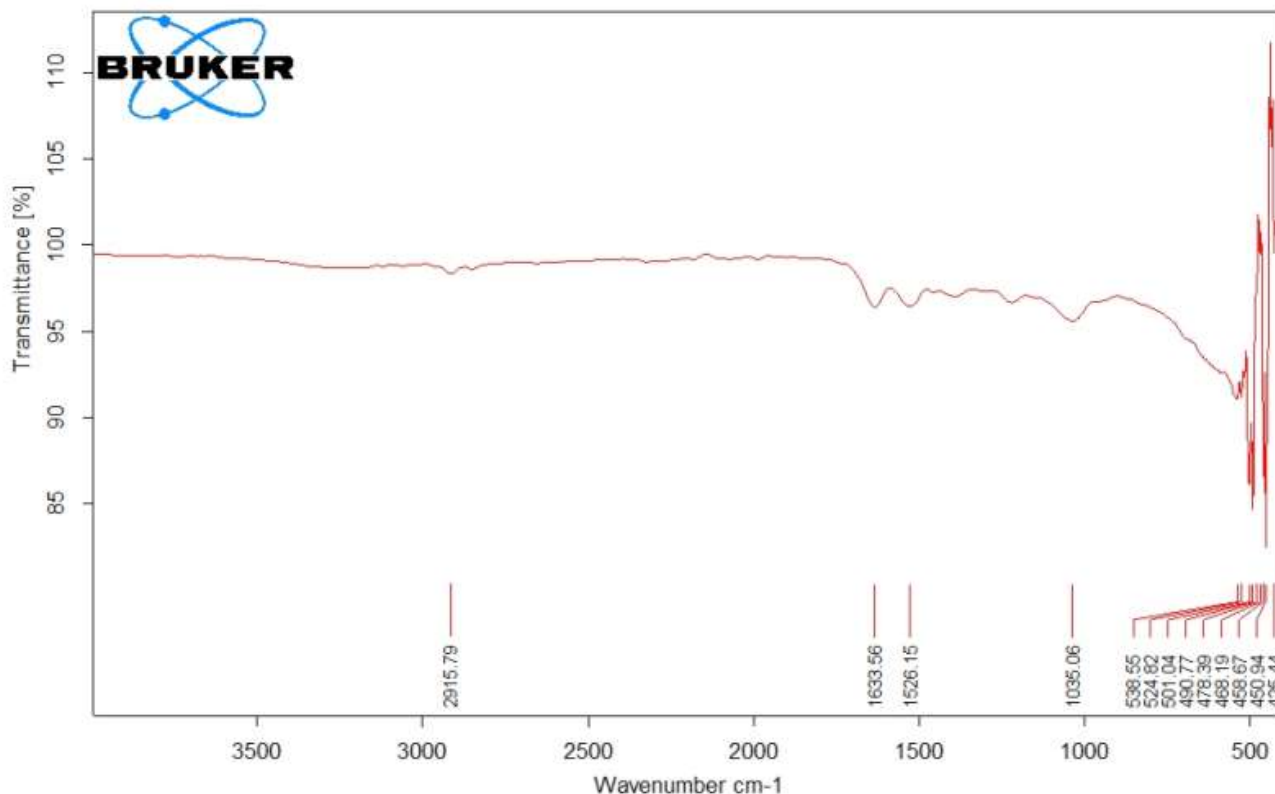


Fig. 5- FTIR spectrum of BRGO.

Results showed that RGO synthesized by *E. coli* strain E-No.7 exhibited a broad diffraction peak at  $2\theta=26.5^\circ$  corresponding to the interlayer spacing of 0.34 nm (Fig. 6).

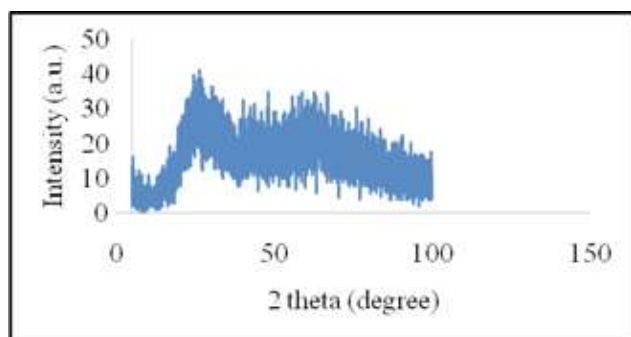


Fig. 6-X-ray diffraction pattern of BRGO.

## Discussion

The interaction between GO sheets and *E. coli* bacteria has been investigated. In previous studies *E. coli* cause reduction of GO and suggested that the GO sheets could act as biocompatible sites for adsorption and proliferation of the bacteria on their surfaces<sup>(9,14)</sup>. The reaction mechanism depends on bacterial cells that have such efficiency directly or indirectly for hydrolyzing acid groups associated with carbon nanosheets specially oxygen atoms. Graphene oxide can serve as the sole electron acceptor by capturing the electrons coming from the respiration process of bacteria<sup>(15)</sup>. For instance, *Shewanella* cells reduce GO via external electron transfer mediated by the outer membrane cytochromes, and by self-secreted electron mediators<sup>(16)</sup>.

The shifting in the peak of BRGO can be attributed to the decrease in oxygen functional groups and an increase in aromatic rings, causing electrons to be easily excited at lower energy<sup>(17)</sup>. So that UV-vis spectrum analysis confirms the restoration of electronic conjugation after the reduction<sup>(3)</sup>. Similar features were observed for the reduction of GO by different phytoextracts, where the peak of RGO is shifted to 268nm and 280 nm<sup>(18,19)</sup>. However, the maximum value observed for the RGO represents the efficiency of the reducing agent used for reduction of GO<sup>(20)</sup>. The SEM images of BRGO showed thin, wrinkled associated individual sheets which can be attributed to the intrinsic properties of graphene<sup>(21)</sup>. Previous studies, confirmed that the RGO exhibited typical wrinkled structure by SEM analysis<sup>(22)</sup>. Using different phytoextracts, SEM images of RGO revealed well separated platelets which are closely associated with each other<sup>(23)</sup>. Using phytoextracts, EDX confirmed the presence of about 71.10% of carbon and 14.2% of oxygen in RGO<sup>(24)</sup> while another study revealed that after reduction of GO by green tea extract, the oxygen was reduced to 28.18%<sup>(19)</sup>.

FTIR spectrum observations of BRGO indicated to the removal most of oxygen functional groups from GO sheet<sup>(25)</sup>. Samples of GO could display a series of different absorption peaks ranging from 900 to 3500  $\text{cm}^{-1}$ , this may be due to different reaction systems and conditions<sup>(4)</sup>. When GO is reduced, the characteristic peaks are gradually weaker over the course of the reaction and some of them vanish completely. This indicates the successful removal of oxygen from the sheets. The spectra of RGO displays a sharp C=C band within the range of 1600  $\text{cm}^{-1}$ <sup>(26,27)</sup>.

In XRD pattern, the diffraction peak at  $2\theta = 26.5^\circ$  indicated the organized crystal structure of BRGO while the interlayer spacing confirmed the removal of oxygen functional groups and water molecules from interlayer during reduction of GO sheets<sup>(9,28)</sup>. Earlier studies revealed that the interlayer distance of RGO decreased significantly after different reduction reactions. After reduction by *Azotobacter chroococcum*, the typical peak near  $2\theta = 11^\circ$  ( $d \sim 0.81 \text{ nm}$ ) for GO vanished while a broad peak appeared in the range of  $17-24^\circ$  indicating parallel stacking of the RGO sheets<sup>(29)</sup>. Upon GO reduction by  $\beta$ -carotene the signal shifted to  $23.13^\circ$  with a d-spacing of  $0.392 \text{ nm}$ <sup>(30)</sup>.

## Conclusion

*Escherichia coli* strain E-NO.7 can be used for the reduction of GO as ecofriendly synthetic protocol. Characterization analyses revealed the successful bacterial synthesis of RGO nanosheets through the removal of oxygen functional groups and water molecules from interlayer during reduction of GO.

**Conflict of Interest:** Nil.

**Source of Funding:** Authors have no competing interests.

**Ethical Clearance:** Authors are in accordance with the ethical standards of the responsible committee on human experimentation (institution and national) and the Helsinki Declaration of 1975.

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# Factors Affecting Pregnant Women Behavior on Antenatal Care (Anc) Examination in Three Health Centers in Jombang Regency

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## Abstract

**Background:** The development of health problems that affect the pregnancy of mothers starting from non-communicable diseases and infectious diseases makes the health condition of pregnant women become one of the priority health problems that must be considered. Early detection on pregnant women is a way to find out pregnancy disorders or problems so that they can prevent the severity and even death of the mother. The Integrated ANC at health center is an antenatal care development program with a comprehensive examination conducted comprehensively to find out problems in pregnancy. The purpose of this study was to analyze the factors that influence maternal behavior in the three working areas of Jombang Regency health centers.

**Material and Method:** Research uses a quantitative approach with observational research and is classified as cross sectional. The research sample are 110 pregnant women with 1-5 months gestational age who are permanent residents in 3 regions of Jombang Regency PHC.

**Result:** The factor that influences the behavior of the Integrated ANC examination is the intention to perform the behavior of the mother to do the Integrated ANC examination (Sig = 0.001) and the Saliency of the behavior (Sig = 0,000) the mother has related to the Integrated ANC examination at the health center.

**Conclusion:** Information about the Integrated ANC raises a good understanding of the importance of behavior, so that the mother has a strong intention to make a decision to conduct an Integrated ANC examination.

**Keywords:** *Influence, Behavior, Integrated ANC, Health Center.*

## Introduction

Health problems that affect pregnancy health are directly caused by labor hemorrhage, preeclampsia, and infection. In addition to direct causes, other causes can affect pregnancy health such as non-communicable diseases and infectious diseases. Non-communicable

diseases such as diabetes, hypertension, heart disease and malnutrition while infectious diseases such as malaria, HIV-AIDS, Syphilis, Tuberculosis and hepatitis <sup>1</sup>. In addition, health conditions, mental status and lifestyle can result in complications of pregnancy that can affect the health of pregnant women and results in maternal death<sup>2</sup>.

Early detection on pregnant women is one way to determine pregnancy abnormalities or problems so that they can prevent the severity of even maternal death<sup>3</sup>. The World Health Organization (WHO) recommends antenatal care as a preventive measure for early detection of pregnancy problems<sup>4</sup>. Antenatal care is done to assist in identifying early pregnancy problems and performing treatment complications during pregnancy <sup>3</sup>.

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Integrated Antenatal Care (ANC) is a comprehensive program of antenatal care development that is carried out to prevent mothers from experiencing severity and even death. Integrated ANC services cover all basic examinations such as pregnancy examinations, dental examinations, nutritional consultations, laboratory tests such as Hb, blood type, complete blood, complete urine and other supporting examinations such as HIV-AIDS, tuberculosis, syphilis and hepatitis<sup>1,3</sup>.

An integrated ANC examination conducted comprehensively requires the mother to come to the health center. Data on the use of antenatal care services in developing countries shows that the utilization of pregnant women is still low in conducting ANC examinations, which is less than 65%, this is very far compared to developed countries which reached 97%. In Indonesia, the utilization of antenatal care services in health center merely reaches 61.4%<sup>5</sup>.

The low visits of mothers who came to check antenatal care at the health center were influenced by several factors such as age, income, education level, knowledge, social support, quality of care and distance to health facilities<sup>6</sup>. The study of factors that influence the use of antenatal care services in Nigeria explains that knowledge is an important factor so women are aware of their health rights to get appropriate health services. The results also showed that sufficient maternal knowledge of the benefits of ANC and pregnancy-related complications play an important role in the utilization of ANC services<sup>7</sup>.

The Integrated Behavior Model Theory states that behavior is an action that arises due to the intention that someone has. Without motivation, it is not possible for someone to do the recommended behavior. In addition to intentions there are 4 components that directly affect behavior, namely knowledge and skill to perform the behavior, salience of the behavior, environmental constraints and habits<sup>8</sup>.

Based on data from Maternal and Child Health of Jombang District Health Office, the results of the Integrated ANC examination in 2017 amounted to 68.53% and in 2018 it was 79.59%. Based on the existing achievement data, it can be seen that the achievement of the Integrated ANC examination at the Health Center has increased, but it is still far from the national target of 100%. Jombang Regency has 34 Health Centers work areas and three of them have the lowest integrated ANC examination results, namely Jelakombo Health Center

in 2018 of 47.24%, Jabon Health Center in 2018 of 60.72% and Cukir Health Center of 2018 of 66.61%<sup>9</sup>. The purpose of the study was to analyze the factors that influence the behavior of mothers to conduct an integrated ANC examination in the Three Working Areas of the Jombang Regency Health Center with the Theory Integrated Behavior Model approach.

## **Materials and Method**

The study used a quantitative approach with observational analytic type using cross sectional design. The sample in this study were pregnant women with gestational age of 1-5 months and lived in a predetermined health center working area with total of 110 pregnant women. The sampling is done by simple random sampling.

The study was conducted in the three work areas of the Jombang PHC are Jelakombo, Jabon and Cukir. Location selection is based on the lowest achievement of Integrated ANC examination at the health center. The research takes place from January to May 2019.

Measurement scale to see independent variables using Likert scales. Scores are grouped in categories. In the category of Intention to perform behavior (intention) that is weak <9 and Strong  $\geq 9$ . Knowledge and skill to perform the behavior is less <7 and Good  $\geq 7$ . Salience of the behavior is weak <15 and strong  $\geq 15$ . Category of environmental constraints is high <12 and low  $\geq 12$ . Habits is less <11 and good  $\geq 11$ .

The study was analyzed using SPSS 21 software, using a multivariate logistic regression method that was used to see the effects of independent variables, namely by intention to perform behavior, knowledge and skill to perform behavior, salience of the behavior, environmental constraints, and habit towards variables dependent is the mother's behavior to check the Integrated ANC at the health center.

**Findings:** From the data in table 1, it shows that the majority of pregnant women have a strong intention to conduct an Integrated ANC examination at the health center. Other factors that influence the behavior of mothers to check for integrated ANC also show positive results. The knowledge and skills of mothers are mostly in the good category, the importance of behavior in the strong category, barriers for mothers to check the Integrated ANC also in the low category and the habits of pregnant women are included in the good category.



**Table 1. Frequency Distribution of the factors of Intention to perform the behavior, knowledge and skills to perform the behavior, salience of the behavior, environmental constraints and habits**

Variable	N	%
<b>Intention to Perform the Behavior</b>		
Weak	29	26,4
Strong	81	73,6
<b>Knowledge and skills to perform the behavior</b>		
Less	39	35,5
Good	71	64,5
<b>Salience of the behavior</b>		
Weak	49	44,5
Strong	61	55,5
<b>Environmental constraints</b>		
High	31	28,2
Low	79	71,8
<b>Habit</b>		
Less	42	38,2
Good	68	61,8

Behavior is divided into two categories, namely yes and not doing an integrated ANC examination at the health center. Table 2. Indicates that the majority of pregnant women have performed an integrated ANC examination at the health center.

**Table 2. Behavior Distribution of Respondents to Check Integrated ANC**

Behavior	N	%
Yes	51	46,4
No	59	53,6

Factors that influence the behavior of mothers to conduct an integrated ANC examination in the three working areas of the Jombang Regency Health Center are based on the results of the logistic regression test, namely:

**Table 3. Logistic Regression Test Results of Factors Affecting Behavior**

Variable	Sig.	Details
Intention to perform the behavior	0,001	Take effect
Knowledge and skill to perform the behavior	0,465	No effect
Salience of the behavior	0,000	Take effect
Environmental constraints	0,917	No effect
Habit	0,765	No effect

Table 3. shows that there are two factors that influence the behavior of mothers to conduct an ANC examination in the Integrated health center, namely intention to perform the behavior and salience of the behavior.

Intention is a probability or possibility that is subjective, that is someone's estimate of how likely it is to do something. Intention will positively influence the conduct of behavior<sup>10</sup>. The majority of pregnant women have strong intentions in conducting an integrated ANC examination. The results of the same study revealed a strong relationship between women's intention factors in Zambia and the use of maternal health services including antenatal care examinations<sup>11</sup>. The research explained the intentions of pregnant women who were significantly associated with using Maternity Waiting Houses in Jimma City, West Ethiopia. Maternity waiting house is the concept of bringing pregnant women closer to antenatal care services<sup>12</sup>.

Knowledge and skill to perform the behavior is the knowledge of pregnant women about various things related to the Integrated ANC examination at the health center. The majority of pregnant women have good knowledge and skills, this shows that pregnant women understand the Integrated ANC examination that must be done at the health center. The benefits of the Integrated ANC examination and the loss if they do not conduct an Integrated ANC examination at the health center. The study showed 85.3% of pregnant women had a high knowledge score about antenatal care. The level of knowledge in pregnant women has a significant correlation with antenatal care practices in primary health care centers in Benghazi, Libya<sup>13</sup>.

Salience of the behavior is the perception of pregnant women who are important and necessary to carry out various actions that support an integrated ANC examination. The results of the study found that the Salience of the behavior factors influence the behavior of mothers to carry out an integrated ANC examination. The majority of pregnant women have important meanings related to good behavior.

Determining whether an important behavior is performed or not, the mothers must have a good understanding of the behavior of the Integrated ANC examination. Of course understanding is associated with education and knowledge that mothers have. Some studies have found that educated women have a good

examination history and pregnancy outcomes compared to uneducated mothers<sup>14</sup>. Mothers who have knowledge of good antenatal care will find it necessary to carry out antenatal care<sup>15</sup>.

Environmental constraints in this study are various environmental conditions that can hinder or make it difficult for pregnant women to carry out an integrated ANC examination at the health center. The results of the study found that some pregnant women have low/little environmental constraints, which means that mothers with fewer barriers should have a great opportunity to conduct an integrated ANC examination.

Distance to health facilities is one of the most common environmental constraints experienced by pregnant women to get ANC examinations in PHC, especially in rural areas. In general, the impact of distance on users of health facilities increases when combined with a lack of transportation in developing countries. In addition, access to health facilities also affects the frequency of services used<sup>16</sup>. The research shows that the distance to antenatal care is a problem that tends to limit access to antenatal care<sup>7</sup>.

The mother's Habit for conducting an Integrated ANC examination in this study is a variety of actions that consciously have often been carried out by the mother to encourage the mother to conduct an Integrated ANC examination. Mothers who have experience will do a behavior, and then the behavior will become a habit. The study revealed that high parity mothers and older women have fewer antenatal examinations because they have experiences of pregnancy<sup>17</sup>. The habit of mothers getting information about antenatal care also affects the behavior of Integrated ANC examinations at the health center. Research conducted in several developing countries reveals that women who often get information or antenatal care education from doctors or nurses increase the use of ANC examination services<sup>18</sup>.

### **Conclusion**

From this cross sectional study there are several factors studied, namely intention to perform behavior, knowledge and skill to perform, salience of the behavior, environmental constraints and habits. Based on the results of the study, it was found that the factors that influence the behavior of mothers to carry out an integrated ANC examination at the health center in the three working areas of Jombang Regency were Intention to perform the behavior and salience of the behavior. The results of

this study prove that the main determinant of a person's behavior is intention. An important factor in a behavior also contributes to pregnant women to have a decision to do or not conduct ANC Integrated examination at the health center. Information related to the Integrated ANC examination is very necessary to improve good understanding so that mothers have the knowledge and confidence in determining the decision not to carry out or conduct an Integrated ANC examination.

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# Relationship between Multiparity and the Types of Histopatology of Cervical Cancer

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## Abstract

Cervical cancer is one of the most common neoplastic diseases in women in the world. Most of the occurrences of cervical cancer occur in developing countries, so cervical cancer becomes the main cancer for women in developing countries. The presence of cervical cancer results in a decrease in the quality of life in women as sufferers. The research method was case control by looking at the data from the respondent's medical records and analyzed using chi square and logistic regression. The purpose of this study was to identify the relationship between parity and the type of cervical cancer histopathology. Most respondents were aged 36-50 years and the incidence of SCC and adenocarcinoma with parity. Based on the results of univariate analysis between variables obtained  $p = 0.036$ , it can be said that parity with histopathology type is related to the strength of 0.118 and multivariate test found that 2-4 parity is more at risk of cervical cancer with histopa SCC with OR 0.037. Parity with 2-4 is the highest number in this study which suffered from squamous cell carcinoma. Educational efforts related to the program to limit the number of births.

**Keywords:** *Multiparity, histopathology, cervical cancer, adenocarcinoma, squamous cell carcinoma.*

## Introduction

Cervical cancer is one of the most common neoplastic diseases in women in the world. The number of cervical cancer sufferers is almost 500,000 new cases every year and kills 270,000 women every year. About 85% of cervical cancers occur in developing countries, so cervical cancer is the main cancer for women in developing countries. The presence of cervical cancer results in a decrease in the quality of life in women as sufferers. In Indonesia, cervical cancer is also the most common cancer among other gynecologic cancers. The incidence of cervical cancer around 7.9% in the world ranks second in all cancers in women with a 9.3% death incidence rate of all cancers in women in the world<sup>1</sup>.

According to the World health organization, it is estimated that in 2020 there will be an increase in the number of patients reaching 20 million per year. 2014 Hospital Information System data, there were 5,349 cases of cervical cancer in women or 12.8% of total client visits. Meanwhile, in East Java, the number of cervical cancer patients in 2015 was 4,304 and in 2016 there was

an increase to 4,796 cases. The city of Surabaya is one of the biggest contributors to cervical cancer which was reported as many as 877 cases in 2016<sup>2</sup>.

Histopathological type of adenocarcinoma cervical cancer and squamous cell carcinoma is influenced by several factors that are at risk for the occurrence of one of these types of cervical cancer. The risk factors are the number of sexual partners, parity, age too early at first delivery, duration of use of oral contraceptives and smoking, but it is still unclear which direct risk factors can be identified for squamous cell carcinoma which is also for adenocarcinoma<sup>3</sup>. Adenocarcinoma of the cervical uterus has different epidemiological and biological causes than squamous cell carcinoma. HPV infection is the main cause of both types of cervical cancer, several studies show differences between adenocarcinoma and squamous cell carcinoma in relation to other factors, such as smoking, and reproductive factors<sup>4</sup>. A study conducted by Green et al., In the UK found risk factors for adenocarcinoma cervical cancer and squamous cell carcinoma at the age of 20-40 years were increased

parity, age at first birth, oral contraception and duration of smoking..

The aim of this study was to find a relationship between parity and the type of cervical cancer histopathology.

### Method

This research is an analytical survey study with a case control study approach with retrospective analysis. The case group is squamous cell carcinoma and the control group is adenocarcinoma. The sample used in this study was 246 respondents divided into two, namely the control group and the case. Data is obtained by collecting secondary data from medical records. The data collection tool used is the checklist sheet. The data collected was then tabulated and analyzed using the chi square test and logistic regression.

### Result

The results of the study found variables such as age, occupation, education, parity number and type of cervical cancer histopathology

**Table 1 Distribution of respondents by age**

No.	Age	Total	Percent
1	20-35	22	9.0%
2	36-50	128	52.0%
3	>50	96	39.0%
<b>Total</b>		<b>246</b>	<b>100%</b>

Based on the age distribution of the respondents the highest was 36-50 years with a percentage of 52.0%.

Table 2 shows the highest number of respondents based on education level are elementary school graduates, namely 80 respondents or 32.5%.

**Table 2 Distribution of respondents based on education level**

No.	Education Level	Total	Percent
1	Elementary School	80	32.5%
2	Junior High School	64	26.0%
3	Senior High School	74	30.1%
4	College	28	11.4%
<b>Total</b>		<b>246</b>	<b>100.0%</b>

**Table 3 Distribution of respondents based on the amount of parity**

No.	Parity	Total	Percent
1	0	9	3.7%
2	1	47	19.1%
3	2-4	178	72.3%
4	>5	12	4.9%
<b>Total</b>		<b>246</b>	<b>100%</b>

Table 3 shows the number of parity of respondents with the highest parity number, namely 2-4 with 178 respondents or 72.3%.

**Table 4 Distribution of respondents based on the type of histopathology ca cerviks**

No.	Type	Total	Percent
1	Adenocarsinoma	123	50%
2	Squamous cell carcinoma	123	50%
<b>Total</b>		<b>246</b>	<b>100%</b>

Based on table 5 Histopathological types are divided equally because in this study using case control.

Bivariate analysis of variable parity and type of histology Ca Cerviks.

**Table 5 Cross tabulation between parity and histopathology type**

No.	Parity	The Type Of Histopathology		Total	
		Squamous cell carcinoma	Adenocarsinoma	F	%
1	0	15	18	33	13
2	1	34	38	72	29
3	2-4	55	45	100	40
4	≥5	29	12	41	18
<b>Total</b>		<b>123</b>	<b>123</b>	<b>246</b>	<b>100</b>

Chi Square p= 0.036, Contingency Correlation= 0.118

Based on table 5, the highest incidence of parity was found in 2-4 with the type of histopathology of squamosa cell carcinoma as many as 55 respondents. Adenocarcinoma is dominated by 2-4 parity with 45 respondents. Univariate analysis between variables obtained  $p = 0.036$  which can be said that parity with histopathology type is related to the power of 0.118.

Multivariate testing of the relationship between parity and the type of histopathology of cervical cancer using logistic regression

**Table 6. Results of multivariate tests on parity and histopathology relationships**

Parity	P value	OR	CI 95%	
			Upper	Lower
Parity 0	0.054	1	-	-
Parity 1	0.030	0.345	0.132	0.951
Parity 2-4	0.017	0.370	0.164	0.838
Parity $\geq 5$	0.006	0.339	155	738

From the table above, it can be seen that the highest risk of cervical cancer is in parity 2-4 with a value of OR 0.370, meaning the risk of cervical cancer in parity 2-4 is 0.37 times greater than other parities..

### Discussion

**Identification of Parity:** Based on table 4 data collected by classifying parity categories with 0, 1, 2-4, and  $\geq 5$  found the highest parity is 2-4, meaning the respondents have 2-4 children (multipara). High parity is one of the risk factors for cervical cancer. Jensen et al., stated that women who had 4 or more times at risk of having cervical cancer were 1.9 times more than the number of women who gave birth between less than or equal to 3 times, although this was a risk factor but this it should be our attention to detect this group. Pregnancy and childbirth that exceeds 3 people and the distance of pregnancy is too close will increase the incidence of cervical cancer..

The majority of respondents who have children 2-4 are aged 36-50 years. The age of sufferers is between 30-60 years, the most between 45-50 years. This study is also in line with a study conducted by Missaoul which shows that the average age diagnosed with cervical cancer is at most above 40 years of age. The latent period of the prevasive phase to be invasive takes about 10 years. Only 9% of women under 35 years showed invasive cervical cancer at the time of diagnosis, while

53% of KIS (carcinoma in-situ) was found in women over 35 years of age<sup>7</sup>.

According to the theory, the incidence of cervical cancer increases with age and the time it starts to become infected with HPV until it becomes invasive cancer as a multistage carcinogenesis process that requires around 10-20 years. In addition, in old age there is also a decrease in immunity which plays a role in destroying cancer cells, slowing growth and spread.

**Identification of Types of Histopathology of Cervical Cancer:** Based on table 6, the most histopathological type was found in squamosa cell carcinoma with 55 respondents with 2-4 parity. The findings in this study are in line with the research of Chen, Tong, Guo, Lau, & Zhao, who stated that histopathology terminology of cervical cancer is divided into squamous cell carcinoma and adenocarcinoma. The most common type of cervical cancer is found in 80%-85% of squamous cell carcinoma, with the remaining 15% -20% followed by adenocarcinoma or adenoskuamosa carcinoma.

The incidence of squamous cell carcinoma was initially preceded by precancerous lesions, also called cervical intraepithelial neoplasia (CIN), which is the beginning of changes to invasive cervical carcinoma. In these precancerous lesions, cell structure changes become abnormal. Cells change shape and size, cell nucleus enlarges, and cell cytoplasm decreases. High cases of squamous cell carcinoma are often caused by skrinning delay so that it is known that at the time of being squamous cell carcinoma<sup>5</sup>.

However, this is not in accordance with Bonin, Devouassoux-shisheboran, & Gol, who stated that in his research found the most cases of cervical cancer were adenocarcinoma. Adenocarcinoma itself is often found at a young age that is under 35 years. In this study most of the respondents were between 36-50 years old so that the type of adenocarcinoma is more lacey than the type of squamous cell carcinoma

**Relationship of Parity with Types of Histopathology of Cervical Cancer:** Based on the results of the chi square test statistics the value of  $p = 0.036$  and  $\alpha = 0.05$  was obtained. Parity can play a synergistic role with other factors such as HPV to increase the risk of cervical cancer, so that parity can be a cofactor that causes cervical neoplasia. Cervical cancer is most commonly found in women who often give birth. This is presumably due to hormonal changes that occur

during pregnancy and cervical trauma that occur during childbirth. Trauma to the cervix and frequent treatment in the reproductive organs during childbirth can facilitate the entry of HPV as a causative agent for cervical cancer. Changes in the composition of the hormone progesterone and estrogen during pregnancy also cause an influence on HPV and the development of cancer <sup>10</sup>

In this study, women with 2-4 more parity were found as sufferers of cervical cancer. High parity increases trauma to the birth canal. The incidence of cervical adenocarcinoma is often associated with HPV exposure. The development of adenocarcinoma initially originates from epithelial cells that experience genetic mutations that change their behavior <sup>11</sup>. These mutated cells carry out uncontrolled, immortal cell division and invade the stromal tissue below. Circumstances that cause irreversible genetic mutations will cause this cancer to grow. Oncoprotein from E6 will bind and make the tumor suppressor gene (p53) become inactive, while oncoprotein E7 will bind and make the retinoblastoma (pRb) gene product become inactive <sup>12</sup>. This mutation of the tumor suppressor gene causes decreased proliferative and apoptotic activity. High parity can increase the risk of cervical cancer because maintaining a transformation zone is on the ectocervix for a long time (years) so as to facilitate direct exposure to HPV and other cofactors <sup>9</sup>.

Patil, Deshmukh, Rathid, Kotgire, & Chavan found that HPV exposure is possible because of the stimulation of the cervix in the form of trauma and inflammation during labor, which can repeatedly cause excessive responses. Childbirth and abortion play a role in the development of cervical cancer because of the repeated birth process or in other words having many children, the uterine cervix will experience trauma and slow repairs, so this is the way for precancerous conditions. This is in line with research by Zaloudek which states that adenocarcinoma correlates with the presence of HPV invasion. As many as 76% of women with adenocarcinoma are positively infected with HPV with repeated labor history <sup>15</sup>.

Repeated labor takes the form of changes from the ectocervical epithelium, namely the squamous epithelium with the endocervical epithelium, which is a ciliated layer of short cuboid/columnar epithelium. In young SCJ women outside the external uterine os, whereas in women over 35 years SCJ is inside the cervical canal <sup>16</sup>. Therefore in young women, SCJ which is outside the external uterine os is susceptible to external factors such

as mutagens which will trigger dysplasia of the SCJ. In women with high sexual activity, SCJ is located in the external os due to trauma or muscle retraction by prostaglandins. During a woman's life physiological changes occur in the cervical epithelium; the columnar epithelium will be replaced by a squamous epithelium that is thought to originate from a columnar epithelial reserve. Sharma & Pattanshetty found the process of replacing the columnar epithelium into a squamous epithelium called the metaplasia process and occurs due to the influence of low vaginal pH after labor. High metaplasia activity resulting in SCJ hyperactivity leads to squamous cell carcinoma.

This illustrates the increasing number of children the more at risk of developing cervical cancer. Due to injury after childbirth and the distance of labor that is too close will cause the virus that causes cervical cancer to enter. Cervical cancer or cervical cancer is the biggest cause of cancer deaths for women. This cancer occurs in the cervical area, which is the part of the uterus that connects the upper uterus to the vagina. The injury triggers HPV invasion and facilitates abnormalities in cells around the injury. The result will be cervical cancer.

## Conclusion

Based on the results of the study there is a relationship between parity and histo PA with a value of  $p = 0.036$  and the strength of a strong relationship with a value of 0.118. 2-4 parity is 0.370 times higher in squamous cell carcinoma. The need to improve health education programs in the prevention of cervical cancer.

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**Ethical Clearance:** Ethical clearance was obtained from The Ethics Committee of the Soetomo General Hospital, Surabaya (ethics approval number 0991/KEPK/III/2019)

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# Stigmatization People Living with HIV AIDS (PLWHA)

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## Abstract

People with HIV AIDS (PLWHA) often experience stigma, the stigma that occurs among them is verbal statement and the act of keeping PLWHA away from social activities, stigma can disrupt the social role of PLWHA. Stigma can come from anyone including health workers. PLWHA need actions to eliminate the stigma that occurs, so that PLWHA can live as other individuals without getting stigma. The purpose of the review literature is to identify the forms and sources of stigma that occur in PLWHA and efforts to eliminate stigma against PLWHA. The author finds journals that are relevant to the problem by using stigma keywords, health workers, HIV AIDS, and people with HIV AIDS. Journals were obtained from the Science Direct, Proquest, SagePub, and Scopus databases with 54 journals and 14 journals fulfilling the criteria for analysis. Journal analysis states that various efforts have been made to solve the problem of stigma against PLWHA, this effort includes the entry of HIV into health care work programs, the source of stigma from health workers requires special attention, because health workers should be promoters to eliminate stigma, necessary increasing the knowledge and expertise of health workers in handling and treating PLWHA. So that officers can become promoters in eliminating stigma against PLWHA

**Keywords:** *HIV, AIDS, People with HIV AIDS (PLWHA), Stigma, Immunology.*

## Introduction

Stigma One of the problems faced in making efforts to control Human Immunodeficiency Virus (HIV) Acquired Immune Deficiency Syndrome (AIDS) in the community, this is due to the fear of being infected and the lack of knowledge about HIV AIDS. Unfair treatment (discrimination) and stigma are not only carried out by the community but also by health workers, stigmatization can be done intentionally or unintentionally. Various efforts have been made to solve the problem of stigma against people with HIV AIDS (PLWHA), these efforts include the inclusion of HIV programs in the Puskesmas work program, but with socialization and health counseling that have not been able to solve the existing problems <sup>1</sup>

Preventive efforts are very necessary because it can reduce the risk of HIV transmission, prevention efforts are considered most effective because they can prevent someone from being exposed to the risk of transmission, research on HIV treatment therapy has been carried out, one of which is Antiretroviral therapy (ART) can increase PLWHA life expectancy <sup>2</sup>

Handling HIV-AIDS problems is not enough only on health aspects, but also refers to social aspects. This is because, HIV-AIDS sufferers not only experience health problems, but also experience social problems. The social problem in question is the presence of stigma on PLWHA and family members, the forms of stigma that are obtained vary among others in the form of verbal statements and discrimination <sup>3</sup>

Stigma occurs not only from people in the surrounding environment, but also often carried out by health workers, who have an important role in advancing in the field of health services. Health workers should provide services to all people in need without distinguishing health and social status. Especially for

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nurses, they must also have value and self-confidence to provide services including PLWHA. Anxious feelings and worries that the nurse has can do stigmatization without the nurse noticing<sup>4</sup>

The stigma can have an impact on many things starting from the onset of depression, psychological distress, and anxiety which will eventually lead to PLWHA being unable to achieve its independence. Other research shows that PLWHA is reluctant to open an identity because it cannot be accepted by its environment, so that most PLWHA has a disruption of social interaction with the surrounding community<sup>5</sup>. Disparities occur in several places that cause PLWHA to get worse with its health status, which is reflected in the treatment received by PLWHA in the work environment and living environment<sup>6</sup>

The purpose of this study was to conduct a systematic review related to PLWHA's perception of the stigma they experienced. This study is expected to provide ideas for further research related to PLWHA's perception of the stigma experienced and can be used as a reference in efforts to handle PLWHA.

### Method

Study search strategies that are relevant to the topic are carried out using the ScienceDirect, Proquest, and SagePub databases restricted from 2000 to 2018. The keywords used are "stigma", "HIV", "AIDS", fulltext articles and abstracts reviewed to choose studies which matches the criteria. The inclusion criteria in this review are stigma in people with HIV/AIDS. Journal searches using the above keywords get 54 journals and articles that match the inclusion criteria there are 14 journals.

### Result

The journals reviewed in this study are qualitative research journals. The number of articles obtained in this review are 14 journals and all of them use qualitative research. The method used to obtain information is using in-depth interviews and FGD (focus group discussion).

The period of research used in these studies varies from 1 month to 1 year, the longer the time the study and the frequency of interviews on average provide good results for the information obtained. The longer the study, the more information that can be extracted, this is indicated by the frequency of frequent interviews and frequently scheduled group meetings.

The sampling method used in the study was 14 studies that had been carried out qualitatively. The sample in this study varied, for example age, in this study the age of the sample varied from teenagers to late adulthood. So that the data obtained is very diverse and covers all age lines.

Based on the description of 14 studies, it is shown that the handling of HIV-AIDS problems is not enough only on the health aspect, but also refers to the social aspects<sup>7</sup>. This is because, HIV-AIDS sufferers not only experience health problems, but also experience social problems<sup>8</sup>. The social problem in question is the existence of stigma on PLWHA and family members, the forms of stigma that are obtained vary among others in the form of verbal statements and discrimination<sup>9</sup>. Various efforts have been made to solve the problem of stigma against people with HIV AIDS (PLWHA), these efforts include the inclusion of HIV programs in health care work programs, but with the outreach and health counseling that has not been able to solve the existing problems<sup>10</sup>

### Discussion

The results of the review indicate that stigma raises health problems and social activities, 1 of 4 people with HIV are unaware of their HIV diagnosis, and almost half present with a CD4 count <350 cells/microliter<sup>11</sup> 95% of informants reject their health status<sup>12</sup>. Stigma causes negative self-image and the occurrence of discrimination from the community causing interruption social PLWHA<sup>13</sup>. Increasing understanding of social support mechanisms contributes to HIV treatment behaviors from PLWHA and can fill knowledge gaps<sup>14</sup>. Family support and peer group support can increase the level of psychological response<sup>15</sup>.

Stigma and discrimination in health services carried out by health workers is one of the obstacles to the quality of providing health services to patients with HIV and AIDS, which in turn can reduce the health status of patients with HIV and AIDS, the stigma associated with HIV and AIDS is called a big problem and damages family life, social, and individual economics<sup>16</sup>. The stigma associated with HIV and AIDS is also considered a major barrier in the prevention, treatment and treatment of HIV and AIDS<sup>17</sup>

The stigma that occurs is influenced by several factors known as the power factor of the occurrence of stigma<sup>18</sup>. Power factors include four components

including social, political, economic and spiritual factors. Social factors are influenced by weak communication and social contact between health workers and patients. Politically, stigma occurs because there is no policy that regulates the handling of HIV and AIDS patients, and the consequences of stigma and discrimination in patients related to HIV and AIDS. Economic factors, the emergence of stigma and discrimination because of the lack of provision of universal precaution facilities, the absence of rewards and reward services, and no health insurance if contracting HIV and AIDS<sup>19</sup>

### Conclusion

The results of a systematic review of research addressing the problem of HIV-AIDS is not enough only on health aspects, but also refers to social aspects. This is because, HIV-AIDS sufferers not only experience health problems, but also experience social problems. The social problem in question is the existence of stigma on PLWHA and family members, the forms of stigma that are obtained vary among others in the form of verbal statements and discrimination. Various efforts have been made to solve the problem of stigma against people with HIV AIDS (PLWHA), these efforts include the inclusion of HIV programs in health care work programs, but with the outreach and health counseling that has not been able to solve the existing problems.

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# Development of Doctors Attire According to Patients Preferences

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## Abstract

**Background:** Doctor-patient rapport can be built in various ways, and it also includes non-verbal communication. Medical attire is an example of non-verbal communication that affects the patient's comfort and perception of a doctor. Medical attire that suits patient's preferences has a positive effect on the patient's trust and comfort.

**Objective:** This study aims to know about patient's preference towards doctor attire, so it will be a guide for doctor building good rapports in doctor-patient communication.

**Method:** This research is an analytical observational study with cross-sectional approach. Using consecutive sampling method, a sum of 6467 Indonesians was taken as samples. The data acquired from questionnaire via google form include age, sex, level of education, and patient's rate of comfort for doctor apparel. To analyze the data, both Independent T test and One Way Anova were conducted.

**Result:** White coat, basic pants, formal shoes, watch, and glasses are male doctors' garments that patients find very comfortable. On female doctors, the pieces of clothing that patients are very comfortable with are white coat, basic pants, formal shoes, and hijabs. There is a significant result in comparison at each attire ( $p < 0,05$ ).

**Conclusion:** The attire that patients find very comfortable to be worn by doctors are white coat, basic pants, formal shoes, hijabs (on women), watch, and glasses.

**Keywords:** *Medical attire, patient's comfort, white.*

## Introduction

A doctor must provide maximum service in all aspects, including promotive, preventive, curative, and rehabilitative aspects when performing his duties.<sup>1</sup> The important thing for doctors to work effectively is through good doctor-patient relationships.<sup>2</sup> Good relationships can be formed through effective communication, both verbally and nonverbal.<sup>3</sup> Nonverbal communication includes body gestures, facial expressions, eye contact, appearance, especially attire.<sup>4</sup> Nonverbal communication is not only a complement to verbal communication, but also gives meaning to the information conveyed. In fact, 65% of communication is delivered nonverbally.

Appearance is one form of nonverbal communication that plays an important role in shaping the patient's initial perceptions.<sup>4</sup> Doctor's appearance and attire is important in increasing patient trust and satisfaction with health services provided by doctors.<sup>6</sup> This is due to patient trust and satisfaction is not only objectively influenced by medical action, but also subjectively, such as by the good appearance and good attire of the doctor.

Problems regarding the patient's trust in doctors, makes it very important for doctor to improve their quality of service by increasing their nonverbal abilities. Therefore, the research that will be carried out regarding the development of doctor attire according to patient preferences can be beneficial for health practitioners.

This study aims to know about patient’s preference towards doctor attire, so it will be a guide for doctor building good rappers in doctor-patient communication. The benefits obtained are knowing the appearance preferences and how to dress that the patient likes, and make the patient feel more comfortable.

**Method**

This study used a descriptive observational method with a cross sectional design to determine patient preferences in choosing doctor’s clothing. The study was conducted in the span of September 2018 - December 2018 at the Medical Faculty of Sriwijaya University. The population of this study is all Indonesian people. The sample in this study was the population that met the inclusion criteria and was chosen as research subject through sampling process. The method of sampling in this study used a non-probability sampling technique, with a consecutive sampling method.

Consecutive sampling is done by taking all respondents or subjects that meet the research criteria. The inclusion criteria for this study were the Indonesian people who filled out questionnaire data and people who filled out questionnaire is 12 years and above. The exclusion criteria for this study were the questionnaire with unfilled data. The variables in this study were doctor’s attire (tops, bottoms, and accessories) and sociodemographic factors (age, gender and education level).

**Results**

**Table 1. Comparison of the Average Value of the Comfort of Patients Against the Doctor's Tops Attire**

Tops	Mean	p value
<b>Male doctors</b>		
Snelli *	4,32	0,000
Shirt*	3,84	0,000
Batik*	3,21	0,025
Polo shirt	2,28	0,000
Leather jacket	1,86	
<b>Female Doctors</b>		
Snelli*	4,50	0,000
Blouse*	3,55	0,000
Abaya*	3,45	0,000
Batik*	3,39	0,001
T-shirt	2,24	

**Table 2. Comparison of the Average Value of Patient's Comfort Level on Doctor's Bottoms Attire**

Bottoms	Mean	P value
<b>Male doctors</b>		
Basic pants*	4,23	0,000
Cotton pants*	4,13	0,000
Chinos*	2,99	0,000
Jeans	2,7	
<b>Female doctors</b>		
Basic pants*	4,01	0,000
Basic skirt	3,58	0,310
Cullote pants*	3,56	0,000
Short skirt	2,62	

Based on this study, it can be concluded that, patients feel very comfortable when male doctors wear snelli (mean of 4.32), and female doctors wear snelli (mean of 4.50). Snelli is the attire for male and female doctors that is perceived as very comfortable by patient, with significant p value. Meanwhile, patients were very uncomfortable with male doctors who wore leather (mean of 1.86) and female doctors who wore shirts with a (mean of 2.2).

Basic pants are considered very comfortable when worn by male doctors (mean of 4.23). The majority of respondents feel comfortable when female doctors wear basic pants (38.2%) with an average value of 4.01. The comparison of the average value between basic pants and cotton pants on male doctors is 0,000, and the comparison of mean values between basic pants and basic skirts on female doctors also shows the results of 0,000 which means there are significant differences (p <0.05). Most respondents felt uncomfortable seeing male doctors wearing jeans (average score of 2.7) and female doctors wearing short skirts (average score of 2.62).

**Table 3. Comparison of the Average Value of Patient’s Comfort Level on Doctor’s Footwear**

Accessories	Mean	P value
<b>Male doctors</b>		
Watches	4,33	0,094
Glasses*	3,93	0,000
Bracelet*	2,16	0,000
Aqeeq ring*	1,82	0,000
Piercing	1,41	
<b>Female doctors</b>		
Hijab*	4,48	0,003

Accessories	Mean	P value
Watches*	4,21	0,001
Glasses*	3,98	0,000
Socks	3,91	0,175
Make up*	3,84	0,000
Earrings	3,74	0,063
Rings	3,65	0,761
Bracelets*	3,13	0,006
Necklace*	2,94	0,000
Piercing	1,61	

**Table 4. Comparison of Mean between Patients Comfort to Doctor Accessories**

Footwear	Mean	P value
<b>Male doctors</b>		
Dress shoes*	4,23	0,000
Sneakers	3,46	0,729
Flat shoes	3	
<b>Female doctors</b>		
Dress shoes*	3,98	0,000
Sneakers*	3,66	0,000
High Heels*	2,67	0,000
Sandals	2,6	0,111
Boots	2,24	

Most respondents felt very comfortable seeing male doctors wearing dress shoes (mean of 4.23) and feeling comfortable when male doctors wore sneakers (mean of 3.46). Comparison of mean between dress and sneakers yields 0,000 ( $p < 0.05$ ) which indicates that the dress shoes is footwear that the respondent feel at ease with. Regarding, choice of footwear worn by female doctors, most respondents felt very comfortable seeing doctors wearing dress shoes (mean of 3.98) and felt very uncomfortable seeing doctors wearing boots (mean of 2.24). Loafers are the most comfortable women's footwear according to patient preferences ( $p < 0,05$ ).

Male doctor accessories that make patients very comfortable are watches (mean of 4.33) and glasses (mean of 3.93). On bivariate analysis, there were no significant differences ( $p > 0.05$ ), which meant that doctors could wear either one of the accessories, watch, glasses, or both.

Patients are very uncomfortable with male doctors that wear piercings (mean of 1.41). Hijab as accessories for female doctors are considered very comfortable (mean of 4.48,  $p < 0.05$ ), followed by watch (mean of 4.21) and glasses (mean of 3.98). The accessories of

female doctors which are considered very uncomfortable by patients are facial piercing (mean of 1.61).

## Discussion

The results of this study indicate that patients have a high preference for doctors who use snelli. In line with these results, the study of Van Der Merwe and Douse et al. found that patients prefer white coats or snelli as clothes that should be worn by doctors when conducting consultations<sup>5,6</sup>. This is presumably because snelli is an easy way for patients to identify doctors and also increase level of professionalism in the eyes of patients<sup>7,8,9</sup>. White coats are also considered more hygienic as doctors are not directly exposed to patients<sup>1</sup>. Furthermore, doctors who wear conventional clothing such as snelli is preferred by patients because it can increase the trust and desire of patients to share social, sexual, and psychological problems<sup>11</sup>. The most disliked tops attire for male doctors to wear is a leather jacket. In line with this findings, Marriane's research found that in general patients do not like very casual clothes such as leather jackets<sup>12</sup>. Doctors with casual clothing are considered less competent and less trustworthy than doctors with snelli or conventional clothing. Research conducted by Jennings supports this, namely for both male and female respondents, casual clothing is the most disliked clothing worn by doctors<sup>13</sup>. However, casual clothes that are semiformal like shirts are quite preferred by patients. According to Lill and Wilkinson's research, patients prefer doctors to dress semiformally and smile during consultations, makes patients feel more comfortable<sup>14</sup>. Semiformal western clothing such as shirts are also preferred in Saudi Arabia, because they make patients feel more comfortable and want to share more about their social, sexual and psychological problems<sup>15</sup>.

Patients felt least comfortable when female doctors wore t-shirts. Van Der Merwe et al in their research on doctor clothing preferences, found that only a few respondents liked t-shirts as female doctor clothes. This result is somewhat different from Hartmans' research, where t-shirts are female doctor's clothing that make respondents feel more comfortable than snelli or formal clothing<sup>16</sup>. However, Harmants found that doctors who used snelli were considered by patients to be more professional than those who were not<sup>16</sup>. In this study, it was found that the majority of respondents thought basic pants were bottom clothes that were suitable for doctors, both for male and female doctors. Several studies were

found to be in line with these results. Marriane in her research got basic pants as a bottoms that was liked by the majority of respondents, this was because patients considered basic pants to be formal and neat pants so that they could improve patient's comfort<sup>14</sup>. In line with these results, a study conducted by Boyce concluded that material pants as bottoms are the most preferred, because it can increase patients' trust<sup>8</sup>.

On the other end of the spectrum, jeans are bottoms that make the majority of patients feel uncomfortable to wear by male doctors. Marriane's research supports this claim that the preference for jeans for male doctors is low<sup>14</sup>. Chang et al. Sought further patient responses to casual clothing such as jeans, ie people with casual clothing were less competent and less trustworthy than those who dressed conventionally<sup>17</sup>. Short skirts on female doctors are bottomsthat patients feel uncomfortable with. Most respondents prefer female doctors to wear skirts under the knees<sup>13</sup>. Marriane's research also found the same thing, short skirts were felt to be uncomfortable by patients, while more conservative clothing such as long skirts were preferred<sup>14</sup>.

Loafers are footwear for male doctors with the highest rating in patients' comfort. Fox research found that the use of loafers is a characteristic expected by patients to their doctors. Similar to this, Van der Merwe's research found the results of loafers as the most preferred footwear for respondents and most comfortable to use for male doctors and male health service provider<sup>5,18</sup>. On the other hand, flat shoes are footwear for male doctors that are less preferred by patients. Same thing with male doctors, patients prefer female doctors who use footwear in the form of loafers. This result is not in line with Van der Merwe's research which found that patients' preference for female doctor's footwear is flat shoes because it is felt to make patients more comfortable and show the competence of a doctor<sup>5</sup>. Casual doctor's footwear such as sandals, high heels, or boots, in some studies suggest that these items have a low preference level in patients because they are considered to be not very professional and reduce the image of a doctor<sup>5,14</sup>.

Accessories with the highest preference for male doctors are watches. While the accessories that make patients feel very uncomfortable are piercing. Although the norms of society have begun to change with the use of piercings, they are accepted in the community, but this does not seem to apply to health workers. Research conducted by Lill and Wilkinson, states that patients

feel very uncomfortable when male and female doctors wear piercings<sup>14</sup>. According to research conducted by Newman et al, Piercing is considered inappropriate when used by medical workers because it can affect patients' beliefs and their views to the competence of a doctor<sup>19</sup>. For female doctors, the most comfortable accessories are hijab, which is in line with the research conducted by Seeger, which states that there is no difference towards Muslim women who cover themselves with hijab, as long as hijab doesn't limit their work capability<sup>20</sup>. In addition, research conducted by Batais shows that people still like doctors who wear special religious accessories such as turban and long overalls<sup>15</sup>.

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## Conclusion

The male doctor's attire patients feel most comfortable is snelli, basic pants, loafers, glasses and watches. Meanwhile, women's doctors attire patients feel most comfortable is snelli, basic pants, loafers, and hijabs.

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# Lower Abdominal Pain During Office Hysteroscopy as a Guide in the Assessment of Tubal Patency in Infertile Women

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## Abstract

**Objective:** to test the accuracy of pain score measuring on each side of the lower abdomen for diagnosis of tubal patency.

**Material and Method:** 60 patients underwent Office hysteroscopy and pain score on each side of the lower abdomen was measured during hysteroscopy using Visual Analogue Score. Transvaginal ultrasonography was done after hysteroscopy to assess the presence of fluid in Douglas pouch. One week later, laparoscopy was done as a reference test for tubal patency.

**Results:** Pain score was significantly higher on the side of lower abdomen if the respective tube was patent (p value <.001). Area under ROC curve for the pain score test was 0.77 (95%CI: 0.85 to 0.9), p value <0.001 denoting good accuracy. The optimum cutoff for pain score to discriminate tubal patency was >10 with sensitivity and specificity 79.8%and 93.6%, respectively.

**Conclusions:** The pain score during hysteroscopy can be used to diagnose tubal patency. The optimum cutoff score is >10.

**Keywords:** *Hysteroscopy, tubal patency, pain.*

## Introduction

Infertility is a worldwide health problem affecting 12.5% of all couples causing emotional and psychological distress in both men and women.<sup>(1)</sup> Assessment of tubal patency is crucial in tailoring the management strategy of the infertile couple.<sup>(2)</sup>

Laparoscopy is considered the gold standard for diagnosis of tubal patency; however, it is an invasive expensive procedure and carries risks of anesthesia and operative complications.<sup>(3)</sup>

Therefore, worldwide hysterosalpingogram (HSG) is a first step in the evaluation of tubal patency as it is less invasive.<sup>(4)</sup> Nevertheless, it has several risks namely: x-ray exposure, allergy from radio contrast material and infection. Although it is still the first diagnostic test for evaluation of tubal patency, it has a sensitivity of 46% to 65% and a specificity of 68% to 89%.<sup>(5 & 6)</sup>

Over the past few decades, attempts were made to find other method to diagnose tubal patency with comparable or better accuracy than HSG and less invasiveness than laparoscopy. Saline infusion Sonohysterography (SIS) was evaluated to replace HSG but its drawback is that it does not differentiate bilateral tubal patency from unilateral block.<sup>(7)</sup>

To overcome this problem, investigators had introduced hysterosalpingo contrast sonography (HyCoSy) for better delineation & assessment of the tubes than SIS. Nevertheless, the contrast medium is not widely available, expensive and carries the risk

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of anaphylaxis. Moreover, the interpretation of this modality is very dependent on the experience of the sonographer & the whole tube cannot be properly observed due to its tortuosity<sup>(8-10)</sup>.

Hysteroscopy, the gold standard approach to evaluate uterine cavity, was recently investigated for its possible role in the diagnosis of tubal patency especially after progressive advancement in the office hysteroscopy. The first suggested method used during hysteroscopy to evaluate the tubal patency was assessment of fluid in Douglas pouch after hysteroscopy, but this approach has similar problem to SIS. Selective perturbation at hysteroscopy was suggested to diagnose tubal patency, however, this method requires learning and is still less accurate than laparoscopy.<sup>(11 & 12)</sup>

Likeovulatory pain, fluid passing through the patent fallopian tube while doing hysteroscopy may lead to temporary irritation of the local peritoneum resulting in pain at the site of patent tube.<sup>(13)</sup> The current study aimed to evaluate the efficacy of pain level (pain score) at the side of fallopian tube during office hysteroscopy in the differentiation between patent & occluded tube.

## Material and Method

The present study was a prospective interventional diagnostic one in which 60 infertile patients (aged between 20 and 35 years) & candidate for assessment of tubal patency were included. Patients recruitment & data analysis were done at department of Obstetrics and Gynecology, Kasr Al-ainy Hospital, Cairo University from January 2013 to March 2017.

Patients who had lower genital tract infection, chronic medical disorder (e.g., diabetes), chronic pain disorders or contraindications to hysteroscopy or laparoscopy (e.g., multiple previous laparotomies) were excluded from the study. Other exclusion criteria included infertile husband semen, presence of pelvi-abdominal masses, presence of cervical stenosis and appearance of fluid in Douglas pouch by vaginal ultrasound (TVUS) before hysteroscopy. Informed consents were taken from all participants.

For all patients, full history was taken followed by examination and routine preoperative investigations. Hysteroscopy was done for participants in the follicular phase (cycle day 6 or 7). Initial TVUS was done (using 7.5 MHz probe of Voluson E8, GE Healthcare Co., Chicago, IL, USA) to exclude the presence of fluid

in Douglas pouch. Then, Office Hysteroscopy using vaginoscopic approach (4-mm endoscope with 30 degrees camera - Tekno Medical Optik-Chirurgie GmbH & Co., Tuttlingen, Germany) was done. 80 to 100 mmHg pressure and 200 ml of saline were used for all patients to standardize all the conditions before assessment of pain. No anesthesia was given. The procedure time was 6 to 8 minutes in all patients. Analgesia was not given except if needed after completion of the procedure and assessment of pain.

Pain assessment was done during the hysteroscopy procedure using Visual Analogue Scale (VAS). Patients were instructed to report pain on each side of the lower abdomen separately on 2 papers of VAS. Each paper had a line from 0 (no pain) to 100 mm (worst pain). TVUS was repeated 15 minutes after completion of the procedure to assess the presence of fluid in Douglas pouch.

Laparoscopy with methylene blue chromopertubation was done 7 days after hysteroscopy for all patients & the surgeons were blinded for the results of the hysteroscopy. The laparoscopy was done under general anesthesia using classical steps of pneumoperitoneum by CO<sub>2</sub> followed by single port 10 mm trocar insertion subumbilically. The laparoscope (Karl Storz GmbH & Co., Tuttlingen, Germany) was then inserted. Methylene blue was injected through the uterus while visualization of the tubes and the spill was helped by a uterine manipulator.

**Statistical Analysis:** Statistical description of data was done in terms of mean±standard deviation (±SD), median and range, or proportions according to the case. Mean or median value was chosen according to distribution of data. Comparison of medians of variables between the groups was done using Mann Witney test. All hypotheses testing was done two tailed. 95% CIs were calculated for all applicable measurements. ROC analysis was done to assess the diagnostic accuracy of the index test (pain level during hysteroscopy) relative to data of laparoscopy (reference test) results. The area under ROC curve was measured with respective confidence interval (1ry outcome). The ROC analysis was used to calculate accuracy measures (sensitivity, specificity, positive and negative predictive values and positive and negative likelihood ratios) for different pain score cutoff values. Binomial exact test was used to calculate the confidence intervals for the different accuracy measures. A comparison of diagnostic

accuracy between the index test and presence of fluid by ultrasound was done by comparing areas under curves of both tests setting the laparoscopy data as a reference using Delong test (2ry outcome). Alpha error for all tests was set at 0.05. Statistical analyses were done by SPSS software, version 23 (IBM Corp., Armonk, NY, USA, 2015).

### Results

The study included 60 patients. Their characteristics are demonstrated in Table 1. No adverse events happened to study patients related to hysteroscopy or laparoscopy.

Pain score was significantly higher on the side of lower abdomen if the respective tube was patent. Median pain score in case of patent tube 30, range 0 to

60 versus median 0, range 0 to 60 in case of occluded tube, 95%CI of difference between medians: 20 to 30, p value <.001 (Table 2). Area under ROC (receiver operator characteristics) curve for the pain score test was 0.77 (95%CI: 0.85 to 0.9), p value <0.001 denoting good accuracy (primary outcome) (Figure 1). The optimum cutoff for pain score suggested by ROC analysis to discriminate tubal patency was >10. The corresponding sensitivity and specificity for this cutoff were: 79.8% (95%CI: 69.9% to 87.6%) and 93.6% (95%CI: 78.6% to 99.2%) respectively (The areas under curve were similar between the pain test and the presence of fluid after hysteroscopy (0.85 versus 0.86, 95%CI for difference in areas -0.1 to 0.1, p value .78). However, the negative predictive value was much lower in case of fluid assessment test (39% versus 62%) (Table 4 & 5).

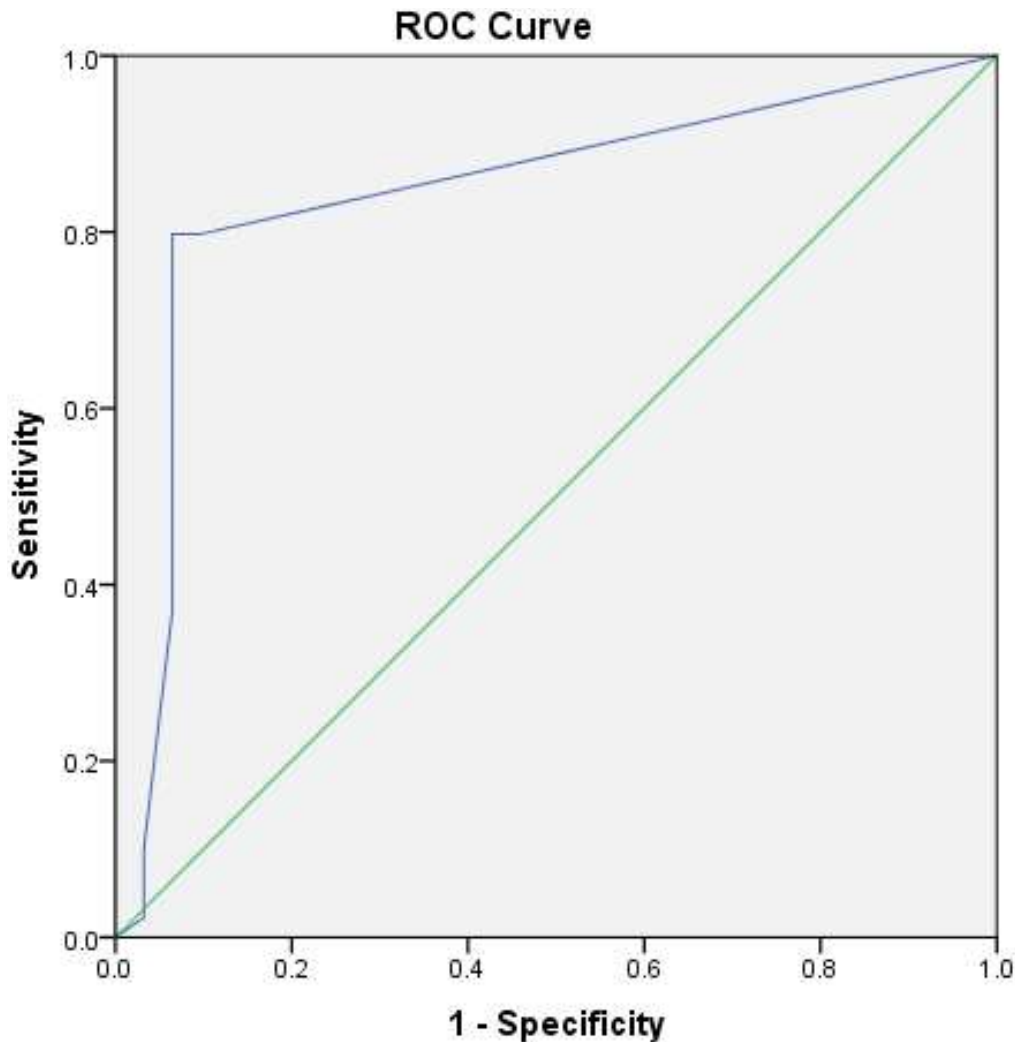


Figure 1: ROC curve for diagnostic accuracy of pain score test during hysteroscopy [AUC is 0.85 (95%CI: 0.77 to 0.9), p value: <.001]

**Table 1: Characteristics of the study group**

<b>Age in years</b>	
Mean (SD)	28 (4.1)
Range	21 to 35
<b>BMI<sup>a</sup></b>	
Mean (SD)	28 (4.1)
Range	21 to 35
<b>Type of infertility</b>	
Primary n (%)	38 (63.3%)
Secondary n (%)	22 (36.7%)

<sup>a</sup>BMI: body mass index**Table 2: Pain Scores in cases of patent and occluded tubes**

	Patent tubes n= 89	Occluded tubes n=31	Difference in median (95%CI)	P value
Pain score during hysteroscopy median (range)	30 (0, 60)	0 (0, 60)	30 (20 to 30)	< .001

Each tube was considered a case (120 tubes).

**Table 3: Efficacy of different pain score cutoffs in detecting tubal patency**

Pain Score Cutoff	Sensitivity (95%CI)	Specificity (95%CI)	+veLR (95%CI)	-veLR (95%CI)	PPV (95%CI)	NPV (95%CI)
0	100.00 (95.9 - 100.0)	0.00 (0.0 - 11.2)	1.00 (1.0 - 1.0)	NA	74.2 (65.4 - 81.7)	NA
>0	79.78 (69.9 - 87.6)	90.32 (74.2 - 98.0)	8.24 (2.8 - 24.3)	0.22 (0.1 - 0.3)	95.9 (88.6 - 99.2)	60.9 (45.4 - 74.9)
>10	79.78 (69.9 - 87.6)	93.55 (78.6 - 99.2)	12.37 (3.2 - 47.4)	0.22 (0.1 - 0.3)	97.3 (90.5 - 99.7)	61.7 (46.4 - 75.5)
>20	66.29 (55.5 - 76.0)	93.55 (78.6 - 99.2)	10.28 (2.7 - 39.6)	0.36 (0.3 - 0.5)	96.7 (88.7 - 99.6)	49.2 (35.9 - 62.5)
>30	37.08 (27.1 - 48.0)	93.55 (78.6 - 99.2)	5.75 (1.5 - 22.6)	0.67 (0.6 - 0.8)	94.3 (80.8 - 99.3)	34.1 (24.2 - 45.2)
>40	10.11 (4.7 - 18.3)	96.77 (83.3 - 99.9)	3.13 (0.4 - 23.8)	0.93 (0.8 - 1.0)	90.0 (55.5 - 99.7)	27.3 (19.2 - 36.6)
>50	2.25 (0.3 - 7.9)	96.77 (83.3 - 99.9)	0.70 (0.07 - 7.4)	1.01 (0.9 - 1.1)	66.7 (9.4 - 99.2)	25.6 (18.0 - 34.5)
>60	0.00 (0.0 - 4.1)	100.00 (88 - 100.0)	NA	1.00 (1.0 - 1.0)	NA	25.8 (18.3 - 34.6)

CI: confidence interval, +veLR: positive likelihood ratio, -veLR: negative likelihood ratio, PPV: positive predictive value, NPV: negative predictive value., The row in bold (cutoff &gt;10) denotes the optimum cutoff value using the Youden index (0.7332).

**Table 4: Diagnostic accuracy for presence of fluid after hysteroscopy in detection of tubal patency (compared to laparoscopy)**

Sensitivity	72.55%	58.26% to 84.11%
Specificity	100.00%	66.37% to 100.00%
AUC	0.86	0.75 to 0.94
+ve LR	NA	NA
PPN	100.00%	90.51% to 100.00%
NPV	39.13%	19.71% to 61.46

NA: not applicable as the specificity is 100%

**Table 5: Comparison of areas under curve (AUC) between the pain during hysteroscopy test and the presence of fluid after hysteroscopy for detection of tubal patency**

<b>Pain during hysteroscopy test: AUC (95%CI)</b>	<b>0.85 (0.77 to 0.9)</b>
Presence of fluid by transvaginal ultrasound after hysteroscopy: AUC (95%CI)	0.86 (0.75 to 0.95)
Difference in AUCs (95%CI)	0.02 (-0.1 to 0.1)
P value	0.78

**Discussion**

Tubal factor is responsible for 20% of all causes of infertility.<sup>(2)</sup> HSG is the first step for assessing tubal patency. However, it has a sensitivity of 46% to 65% and a specificity of 68% to 89%. Moreover, it has several risks as allergy from the dye and discomfort for the patients.<sup>(6)</sup>

Our study examined the accuracy of pain score on each side of the lower abdomen as a diagnostic test for tubal patency. Pain score was significantly higher on the side of lower abdomen if the respective tube was patent (p value <.001) & the optimum cutoff value to discriminate tubal patency was VAS >10 with a sensitivity and specificity of 79.8% and 93.6%, respectively. Moreover, the AUC for testing the presence of fluid by TVUS (0.86, CI: 0.75 to 0.95) was similar to the AUC of the pain test. However, NPV was much lower in case of fluid test in comparison to the pain test (39% versus 62%). Moreover, the fluid test positivity suggested one or both tubal patency, while the pain score on each side suggested tubal patency specific to that side.

These measures of diagnostic accuracy of pain test are better than measures of accuracy of HSG<sup>(6)</sup> and comparable or better than other tests for tubal patency.<sup>(7-12,14 & 15)</sup> However, some of the new tests (SIS and TVUS assessment of fluid after hysteroscopy) cannot differentiate unilateral tubal block from bilateral patency<sup>(7&11)</sup> while others (HyCoSy or hysteroscopy combined with HyCoSy) have the problems of high cost and complications of the dye.<sup>(10,14&15)</sup> Furthermore, other modalities(i.e. selective perturbation during hysteroscopy and hydrolaparoscopy) require learning and still less accurate than laparoscopy.<sup>(12,16&17)</sup>

To the best of our knowledge this is the first study measuring the pain score for diagnosis of tubal patency. Although we measured pain score as test of tubal patency, the pain was mild to moderate in all patients who felt discomfort. This was in agreement with other

study that found the discomfort felt during hysteroscopy less than that felt during HSG in 70% of patients.<sup>(18)</sup>

Office hysteroscopy has the advantages of low cost and simultaneous assessment of the uterine cavity. No anesthesia or dye are needed. It is less invasive than laparoscopy and better tolerated than hysterosalpingography.

To optimize the internal validity of the present study, we standardized all the conditions (e.g.,Vaginoscopic approach, no anesthesia nor analgesia & the filling pressure was at 80 to 100 mmHg)that might affect the perception of pain during hysteroscopy.<sup>(19)</sup>

However, the limitation of the present study is that it needs external validation in order to rely on its results. This is through replication of the study in different places with different types of patients to validate our results.

**Conclusion**

The pain score measurement on each side of the lower abdomen during office hysteroscopy can be used to diagnose tubal patency with optimal cutoff pain score >10.

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**Ethical Clearance:** The study was approved by the hospital ethical committee.

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# Overview of Smoking History in Lung Cancer Patients at RSUD Dr. Soetomo, Surabaya

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## Abstract

**Introduction:** Lung cancer belongs to the top ten diseases which caused death in the world. World Health Organization (WHO) estimated that there is about 2,09 million cases of lung cancer and 1,76 million death accident due to this disease. Smoking is defined as the most factor that can promote the lung cancer about 80% cases in male and 50% cases in female.

**Aims:** To identify the history of smoking activity in the lung cancer patients in the RSUD Dr. Soetomo, Surabaya.

**Method:** Research was determined as descriptive research with cross-sectional design. Variable in this research smoking status, age on the first time of smoking, duration of smoking, kind of smoke, and smoking level. Lung cancer patients in the RSUD Dr. Soetomo, Surabaya was addressed as subject in this research. Accidental sampling was performed as sampling method to the 53 respondents. Data was collected by distribution of questionnaire which contained risk factor of lung cancer. Data was analyzed by univariate analysis.

**Result:** Result saw that about 31 out of 53 respondents had history of smoking. Most of them had experienced as active smoker (22 respondents, 41,5%), had experience as first-time smoker on the age less than 15 years old (25 respondents, 47,20%), had been smoked for more than 20 years (29 respondents, 54,70%), have preferred to consume smoke with filter (21 responden, 39,60%), and considered as heavy level of smoker (15 respondents, 28,30%).

**Conclusion:** Most of lung cancer patient in the RSUD Dr. Soetomo, Surabaya had history as smoker.

**Keywords:** *Epidemiology, history of smoking, lung cancer, tobacco.*

## Introduction

World Health Organization (WHO) estimates 9.6 million people worldwide deaths caused cancer<sup>(1)</sup>. Lung cancer is the highest cause of death in men in 2018. The

incident Lung cancer amount 22,440 cases Or 14% of all cancer cases<sup>(2)</sup>. The main risk factor for lung cancer is smoking. In general, smoking causes 80% of lung cancer cases in men and 50% of lung cancer cases in women<sup>(3)</sup>.

The Result from Minister of Health Survey 2018 showed that proportion of tobacco consumption in the population aged 15 years and over were 62,9% in men and 33,8% for all. The prevalence of smoking in aged 10-18 years increased from 8.8 in 2016 to 9.1 in 2018<sup>(4)</sup>.

According to Sudoyo<sup>(5)</sup> the definition of smokers is people who have smoked 1 stick or more every day for at least a year. If people were not smoking for a

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month, they called people with a history of smoking. The increased risk factors are related to the duration of smoking in a year and the factors when starting smoking (the younger the individual starts smoking, the higher risk of lung cancer). Other factors that can be considered include the types of cigarettes smoked (tar content, filter, and *kretek* cigarettes) (6).

The various research studies found that Lung cancer not only associate with active and passive smoking, but some occupational agents, and indoor or outdoor air pollution(7,8).Lung cancer has most commonly been associated with occupational exposures. Occupational exposures such as Asbestos, Vinyl chloride, Arsenic, Beryllium, Chromium and Nickel(8).

Lung cancer cases in East Java Province calculated about 34,706 cases(9). Based on the recapitulation data for the last 10 months at Dr. Soetomo in 2018, lung cancer morbidity was 733 cases. Lung cancer morbidity is still high in Dr. Hospital Soetomo, it is necessary to conduct research on the description of smoking history as the main risk factor. This research aims to identify the history of smoking activity in the lung cancer patients.

### Methodology

The research was conducted in RSUD Dr. Soetomo, Surabaya on August 2018-January 2019. The

descriptive method obtained from secondary data of research by Dr. Santi Martini, dr., M. Kes about “Risk of diseases caused by smoking”. Cross-sectional was performed in this research. The research sample was about 53 respondents by accidental sampling technic. Moreover, variable in this research were smoking status, age on the first time of smoking, duration of smoking, kind of smoke, and smoking level. However, another risk factor was also included in this research such, for instance, family history, exposure of asbestos, pollutant exposure at home, and pollutant exposure at workplace. The questionnaire of lung cancer risk was used in this research. Then, research was analyzed by univariate analysis and presented frequency distribution by epidemiological approach.

### Results

Distribution of respondents by place and time.East Java consists of 38 districts/cities which consist of 29 districts and 9 cities. Based on the results of the study, it found that the highest lung cancer cases were in Surabaya with 14 respondents (26.41%). It can be due to the location of Dr. Soetomo located in Surabaya. Figure 1. shows that the distribution of respondents based on the year diagnosed was mostly in 2018 as many as 46 respondents (86.79%).

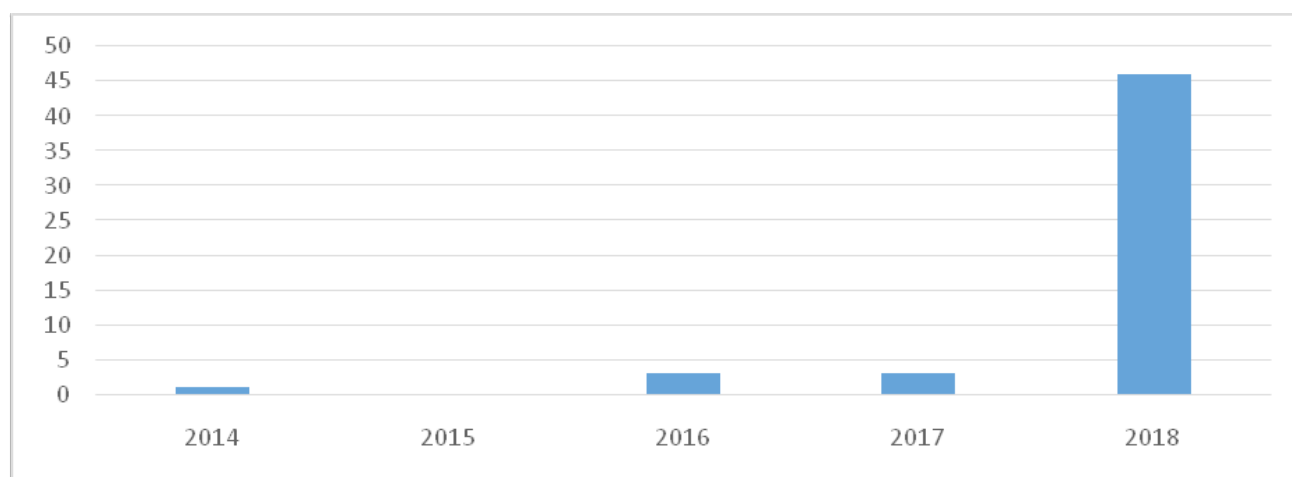


Figure 1. Distribution frequency respondent base on year when diagnose

Distribution of respondents based on people. Characteristics of lung cancer patients based on age showed that the majority of respondents belong to the age of more than 40 years as many as 47 respondents

(88.70%). The characteristics of lung cancer patients based on sex are mostly male about 35 respondents (66.00%) like at Table 1. The characteristics of lung cancer patients based on education are mostly classified

into the basic education category as many as 29 respondents (54.70%) are elementary or equal. More than 50% of lung cancer patients have stage IV as many as 46 respondents (86.8%).

**Table 1. Distribution frequency respondent base on person**

Characteristic	Frequency	Porcentage (%)
Age >40 year	47	88,70
Men	35	66,00
Work	36	67,90
Stage IV	46	86,80
<b>Type of Education</b>		
Basic	29	54,70
Intermediate	18	34,00
High	6	11,30
<b>Total</b>	<b>53</b>	<b>100,0</b>

Distribution of respondents based on smoking history. Based on table 3, the data showed that most lung cancer patients have a history of active smoking as many as 22 respondents (41.50%). Most respondents have a history of smoking by consuming filter cigarettes as many as 21 respondents (39.6%). Most of respondents first time smoking at the age of 15-55 years as many as 25 respondents (47.2%), most respondents had a long history of smoking more than 20 years as many as 29 respondents (54.7%), and most smoking level of respondents is belong to heavy category namely 15 respondents (28.3%).

**Table 2. Distribution Frequency base on history of smoking**

Variable	Frequency	Porcentage (%)
<b>History of Smoking</b>		
Never Smoke	12	22,60
Active Smoker	22	41,50
Passive Smoker	10	18,90
Active and passive smoker	9	17,00
<b>Type of Cigarette</b>		
No Type (Never & Passive smoker)	22	41,50
Filter	21	39,60
Non Filter	10	18,90
<b>Initial Smoking Age</b>		
Never & Passive smoker	22	41,50
1-14 years	6	11,30
15-55 years	25	47,20

Variable	Frequency	Porcentage (%)
<b>Duration Smoking</b>		
Never & Passive smoker	22	41,50
≤20 years	2	3,80
>20 years	29	54,70
<b>Level of Smoking</b>		
Never & Passive smoker	22	41,50
Mild	4	7,50
Middle	12	22,60
Heavy	15	28,3
<b>Total</b>	<b>53</b>	<b>100,0</b>

Distribution of respondents based on other risk factors. Based on Table 2, most respondents did not have a family history of lung cancer about 51 respondents (96.2%), most of the respondents were not exposed to asbestos as many as 40 respondents (75.5%), most respondents were not exposed to pollutants in the residence as many as 49 respondents (92.5%), and the majority of respondents were not exposed to pollutants in the workplace about 44 respondents (83.0%).

**Table 3. Distribution frequency of respondent base on others factor**

Other risk factor	Frequency	Porcentage (%)
<b>History of Family</b>		
Yes	2	3,8
No	51	96,2
<b>Asbestos Exposure</b>		
Exposure	13	24,5
Not Exposure	40	75,5
<b>Pollutant exposure at home</b>		
Exposure	4	7,5
Not Exposure	49	92,5
<b>Pollutant exposure at work place</b>		
Exposure	9	17,0
Not Exposure	44	83,0
<b>Total</b>	<b>53</b>	<b>100,0</b>

### Discussion

Distribution of respondents based on people. Based on the results, it exhibited that the majority of respondents was on the age more than 40 years old. About 95% of lung cancer patients at the age more than 40 years old which conducted by Malhotra as a trend of lung cancer in Delhi, India. Moreover, data showed that most of the respondents were male<sup>(3)</sup>. This study was in line with the research conducted by Neupane<sup>(10)</sup>. It stated that most

lung cancer is suffered by men. Then, based on the results, the respondents had the type of basic education<sup>(10)</sup>. This research is in agreement with the research conducted by Ernawati et al<sup>(11)</sup> which stated that most lung cancer patients have a history of junior high school level. Based on the results, most of the respondents are worker. Furthermore, other data showed that the majority of respondents belonging to stage IV. Some Research performed<sup>(12)</sup>,<sup>(13)</sup> that the stage of lung cancer patients is found in the late stages. Lung detection is generally slow in process. This also can promote patients to have less awareness to see themselves. Most patients are referrals from regional hospitals and health centers, including some services which do not have specialist doctors or supporting tools for diagnosing lung cancer. Another thing considered as a factor is the policy to go to the health center before going to the hospital. There are many reasons for improving the quality of care, evaluation of the cost, and reluctant to do the examination.

Distribution of respondents based on history of smoking. Based on the results, it found that most respondents had a history of active smoking. This research is in line with the research conducted by Hulma, Basyar, and Mulyani<sup>(14)</sup> found that smoking history in most detected in lung cancer patients. Based on the results of the study, it was found that the majority of respondents consumed filter cigarettes. This research is supported by research conducted by Herlina, Rahmalia, and Dewi<sup>(15)</sup>. They stated that lung cancer patients who have a history of smoking more often consume filter cigarettes. Other study found that Smoker have Risk more than 5 times death rate higher than No Smoker for Asian people<sup>(16)</sup>.

Based on the results of the study it was found that the majority of respondents who had a history of smoking, first smoked at the age of less than 15 years with 25 respondents (47.20%). This research is in line with the research conducted by Putera et al<sup>(17)</sup> states that most of lung cancer patients smoke at the age of 17-25 years old. This study is in line with the research conducted by Setyanda et al<sup>(18)</sup> that the average person has a long history of smoking with more than 20 years. The British Doctors' Study found that the relative risk (RR) of smoking for lung cancer have increased over the 20-year, 40- year, and 50-year follow up<sup>(16)</sup>. Based on the results of the study, it was found that most of the respondents were classified as heavy smoking level. This study is similar with Naser, Medison, and Erly<sup>(19)</sup>, that

the highest number of smoking is in the level of heavy smoking. The number of lung cancer patients who have a history of heavy smoking consuming large quantities of cigarettes per day has a greater risk of lung cancer.

Distribution of respondents based on other risk factors. Based on the results of the study, it found that most respondents did not have a family history of lung cancer. This research is in line with the research conducted by Ernawati et al<sup>(11)</sup> stated that most of lung cancer patients do not have a family with a history of cancer. The research by Yoshida et al<sup>(20)</sup> stated that a family history of lung cancer in the close relatives was associated with an increased risk of lung cancer between the sexes. Families who have cancer will increase the risk of lung cancer by 13.8%. First sisters allow a greater risk than brothers<sup>(21)</sup>.

This study was found that the majority of respondents were not exposed to asbestos. This can be seen from the top use (platonik) of occupied houses made of abscesses. Continuous exposure to asbestos and increased amount of exposure will increase the risk of lung cancer. Smokers exposed to asbestos have a higher risk of lung cancer<sup>(22)</sup>. Based on the results of the study, it was found that more than 80% of respondents were not exposed to pollutants in their homes. The pollutants came from the use of wood fuel stoves, the use of kerosene fuel stoves, and mosquito coils. Continuous exposure to the smoke will increase the risk of lung cancer<sup>(23)</sup>.

## Conclusion

Most of lung cancer patient in the RSUD Dr. Soetomo, Surabaya had history as smoker.

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# Radiographic Evaluation of Two Different Designs for Treatment of Mandibular Bilateral Free End Saddle with Osseo-integrated Implants

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## Abstract

**Purpose:** The goal of this study was to evaluate radiographically two different designs for mandibular free end saddle with osseointegrated implants.

**Materials and Method:** Ten lower Kennedy class I partially edentulous patients were selected to receive implant at the second molar area, then patients were divided into 2 groups according to the implant superstructures either (extra-coronal attachment or bar attachment). Patients of both groups receive removable partial denture of the same design. Patients were followed up for 0, 3, 6 and 9 months clinically.

**Results:** Showed statistical difference between the 2 designs.

**Conclusion:** It could be concluded that Tooth-implant supported partial denture may be reasonable and simple solution for Kennedy class I partial denture.

**Keywords:** Lower Kennedy class I, Removal partial denture, implant, extra-coronal, bar attachment.

## Introduction

Free end removable partial dentures were considered the gold standard for missing posterior teeth many years ago, they were originally used to achieve primary stability, restore patient occlusion and prevent tooth migration. But they had a main limitation of gradual ridge resorption due to pressure areas between the tooth-fibro mucosa and support system<sup>(1)</sup>.

The continual resorption of the residual ridge affects the support, stability and retention of RPDs. It also modifies the occlusal conditions by causing premature contacts and uneven occlusal forces on the remaining natural teeth<sup>(2)</sup>.

Bounding of the RPD with implants is a treatment option which combines the advantages of the implants and simplicity of the RPD system, with reducing the drawbacks of invasive attempt and cost of the implants more than two. by placing an implant to the distal extension site of the RPD, enhancement of distribution of the occlusal forces, movement of the posterior rotational axis to a distal position, shortening of the distal extension of the RPD, and reducing potential rotational movement of the RPD can be improved<sup>(3,4)</sup>

Since the common clinical problems of bilateral distal extension RPD are the lack of retention, stability, and esthetics; so, placing bilateral single dental implants in the molar area would effectively change the Kennedy Class I situation to Kennedy Class III which improves retention and stability of the dentures<sup>(5, 6, 7)</sup>

Moreover, implant support decreases the amount of alveolar ridge resorption and the need for relining in the following years.<sup>(7, 8, 9)</sup>

There are different types of connection between

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the implants and the acrylic base of the RPD, such as implant cover screws, stress-breaking attachments, and healing caps. Ball, locator or ERA attachments are the different types of stress-breaking attachments that have been applied to the implants in previous studies and some case reports. In addition, placement of only healing caps to function as vertical stopping has previously been reported<sup>(2,5,6,7,9,10,11)</sup>

## Materials and Method

Ten partially edentulous patients indicated for implant installation were selected from Out-patient clinic, Faculty of Oral and Dental Medicine, Minia University. All patients had Kennedy class I lower partially edentulous ridges with completely edentulous maxilla to be restored with complete denture.

**Group I:** Patients received extra-coronal attachment distal to the last natural abutment teeth with construction of metallic removable partial denture.

**Group II:** Patients received bar attachment with construction of metallic removable partial denture.

CBCT was taken before treatment to evaluate bone density and height, presence of any anatomical structures and to determine the appropriate implant angulations.

Reduction of the last 2 abutment teeth on each side was done to receive full veneered porcelain crowns and covered with temporary crowns. Impressions for the upper jaw was done and construction of occlusion blocks to be ready for jaw relation with the lower partial dentures.

Trial setting up of artificial teeth in edentulous areas of mounted upper and lower casts was carried out. Acrylic surgical template was fabricated on edentulous area of lower cast. 2 screw shaped internal hex titanium implants (3.9 mm diameter and 12 mm length) were inserted bilaterally for each patient in the second premolar. Primary stability using Osstell device (*Osstell ISQ, Göteborg, Sweden*) was measured for each implant then a healing collar of suitable length was threaded on the fixture.

3 days after fixture installation, the patients were recalled, and another CBCT were made to confirm the angulation of the implant.

**For group I:** Waxing up for the crowns and extra-coronal attachment distal to the last abutment teeth by the

help of paralellometer was done, the crowns-attachment assembly were sprued, invested and cast, finished and polished.

Try-in was done, porcelain was built-on and porcelain fused to metal restoration was obtained and finally cemented. Rubber base impression was taken for construction of the metal framework (lingual bar, bracing arm on the last abutment tooth and saddle meshwork). Try-in of upper and lower dentures, then delivery with occlusal adjustment.

At this step, direct pick up for the metal housing and retentive cap of the extra-coronal attachment was done Fig. 1:, then finishing for excess resin in the fitting surface was done and dentures were delivered to the patients.



**Fig. 1: Prepared metal surface for direct pick up**

**For group II:** A wax pattern was made for implant abutments and natural abutments with using the bar in its resilient form, spruing, investing and casting. Try in was performed and porcelain was built in and final cementation of the assembly was done. **Fig. 2.** Rubber base impression was taken for construction of the metal framework (lingual bar, bracing arm on the last abutment tooth and saddle meshwork). Then try in was done and jaw relation with the upper occlusion blocks. Try-in of upper and lower dentures, then delivery with occlusal adjustment.

At this step, direct pick-up of the retentive clip was done with self-curing acrylic resin after blocking all undercut. Then excess resin was removed and finished. Dentures were delivered to the patient.



**Fig. 2: Try-in of the finished bar assembly**

**Radiographic Evaluation:**

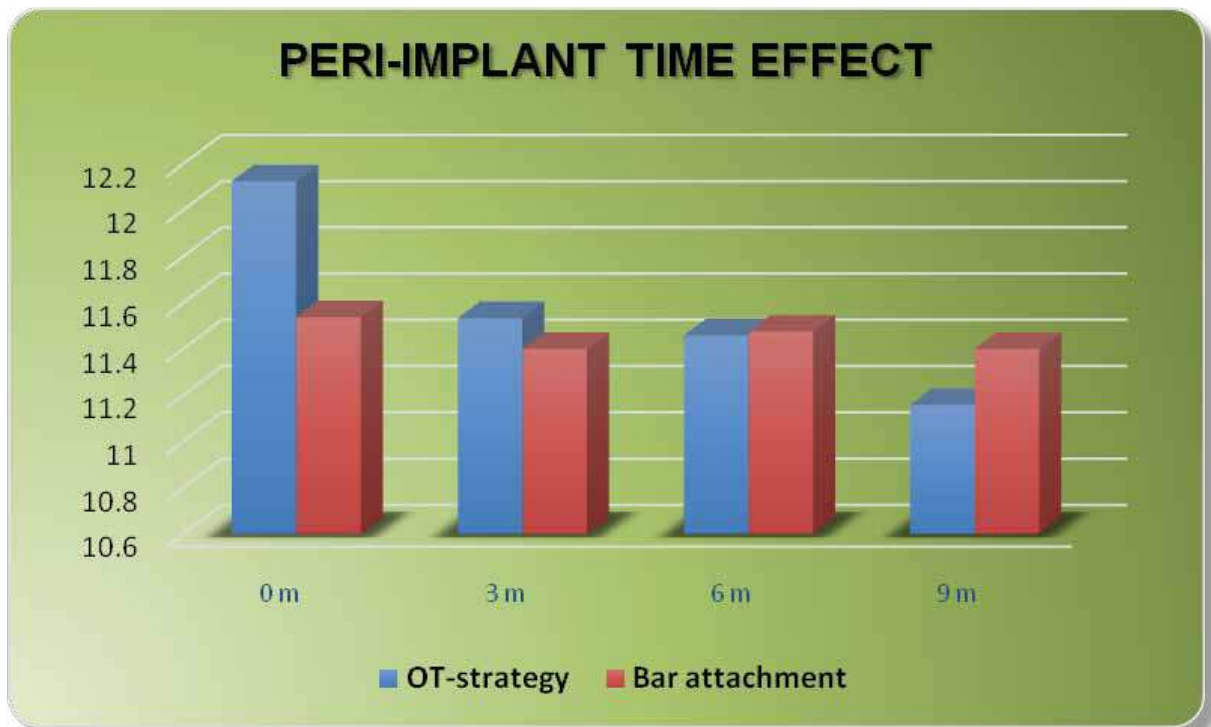
1. **Pre-Surgical Evaluation:** CBCT was made to determine the bone quantity and quality and an approximation of the implant site with the critical structures.
2. **Follow Up Evaluation:** This phase started just after the prosthesis placement (0-evaluation), then after 3, 6- and 9-month intervals respectively to evaluate

crestal bone height changes of the implant and any peri-implant bone changes with the Digora software (Soredex, Tuusula, Finland)

Standardized digital images were obtained following long cone periapical paralleling technique (Rinn Corporation, XCP instrument for extension cone paralleling technique, USA.) long cone tube (sixteen inch) of X-ray machine, radiographic template, Digital X-ray machine (Kodak 6100, Italy), sensor and personal computer. Bone density and bone height measurements were taken statistically analyzed.

**Results**

- A. Bone height changes around peri-implant bone for both designs:** The results of peri-implant bone height measured for both type of attachments (OT-Strategy and bar attachment) along the follow up intervals (At 0-3, 0-6, and 0-9 months) are shown in fig (3). At all follow up periods the bone level measured showed a significant difference within OT-strategy extra-coronal attachment. While there was no significant difference in the same time intervals for bar attachment design.



**Fig. 3: Effect of time on mean values of peri-implant bone height loss for OT-strategy extracoronary attachment and bar attachment**



**B. Bone height changes around natural abutment for both designs:** The results of abutment bone height measured for both type of attachments (OT-Strategy and bar attachment) along the follow up intervals (At 0-3, 0-6, and 0- 9 months) are shown

in fig(4) At all follow up periods (0-6 and 0-9) the bone level measured showed a significant difference within OT-strategy extra-coronal attachment. While there was no significant difference in the same time intervals for bar attachment design.

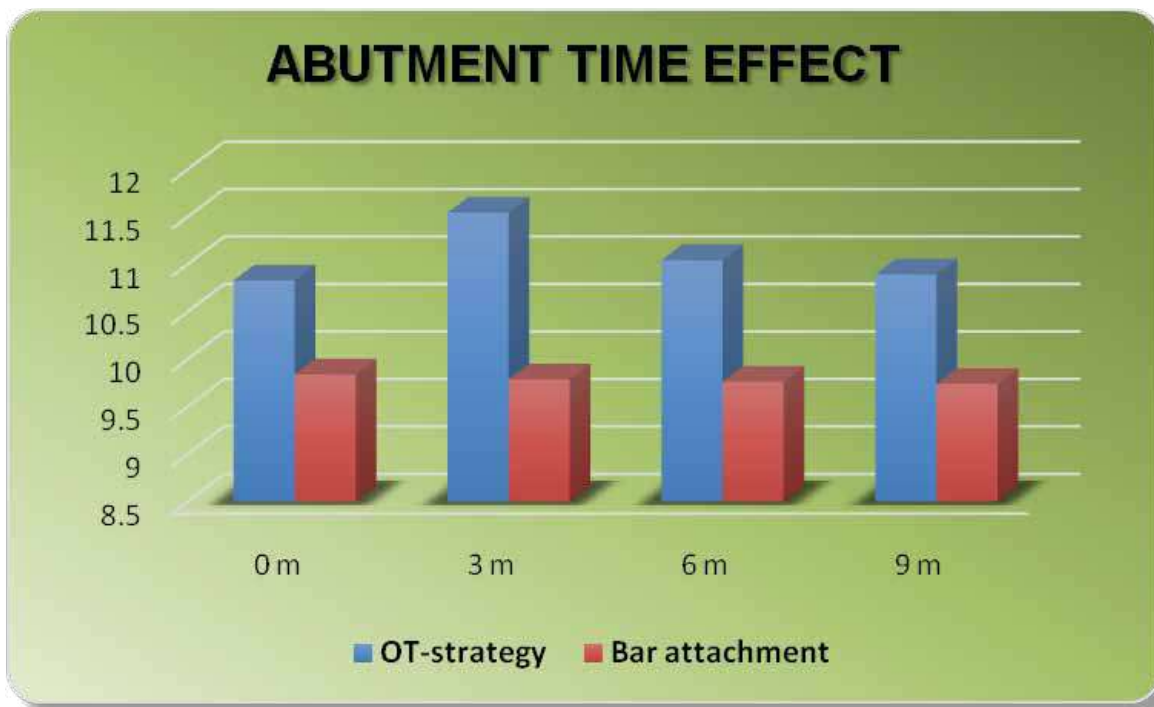


Fig. 4: Effect of time on mean values of abutment bone height for OT-strategy extracoronar attachment and bar attachment

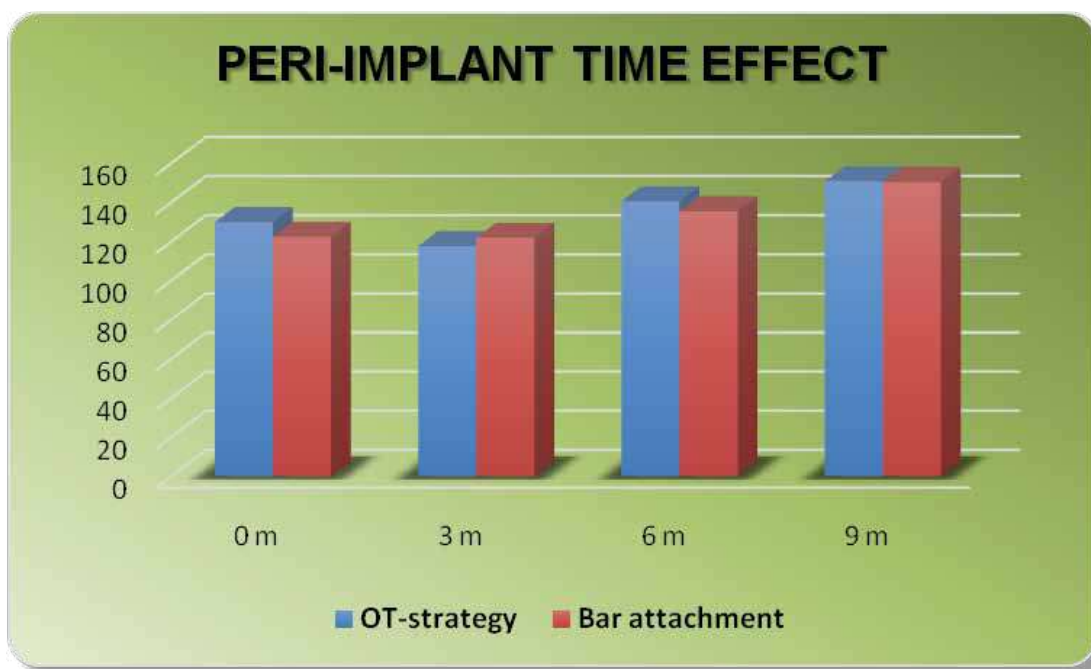


Fig. 5: Effect of time on mean values of peri-implant bone density for OT-strategy extracoronar attachment and bar attachment

## Discussion

There was a decrease in bone height for both groups, which coincides with reported studies which explained that crestal bone resorption around implants is a well-known phenomenon occurring mostly as an immediate bone response after implant insertion and after functional implant loading. The amount of bone resorption occurring after loading may be related to many factors as the amount of load, nature of prosthesis, bone quantity and quality, implant related factors (design, number and dimensions), opposing restoration and crown height space<sup>(12,13)</sup>.

It is well known now in the literature that crestal bone resorption is not only unavoidable but also time related. Many studies confirmed this finding<sup>(14)</sup>. All these studies agreed that most of this resorption occurs within the first year from loading with an average of 1.2 mm and the annual bone loss should be < 0.2 mm, which does not contradict with implant success<sup>(15)</sup>.

The bone height changes were significant in the first interval, then insignificant with time, they remain within the clinically permissible range previously mentioned (1.2mm). This may be attributed to many factors. First of all was our careful patient selection that excluded those with previous history of bruxism. This helped to avoid implant overload as much as possible. Second, the type of prosthesis which is an implant-tissues supported prosthesis that shares the load between the ridge and the implant putting into consideration the ability of this prosthesis to protect the implants by the stress breaking action. Also, the screw type 3.9 mm diameter and 12 mm length implant had enough surface area to minimize the stress transmitted to the surrounding bone as supported by many authors<sup>(16)</sup>. Finally, it should be noticed that the opposing restoration was upper complete denture that exerts less load on opposite arch compared to natural dentition or fixed restorations<sup>(17)</sup>.

The significant difference in bone height between both attachments in the 1<sup>st</sup> interval period (0-3 months), showing that bar attachment is better than OT-Strategy, which coincide with Vafaei et al.<sup>(18)</sup>, who examined the effect of overdenture attachment design on the strain distributions and values of both bone and implants. Results from the bar design showed smaller strain magnitudes in both laterotrusive and protrusive motions. Thus, they claimed that, bar design was considered superior than the single standing implants with attachment. Furthermore, Tabata et al.<sup>(19)</sup>, who compared

the stress-strain analysis of splinted versus non-splinted implant overdenture. They found that the use of single standing implants with attachment induced more stress in bony tissues than the bar-clip system.

It is also noticed that splinting of the natural teeth helped in stress distribution in both groups which coincides with Kapur et al.,<sup>(20)</sup> who has suggested that splinted 1<sup>st</sup> and 2<sup>nd</sup> premolars by full coverage crowns, has provided good support and improved the prognosis of cast partial denture. Furthermore, splinting helps in reducing the amount of marginal bone resorption which reduces damaging stresses by efficiently dispersing the load generated during mastication<sup>(21,22,23)</sup>.

**Ethical Clearance:** All patients participated in the study were informed about the nature of the study and its purpose, agreed to take part in it and write an informed consent reviewed and approved by the research ethics committee of the Faculty of Dentistry Minia University.

**Source of Funding:** Self-funding

**Conflict of Interest:** Nil.

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# Adaptive Physical Education in Rehabilitation after Injuries Maxillofacial Area

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## Abstract

The frequency of damage to the maxillofacial region remains very high. This makes the problem of further improving approaches to the rehabilitation of this category of patients very important for the whole world. The relevance of this problem is due to the large number of patients with fractures of the bones of the facial skeleton and a tendency to worsen these injuries due to the presence of multiple and combined injuries of the head, neck and jaw. The danger of jaw dysfunction and the appearance of a “cosmetic defect” in this category of patients creates a great need to continue improving their rehabilitation. The central place among the rehabilitation approaches used in this pathology is occupied by adaptive physical education. In most cases, it is effectively supplemented by a whole arsenal of physiotherapeutic and psychotherapeutic effects. Their complex application provides in the vast majority of cases the gradual development of a positive persistent effect.

**Keywords:** *Adaptive physical education, injuries, cranial bones, maxillofacial region, rehabilitation.*

## Introduction

In the modern world, the prevalence of various diseases and dysfunctions in people of different ages remains high<sup>1</sup>. Modern medicine does everything possible to restrain the growth of their distribution and reduce their consequences<sup>2</sup>.

However, due to the increase in the frequency and severity of injuries as a result of transport, criminal, sports and domestic accidents, there is a significant increase in the number of patients with acute trauma to the maxillofacial region<sup>3</sup>. Among all patients with

skeletal fractures, patients with facial bone fractures account for about 8%<sup>4</sup>.

Trauma to the maxillofacial region is a complex pathology. Significant changes always occur in the injury zone, which are associated with intoxication with the products of decay and autolysis of necrotic tissues. Its consequences often lead to significant impairment of jaw function. In this case, the appearance of a “cosmetic defect”, which is the reason for the always severe psychological trauma of the injured person, is especially important. Therefore, for the success of treatment and rehabilitation procedures in this category of patients, it is very important to start early and the breadth of the range of recreational activities<sup>5</sup>.

The high frequency of injuries of the maxillofacial area makes the problem of further improving approaches to the rehabilitation of this category of patients very relevant for the whole world. This is due to the large number of victims with fractures of the facial skeleton and a tendency to worsen these injuries due to the presence of multiple and combined injuries of the head, neck and jaw<sup>6</sup>.

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The purpose of the study is to consider existing approaches to the physical rehabilitation of patients with injuries of the maxillofacial region.

**Fundamentals of physical rehabilitation for injuries of the maxillofacial region:** Forced restriction of motor activity, prolonged jaw immobilization, the possibility of cicatricial deformities of soft tissues damaged during a fracture can lead to complications in the form of contractures of the lower jaw and ankylosis of the temporomandibular joint. The severity of these disorders depends on the location of the fracture - with fractures of the condylar process, degenerative changes in both joints are observed more often than with extraarticular fractures<sup>7</sup>.

Initially, these disorders are in the nature of functional insufficiency, which in 2–7 years can develop into degenerative changes. Unilateral arthrosis develops on the side of the lesion after single fractures, and bilateral after double and multiple fractures<sup>8,9</sup>.

The ultimate goal of rehabilitation for jaw fractures is to restore the continuity and anatomical shape of damaged bones with full and early normalization of chewing function<sup>10</sup>.

As a rule, in the first 3-4 days, patients with jaw fractures are recommended a half-bed regimen, and in the future, a free motor regimen. In the first days of treatment in the clinic, a functional rehabilitation program is developed. During it, the patient is engaged in adaptive physical education at home, visiting the clinic once a week to determine the effectiveness of classes and make adjustments to the program<sup>11</sup>. 3-4 days after immobilization, you can assign an adaptive physical culture according to the methodology of the first period of classes. The general serious condition of the patient, fever, fainting, or the presence of an acute inflammatory process in the fracture area or the risk of bleeding are considered temporary contraindications to the use of physical education<sup>12</sup>.

**Adaptive physical education in eliminating the consequences of maxillofacial injuries:** Adaptive physical education contributes to a significant improvement in the general condition of the patient, prevents the development of complications associated with physical inactivity and the immobilization of the temporomandibular joint, accelerates the consolidation of bone fragments, ensures the speedy restoration of the function of this jaw and reduces the patient's disability.

The fulfillment of these tasks largely depends on how timely functional treatment is started and whether it is carried out correctly<sup>13</sup>.

The use of special exercises for facial and chewing muscles depends on the method of immobilization. Promoting the restoration of the coordinated work of the muscles involved in swallowing, chewing and speech is the main task of the gymnastics of the first period<sup>14</sup>.

In connection with an increase in the tone of the masticatory muscles on the side of the fracture and its strengthening under the influence of immobilization, it is necessary to promote the relaxation of facial muscles in every possible way. To this end, exercises are widely used in the form of stroking, rubbing and kneading for the facial muscles, as well as the muscles of the tongue and neck, which contribute to improving blood supply and lymph flow of tissues in the fracture area<sup>15,16</sup>.

If there are no acute inflammatory phenomena in the area of study damage, then on the 7–8 day, you can proceed to massage the face and neck. It should be noted that the muscles and ligaments have their own receptors that respond to contraction: their excitability increases, blood circulation in the muscle fibers is activated, which significantly affects the functional state of the neuromuscular apparatus, pain is quickly stopped and muscles are tightened<sup>17</sup>.

The functional activity of the masticatory muscles is restored faster when the exercises of therapeutic physical culture are included in the treatment of fractures of the lower jaw. With single jaw splinting or osteosynthesis without intermaxillary fixation, patients already on the 2-3 day are allowed careful movements of the lower jaw in various directions, exercises are widely used for facial muscles, tongue and neck muscles, which help to improve local blood circulation and reduce the tonus of chewing muscles during 10-15 minutes<sup>18</sup>.

The functional load for the temporomandibular joint is enhanced by assigning individual tasks to the patient, consisting of several special exercises performed independently by the patient 7-10 times during the day. In case of double jaw splinting, mechanotherapy and passive movements of the lower jaw are not used, as this can lead to the formation of a false joint<sup>19</sup>.

A wide selection of special exercises for chewing muscles (active, active – passive and with resistance, the use of mechanotherapy), performed with a maximum

range of movements (even against a background of moderate pain), eliminates the existing limitations in the function of the temporomandibular joint. Functional load should also be carried out with great care and be supported by the appointment of an appropriate diet<sup>20</sup>.

General strengthening and breathing exercises are prescribed in a dosage that provides increased activity of the cardiorespiratory system, corresponding to the functional capabilities of the patient's body. Against the background of regular motor activity in patients, somatic status changes: microcirculation, the state of the cardiovascular, respiratory, digestive systems improves. The methodology of therapeutic gymnastics provides for an individual selection of general strengthening, breathing and special exercises against the background of the motor regime adequate to the patient's condition<sup>21</sup>.

The alternation of general developmental exercises with special ones in a ratio of 2:3 is recommended. Therapeutic exercises include respiratory and general developmental exercises for all muscle groups in an amount that does not cause an acceleration of the pulse by more than 20-30% compared with the state of rest. Already on the 4th – 5th day, most patients pass from bed rest to free<sup>22</sup>.

At the initial stage, general developmental exercises are performed with gymnastic sticks, dumbbells, in the future, jumping rope, hoop, lunges, push-ups, squats, twisting, morning jogging and so on are gradually added. At first, when performing gymnastic exercises, patients may experience a feeling of fatigue, then, under the influence of regular physical exertion, ease of movement, a surge of strength, increased mood, and improvement of endurance and physical activity appear<sup>23</sup>.

After a trauma, a number of patients develop dysphonia (a qualitative violation of the voice, which is manifested by nasal, hoarseness, hoarseness). In this situation, a correction of phonetics is required. To this end, special tests have been developed with words from complex consonants and vowels. These texts are recommended to be read 3-5 times a day for 20-30 minutes<sup>24</sup>.

**Physiotherapy in the rehabilitation of patients after trauma of the maxillofacial region:** The inclusion of physical treatment method in the rehabilitation complex helps to prevent many consequences of trauma and prolonged immobilization, enhances the restoration of chewing activity after removing tires<sup>25</sup>.

Electrophoresis is a physiotherapeutic procedure in which solutions of drugs are delivered to tissues using electric current. This method of physiotherapy is often used during rehabilitation after injuries and injuries in the face and jaw. In these patients, several types of electrophoresis are used: - on the surface of the tooth; on the gum; into the nasal cavity. This procedure is most often carried out by the Potok-1 apparatus. It includes intraoral and extraoral active electrodes of various sizes and shapes. If necessary, eliminate inflammatory processes, appoint electrophoresis with a solution of ascorbic acid (5%), vitamin P (1%), trypsin solution, 1% nicotinic acid solution<sup>26,27</sup>.

Fluctuorization - treatment is carried out by alternating current. It includes extraoral and intraoral electrodes. This device generates three forms of current: 1 - bipolar symmetric; 2 - partially straightened; 3 - constantly pulsating current<sup>28</sup>. The first and second forms are used to relieve inflammation and pain. The third form is used to administer drug solutions. In inflammation, fluctuation is combined with exposure to ultrahigh-frequency current and microwave therapy<sup>29,30</sup>.

During therapy with alternating current, Darsonval apparatus Spark-1 and Spark-2 are often used. These devices generate high-frequency alternating current of low power and high voltage. As a result, a sharply decaying charge is produced. In the process of such treatment, it is possible to reduce the sensitivity of peripheral nerve receptors, thereby achieving a painkiller effect. Itching in the tissues decreases, vasospasm is relieved, the outflow and movement of leukocytes increases<sup>31,32</sup>.

Ultrahigh-frequency currents as one of the types of electrotherapy for maxillofacial trauma are performed by microwave therapy apparatus-4 and microwave therapy apparatus-66 devices. Under the influence of an ultrasonic field, colloids of molecules change. This is due to thermal and oscillatory effects. Under the influence of ultrahigh-frequency electromagnetic fields, macrophages are activated, edema decreases, metabolism is activated, growth of young connective tissue is enhanced, and sensitivity of nerve receptors decreases.

## Conclusion

Currently, a significant increase in the number of patients with acute trauma of the maxillofacial region is observed in the world. Its consequences often lead

to significant violations of the jaw function and the appearance of a “cosmetic defect”. Modern science and practice have a large arsenal of rehabilitative effects on such patients. The central place among them is adaptive physical education. It is effectively complemented by a whole arsenal of physiotherapeutic and psychotherapeutic effects. Their complex application provides in the vast majority of cases the gradual development of a positive persistent effect.

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**Ethics Committee Resolution:** The study was approved by the local ethics committee of the National State University of Physical Culture, Sport and Health named after PF Lesgaft on September 15, 2018 (protocol №9).

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# Role of Autophagy in the Myelodysplastic Syndrome and Myeloproliferative Disorders

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## Abstract

**Objective:** Modulation of autophagy is a promising potential strategy enhancing cancer therapy, especially after development of new autophagy inhibitors. We planned to assess the role of autophagy in Myelodysplastic syndrome (MDS) and Myeloproliferative neoplasms (MPNs).

**Design:** Case controlled single center study.

**Setting:** Internal medicine department, Minia University Hospital, Minia, Egypt.

**Subjects:** A total of 70 subjects divided into two groups: group I: 35 newly diagnosed patients with MDS and MPNs and group II: 35 apparently normal individuals.

**Intervention:** Serum beclin-1 (S.BECN 1) and Serum autophagy protein 7(S. Atg-7) were measured in both groups.

**Main Outcome Measure:** We considered the following parameters: demographic data, bone marrow examination, splenomegaly, hepatomegaly and laboratory investigations in both patients and control group including beclin1 and Atg7.

**Results:** By comparing serum beclin1 level in the two groups: patients group showed that the mean and SD of both S. beclin1 and S. Atg-7 were much higher than the control group. This shows highly significant P value <0.001\*.

**Conclusion:** Measurement of high level of S.BECN 1 and S. Atg 7 in MDS and MPNs indicate that they may be autophagy-dependent markers and it may be modifiable factors through its inhibition or induction.

**Keywords:** *Autophagy, Myelodysplastic syndrome; Myeloproliferative neoplasms.*

## Introduction

The term of Autophagy was firstly described by Christian de duve in 1963, who coined that autophagy is a “self-eating”. He observed that the cell could destroy

its own contents by enclosing it in membranes, forming sack-like vesicles that were transported to a recycling compartment, called lysosome, for degradation. In 2016, Nobel Prize in physiology or medicine was awarded to Yoshinori Oshimi for his discovery of the mechanism of autophagy [1].

Autophagy is a cellular pathway responsible for the sequestration of spent organelles and protein aggregates from the cytoplasm and their delivery into lysosomes for degradation<sup>[2]</sup>. Whereby cellular proteins and organelles are engulfed by autophagosomes, digested in lysosomes, and recycled to sustain cellular metabolism<sup>[3]</sup>.

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Autophagy has been shown to play several important roles in cancer [4]. It has a dual role in cancer, acting as both a tumor suppressor by preventing the accumulation of damaged proteins and organelles and as a mechanism of cell survival that can promote the growth of established tumors. Tumor cells activate autophagy in response to cellular stress and/or increased metabolic demands related to rapid cell proliferation. The role of autophagy in cancer has been highly researched and reviewed. There is evidence that emphasizes the role of autophagy both as a tumor suppressor as well as a factor in tumor cell survival. However, recent research has been able to show that autophagy is more likely to be used as a tumor suppressor [5].

Concerning hematological malignancies there is evidence suggests that autophagy defects in hematopoietic stem cells (HSCs) may be implicated in the pathogenesis of Myelodysplastic syndromes (MDS) and myeloproliferative disorders. Bone marrow cells from those patients are characterized by mitochondrial abnormalities and increased cell programmed death [3]. Indeed, multiple autophagic markers, including Beclin 1 and autophagy protein 7 have now been characterized as tumor suppressors [6], through controlling oxidative stress as well as the build-up of potentially DNA damaging wastes [7].

The evolution of autophagy and its relation to hematological malignancies; make it an encouraging field for research. Hoping for further progress in curative management of blood malignancies, so the modulation of autophagy is a promising potential strategy to enhance cancer therapy.

**Ethical Approval:** This study was approved by the Institutional Ethics Committee of School of Medicine, Minia University, Egypt, and all patients gave informed consent before participation in this study. The study conducted in accordance with the ethical guidelines of the 1975 Declaration of Helsinki and International Conference on Harmonization Guidelines for Good Clinical Practice.

### Subjects and Method:

A total of 35 newly diagnosed patients with Myelodysplastic syndrome and myeloproliferative disorders collected in a single center, Minia University Hospital. The diagnosis of Myelodysplastic syndrome and MPNs was based on 2016 WHO criteria.

We excluded the Secondary causes of dysplasia from the MDS group.

During the same period, the serum of 35 apparently healthy individuals collected as a control group.

**Clinical and laboratory assessments:** The diagnosis of MDS is suspected clinically by symptoms and signs of anemia, bleeding tendency or repeated infections, and laboratory by the presence of an abnormal blood count at routine blood test. The assessment of dysplasia on PB and BM smears are the hallmark of the diagnosis of MDS according to the 2016 WHO criteria.

Some additional laboratory tests were done to confirm the diagnosis in MPNs group as detection of JAK II mutation, serum erythropoietin level in polycythemia patients and BCR-ABL gene expression in CML patients.

**Measurement of S. BECLIN-1 and S. Atg-7:** Using commercial kits from ANOVA Company: using Sandwich-ELISA technique. The Microelisa stripplate provided in this kit had been pre-coated with an antibody specific to Beclin 1 and S. Atg-7. Then we calculated the concentration of Beclin 1 and Atg-7 in the samples by comparing the OD of the samples to the standard curve.

**Assay Range:** 30pg/ml- 2000 pg/ml.

**Statistical Analysis:** All analysis was carried out using SPSS software version 20.  $P < 0.05$  was considered statistically significant.

### Results

Out of 35 patients, 19 were males and 16 were females. Their age ranging from 30 to 70 years with 22 of them with no comorbidities but 13 of them had comorbidities. The control group contained 35 apparent normal individuals. Their age were ranging from 46 to 67, 20 of them were males and 15 were females. 31 of them with no comorbidities but 4 had comorbidities.

The patient group subdivided into two groups, 20 patients were MDS and 15 were MPNs. In the MDS: 10 were males and 10 were females. In MPNs: 9 were males and 6 were females. BM examination in MDS: 2 were hypocellular but 18 were hypercellular, while in MPNs: 5 were hypocellular and 10 were hypercellular. In MPNs, 1 case had mild splenomegaly, 4 had moderate splenomegaly and 10 had huge one.

Among the laboratory investigations between two groups: HB level in both groups showed statistically significant difference with P value <0.001\*. Creatinine level, showed statistically significant difference between two groups with P value <0.010\*. By comparing serum beclin1 and Serum Atg 7 in the two groups, there was statistically highly significant difference with P value <0.001

ROC curve for Beclin-1 showed area under curve 0.835, P value <0.001, sensitivity 94.3% and specificity 71.3%. while ROC curve for Atg 7 showed area under curve 0.962, P value <0.001, sensitivity 97.2% and specificity 94.3%. Using Pearson correlation between S. Beclin1 and S. ATG7, there was a moderate association ( $r=0.643$  &  $p<0.001$ ).

**Table (1): Demographic data in patients and control group**

Parameters	Case (n=35)	Control (n=35)	Test statistic	p value
<b>Sex</b>				
Male	19 (54.3%)	20 (57.1%)	$\chi^2$ 0.058	0.810
Female	16 (45.7%)	15 (42.9%)		
Age	58.5±8.9 (30-71)	57.8±6.8 (46-67)	0.379	0.706
<b>Comorbidity</b>				
No	22 (62.9%)	31 (88.6%)	6.293	0.012
Yes	13 (37.1)	4 (11.4%)		
<b>Type of comorbidity</b>				
HTN	6 (17.1%)	2 (5.7%)		
DM	4 (11.4%)	2 (5.7%)		
HTN/DM	1 (2.9%)	0		
Down/DM	1 (2.9%)	0		
Asthmatic	1 (2.9%)	0		

**Table (2): Laboratory investigations in both patients and control group**

Parameters	Case (n=35)	Control (n=35)	t	p value
	Mean±SD (Range)	Mean±SD (Range)		
HB	7.6±4.1 (4-19)	11.5±0.9 (10-13)	-5.624	<0.001*
MCV	86.5±10 (59-101)	82.8±2.3 (80-86)	2.121	0.038*
PLT	214.7±353 (1-1321)	289.3±80.3 (178-411)	-1.220	0.227
TLC	9.5±13.4 (3-56)	7.7±1.9 (5-11)	0.777	0.440
INR	1.1±0.1 (1-1.3)	1.1±0.1 (1-1.3)	0.650	0.518
ALT	42.5±7.2 (35-60)	42.8±5.7 (35-55)	0.165	0.869
AST	45.9±8.4 (35-67)	47.6±5.9 (39-60)	-1.022	0.310
Cr	1±0.2 (1-1.4)	0.9±0.2 (1-1.2)	2.642	0.010*
beclin1	3223.9±1275.7 (14-7140)	1125.4±1423.3 (28-4215)	6.495	<0.001*
ATG7	3494.1±2841.8 (13-9870)	345.2±301.3 (15-1445)	6.519	0.001*

Figures:

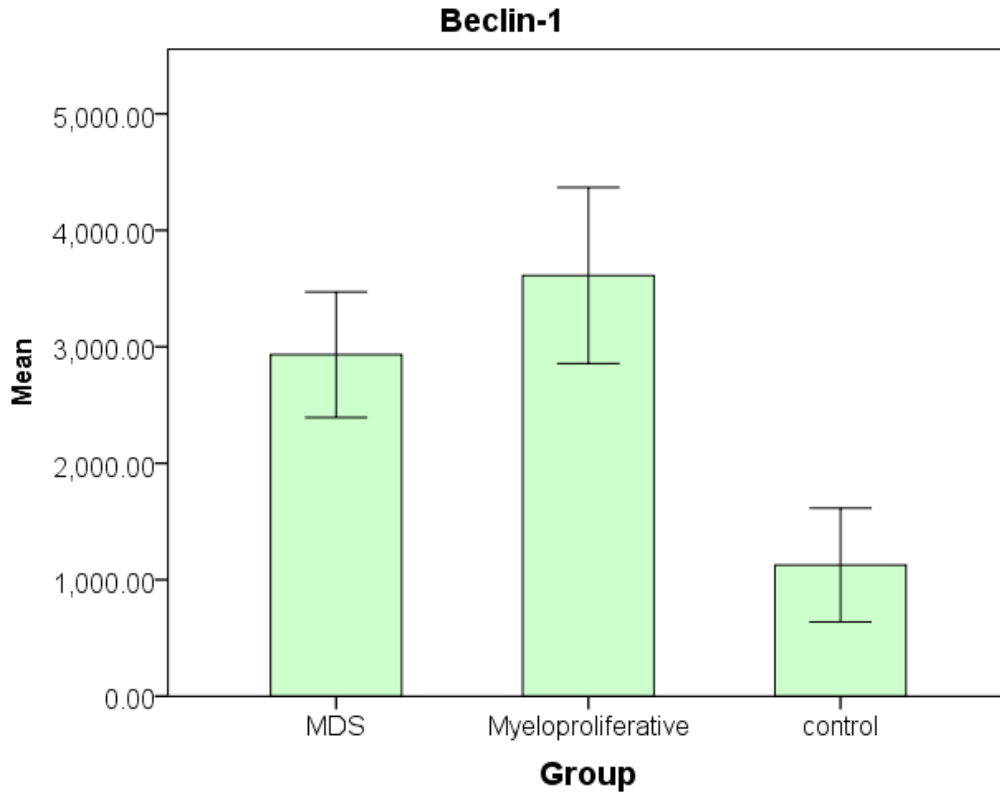


Figure (1): Comparison between S. Bcl-1 in different groups.

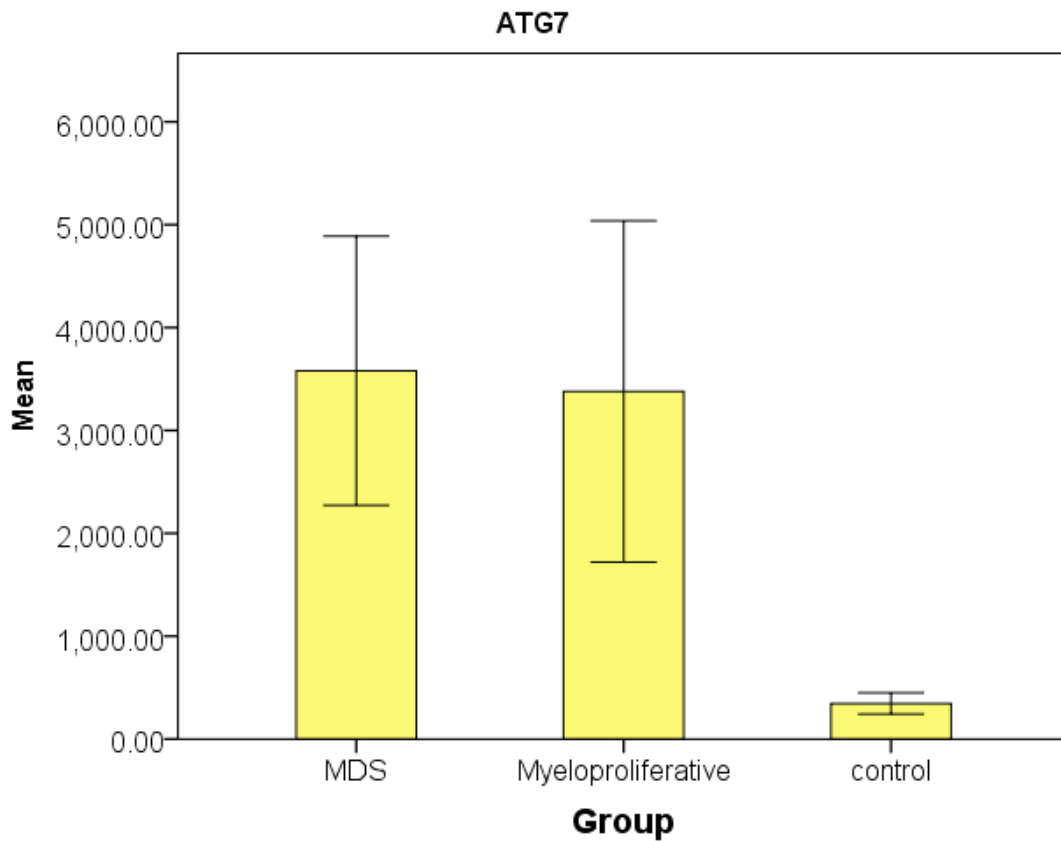


Figure (2): Comparison between S. ATG 7in different groups.

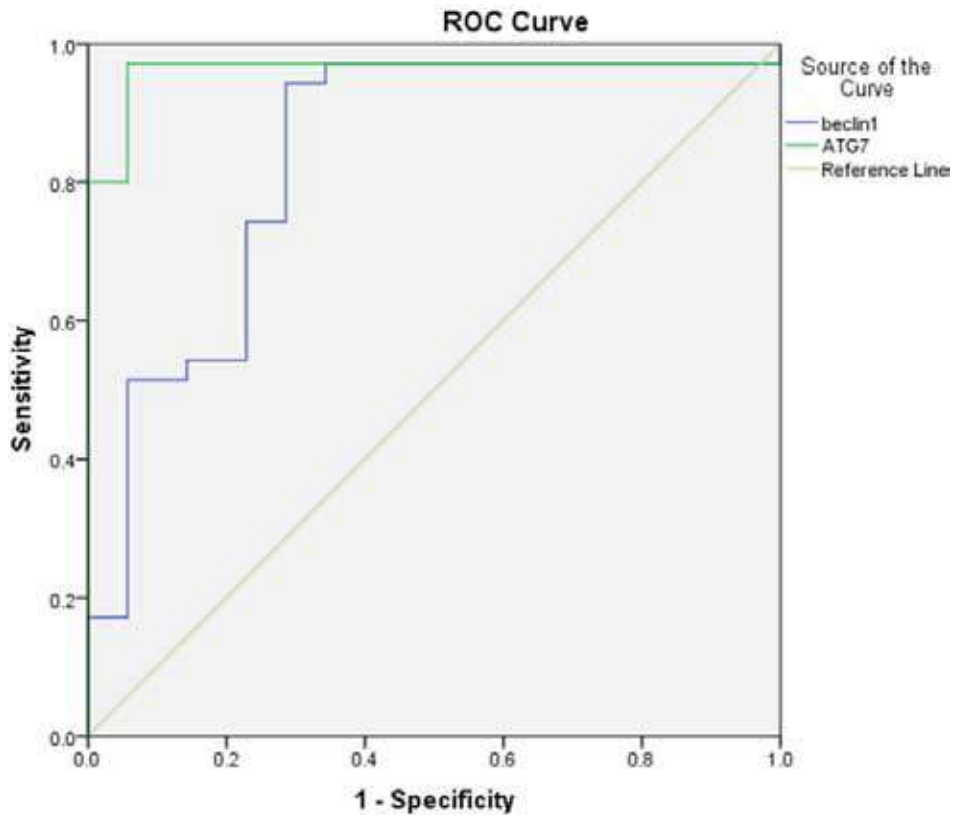


Figure (3): ROC curve for Bcl-1 and ATG 7.

	Ares under the curve	P value	Cutoff point	Sensitivity	Specificity
Beclin1	0.835	<0.001	1160	94.3%	71.4%
Atg7	0.962	<0.001	435	97.2%	94.3%

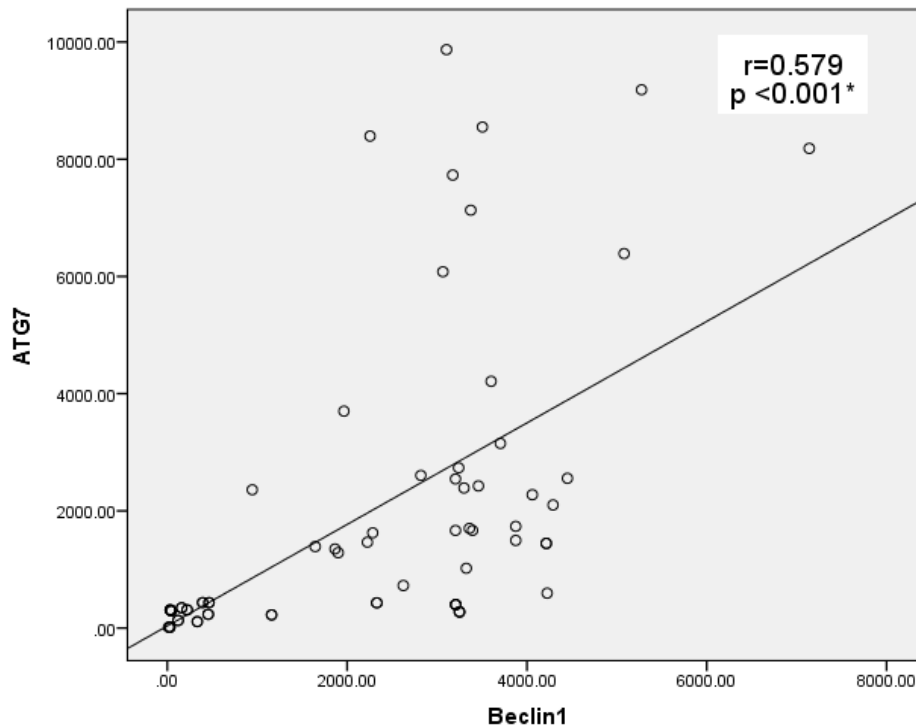


Figure (4): Correlation between Beclin 1 and ATG7 among the studied sample

## Discussion

Autophagy is included in the regulation of haematopoietic stem cells (HSCs) that are the precursors of normal hematopoiesis<sup>[8,9]</sup>. Dysregulation of autophagy in HSCs is linked to the initiation and progression of blood cancers including: leukemias<sup>[10]</sup>, lymphoproliferative disorders<sup>[11]</sup> and myelodysplastic syndrome<sup>[12]</sup>. Recently, many clinical trials using autophagy inhibitors are being applied to multiple blood cancer types together with chemotherapeutic agents to achieve complete cure. So it is the flavour of the moment to try to understand the relationship between autophagic protein markers and various blood malignancies.

In the present study, 20 newly diagnosed MDS patients and 15 patients of newly diagnosed MPNs, were assessed for autophagy by measuring serum beclin-1 and serum autophagy protein 7. The two groups of patients showed significantly increase in the level of S. BCL-1 and S. ATG-7 which indicating the induction of autophagy in the development of MDS and MPD.

Numerous recent studies suggest that inhibiting autophagy may be an efficient approach to improve the chemotherapeutic antileukemic regimens, but this was not in agreement with Alessio et al.,<sup>[13]</sup> whom suggested that autophagy induction through using autophagy-activating pharmacological or dietary approaches could be utilized as a way to enhance the efficacy of chemotherapeutic agents as well as helping to reduce some of the side effects of anticancer agents.

Our data was agreed with Tan et al.,<sup>[14]</sup> as they proved that hypoxia-induced cell death increased upon knockdown of Beclin-1 or Atg7 as well as with autophagy-deficient cancer cell, were proliferating less in mouse xenograft models.

Folkerts et al.,<sup>[15]</sup> hypothesized that most of blood cancers induce autophagy which contributes to survival in poorly oxygenated tumor areas but, appropriate testing of the efficacy of autophagy inhibition in cancer cells of patients will have to be more developed, with current trials mainly monitoring autophagy in peripheral blood mononuclear cells (PBMCs) as a surrogate marker of response. However, the level of autophagy in PBMCs does not seem to correlate with autophagy inhibition in the tumor microenvironment<sup>[16]</sup>. Therefore, positron emission tomography/computed tomography and magnetic resonance imaging probes for Atg activity are currently being developed.

In our work, the serum BECLIN-1, the key regulator of autophagy showed significantly increase in myeloproliferative group, especially in the CML subtype. These previous data was similar to Xiaoli et al.,<sup>[17]</sup> whom demonstrated that induction of upregulation of Beclin-1 help to augment autophagic cell survival. The levels of miR-93 depression and Beclin-1 upregulation contributed to the levels of Pediatric Leukemias (PL) resistance against chemotherapy. They suggested that strategies which increase miR-93 levels or inhibit cell autophagy may improve the outcome of PL, and this is our aim in the next studies to try the autophagy inhibitors and identify their role in cancer regression in combination with the currently used chemotherapeutic agents. Hoping to come in depth and more detailed informations about the role of autophagy in various blood malignancies, as It is evident that autophagy is more and more emerging as a potential target for cancer therapy.

Also, Vilcassim et al.,<sup>[18]</sup> were agreed with our results of high level of autophagic markers obtained in CML subgroup as they demonstrating that iron chelator Deferasirox (DFX), blocked growth of myeloid leukemia cell lines whilst sparing normal stem cells through its ability to inhibit autophagy, postulating that modulation of intracellular iron levels can be adopted as a tool to elucidate the role of autophagy in this disease.

On the contrary, El-Sharkawy et al.,<sup>[19]</sup> elucidated that beclin-1 dependent autophagy is increased after the beginning of imatinib therapy indicating induction of autophagy in CML patients, along with complete clinical and hematological response, i.e. they supporting the theory of tumor suppression related autophagy and programmed cell death.

However, it is a must to take in our considerations that our study was carried out using serum autophagy markers by ELISA kits instead of gene expression, in a trial to facilitate and simplify the diagnosis and correlation between autophagy and blood malignancies.

However, Chen et al.,<sup>[20]</sup> hypothesized that irregular myeloid proliferation occurred in the bone marrow of autophagy related gene (Atg) 7 knockout mice, which was similar to the process of development of myelodysplastic syndrome (MDS) and this support the theory that the presence of autophagy guard against tumor development.

In the current study, there is significant increase

in both S. Atg 7 and S. BECN-1 in MPNs group compared to the control group that was in accordance with Celso et al.,<sup>[21]</sup> who reported that it was better to combine Ruxolitinib; which is a JAK2 inhibitor used in MPNs with positive JAK2 mutation, with autophagy pharmacological inhibitors, especially chloroquine, may be a promising strategy for improving the outcome of MPN with positive JAK2 mutation. This supports the theory that autophagy promotes blood malignancies.

**Limitations of the present study:** (1) The number of subjects that was small due to financial issues. (2) Future studies are required to further using pharmacological autophagy inhibitors in a larger sample size and assess its role in regression of the blood malignancies either alone or in combination with available chemotherapeutic agents. (3) S. BECN-1 and S. Atg 7 levels were not assessed after initiation of treatment which could provide important information about the relation between autophagy and response to chemotherapy.

### Conclusion

High level of serum BECN-1 and serum Atg 7 in MDS and MPNs indicate that they can be autophagy-dependent markers and it may be a therapeutic window for autophagy inhibition in combination with cancer therapy.

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**Ethical Statement:** The material has not been published anywhere. Authors of the manuscript have no financial ties to disclose and have met the ethical adherence.

**Disclosure of Interest:** The authors declare that they have no competing interests.

**Declaration of Authorship:** All authors have directly participated in the planning, execution, analysis or reporting of this research paper. All authors have read and approved the final version of the manuscript.

**Conflict of Interest:** None

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# The Influence of Reward and Communication to Cohesion Team of Tuberculosis Prevention Team in Community Health Centers

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## Abstract

Tuberculosis is an infectious disease caused by the tuberculosis virus, *Mycobacterium tuberculosis*. Indonesia is the third country after India and China that has 420.994 tuberculosis cases. East Java was ranked in the second among other provinces in Indonesia with more than 20.000 newly cases. Surabaya has the highest number of tuberculosis cases in East Java with the success rate of less than 90%. The key role of a community health center is to support the program of tuberculosis prevention but the organization frequently did not achieve the goal of health program. The study was an observational analytic on the team of tuberculosis prevention in Surabaya's community health centers. The sample was taken using stratified random sampling and chose 43 teams of tuberculosis prevention with simple random sampling. Total of participants was 318 people consisted of a doctors, nurses, and health analysts. The statistical analysis was a linear regression test. The findings showed reward influenced significantly toward team cohesion, while communication variable did not influence to team cohesion. The research concluded there was an influence of intrinsic reward toward cohesion in a team. Team cohesion is one of team process enabling to support team performance to achieve program target of tuberculosis prevention so it suggested paying attention to their staff particularly intrinsic reward by the management.

**Keywords:** *Communication, intrinsic reward, team cohesion, tuberculosis.*

## Introduction

Tuberculosis is a disease caused by anaerobic bacteria living in the lung or any organs that have high oxygen partial pressure<sup>(1)</sup>. Tuberculosis (TB) was caused by *Mycobacterium tuberculosis* that resisted from the acid<sup>(2)</sup>. The incident of TB has been predicted that 10 million in 2017 or 133 cases per 100.000 population have occurred worldwide. There are about 1,3 million mortalities due to tuberculosis and 300.000 mortalities

with HIV<sup>(3)</sup>. Meanwhile, Indonesia's TB incidence was 420.994 cases until May 2018 and the country was positioned in the third after India and China<sup>(4)</sup>. The province positioned second highest incidence of TB in Indonesia was East Java Province with 360.770 cases consisted of positive BTA of 26.152 cases. Surabaya city itself was the highest TB incidence of positive BTA (6.338 cases) among all districts of East Java<sup>(5)</sup>.

The government has made a program of TB prevention and controlling by tracking and finding new cases, treating TB patients and suspect optimally, improving social setting and environment, and implementing BCG immunization<sup>(1)</sup>. The prevention program by the government of Indonesia was launched in Indonesian Ministry of Health Regulation No. 67 the Year 2016 about TB prevention. The program aimed to reduce and to eliminate transmission and prevalence of TB in the society. The primary health facility in Indonesia includes the community health center as the

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health facility for prevention and health promotion<sup>(6)</sup>. The community health center must assign doctors, nurses, and health analyst as the responsibility in managing the program of TB prevention<sup>(2)</sup>. Throughout the inter-profession collaboration, the community health center enables to make a team of TB prevention consisted of those three professions. A team was a workgroup consisted of people with equal ability and interact with weach other to actuate the task in a organization<sup>(7)</sup>. The problem faced in a team might be overcome easily compared to an individual problem in an organization<sup>(8)</sup>. However, the problem in a team emerged among the team members. Mcshanedan Von Glinow (2018) stated that one of the supporting factors for a team was team cohesion to obtain effective performance<sup>(10)</sup>. The team cohesion was influenced by reward and effective communication from an organization toward the team. This study aimed to analyze the influence of reward and communication toward team cohesion.

### **Material and Method**

The research was an observational analytic study with a cross-sectional design. It conducted in Surabaya between February and May 2019. The unit of analysis was TB prevention team of each community health center in Surabaya. The study involved 43 teams that were taken using simple random sampling. The sample used proportional stratified random sampling based on success rate (SR) per community health center. The participants were doctors, nurses, and health analyst who work closely with patients who need TB treatment. Total of participants was 318 people from 43 teams of TB prevention. The data collection used a questionnaire that had been validated and tested of its reliability and took from success rate data from Surabaya District Health Office.

The dependent variable was cohesion team, while the independent variable was reward and communication. Cohesion team was defined as the perspective of each member toward his/her interest and motivation to be in a team of TB prevention. A reward was defined as a perspective of every member toward rewarding from an organization because of TB prevention team's result and achievement. Communication was defined as a member's perspective toward effective information from the head of community health center or the leader team of TB prevention.

Cohesion team used GEQ questionnaire consisted

of task cohesion, social cohesion, individual attraction to the group<sup>(9)</sup>. Reward here was intrinsic reward that consisted of trust, responsibility, power, and complimentary. Communication variable consisted of the ability to send information, similar perspective of symbol, language, and abbreviation that occurred in team of TB prevention.

The responses were calculated in mean for team's score. The team score is calculated form average score for all members<sup>(10)</sup>. The statistical analysis used linear regression test and descriptive analysis using mean value, with cut off point of 3.20 from Pareto principle mentioned. The pareto principle explains that 80% of effects occur because of 20% caused. The average score of each team is tested using a linear multivariable regression test, which if the p-value is less than  $\alpha$  value (0,05), it will give significance.

### **Findings and Discussion**

**a. Reward:** Reward is an appreciation form by an organization to staffs or team. The reward not only might come out like money, but also appreciation, giving responsibility, and fully trust to team in decision making<sup>(11)</sup>. The organization offered reward both intrinsic and extrinsic to every staff aiming to improve performance of staffs<sup>(12)</sup>. Intrinsic reward might be a form of an appreciation towards a well-done job and a non-financial way in respect and appreciate the staff's contribution towards quality and consumer service<sup>(13)</sup>. Reward could not affect the successful performance but it made an impact toward motivation of employees<sup>(14)</sup>.

This study focused on intrinsic reward toward the staffs of TB prevention team in a community health center. Intrinsic reward was necessary for the employees besides extrinsic reward. The findings showed the team of TB prevention in all of Surabaya community health centers perceived that the reward they obtained was good (81.4%). Specifically, the indicators of reward variable had high mean value such as getting trust, responsibility delivery, and authority shifting.

The highest mean among those three indicators was responsibility delivery from the head of community health center. Besides, the staffs did not need to be reviewed for the decision they made<sup>(15)</sup>. Meanwhile, responsibility was an obligation for someone to work well according to the procedure and direction

beforehand<sup>(16)</sup>. In this context of the study, responsibility delivery was given according to the ability of each member of TB prevention team.

Responsibility delivery as reward from the head of community health center was perceived as very high reward (44.2%) by the respondents. Responsibility delivery also was suitable for the staff's ability. The ability of employees was a condition indicating maturity which related to insight and skills from education, training, and knowledge<sup>(17)</sup>. Meanwhile, the workability among the staffs was a level of skills, desire, and accomplishing the tasks of their responsibility and authority so they were able to achieve goals and organization's target<sup>(18)</sup>. Giving responsibility based on staff's ability affected to enhance work performance<sup>(19)</sup>.

- b. Communication:** Communication was primary factor for the team to explain its expectation and to coordinate the work that enabling the team to achieve organization's goal in effectively and efficiently way<sup>(11)</sup>. Communication presence in a team described interaction among team members in accomplishing the tasks and owning an important role in transforming input and outcome both cognitive and emotional<sup>(20)</sup>. The condition of communication both organization level and team level had key role in forming the bond among team members<sup>(21)</sup>. Mcshanedan Von Glinow (2018) stated there were three indicators of communication namely information delivery ability, similarity of symbol perception, language, and abbreviations. Another indicator was the understanding of the program of TB prevention. The result indicated that the team members mostly (88.4%), felt effective communication from the leader to them.

The lowest average was the ability to deliver information from the leader to the staffs. The study showed the participants tended to deliver information in a way of face to face or gadget. The result obtained 7% of respondents felt very effective communication in the team of TB prevention from the leader. That finding showed the channel to deliver the message had an impact on team's perception to get information. The team interacted according to the regulation when all members were able to access the visual information. However, that interaction had a limit when the team must be able to adapt dynamically with obstacles of communication channel they used for exchanging information<sup>(22)</sup>.

Another study found the indirect instruction from a leader to the team via voice recording might cause the staffs made more mistakes compared to direct instruction<sup>(23)</sup>.

Also, the mean value of the indicators of the same perception related to symbol, language, and abbreviations among members, and lacking understanding regarding the program was <3.2 like the indicator of information delivery. The communication was potential to improve performance when it presented acquisition and knowledge exchange among team members<sup>(20)</sup>. In addition, low value of same perception on symbol, language, and abbreviations, and program understanding was probably caused by the different professionals in the team. This determination might make different view of knowledge among team members. Different spectrum in the team was planned by Mannixdan Neale. It had six categories which one of them was different knowledge, skills, and abilities (education, functional knowledge, information or expertise, training, experience, and skills)<sup>(24)</sup>. Those low indicators were not complied with another study that found the difference in a team made positive impact on open communication in the team<sup>(20)</sup>.

- c. Team Cohesion:** The team members mostly perceived integrated team cohesion in TB prevention team (93%). The mean value of team cohesion was >3.2 as the variable did not have any indicator. The findings showed low integration among team members. The lowest mean indicator was social cohesion. Cohesion was a process whereby each member shared bond enabling the team to work together<sup>(25)</sup>. Refer to that definition; it was necessary for a team to have integration in order to achieve the goal. The task cohesion was in low mean value so it implied that the team had low perception regarding the unity of team as the social community for the team members. This social cohesion also experienced low mean due to the team needed to collab with other teams of antenatal care, immunization, health promotion, and others. Therefore, the team members did not have high perception of unity due to the collaboration with other teams.

- d. The Influence of Reward, and Communication to Team Cohesion:** The result from statistical analysis test in Table 1 showed variable of reward

influenced team cohesion ( $p=0.007$ ). The value of  $\beta$  coefficient was 0.406 that implied high reward had an opportunity of 40.6% to make integrated team cohesion. Team cohesion needed emotional association among team members based on its definition. Reward given to the team might be able to improve cohesion as rewarding to a team had different qualitative impact compared to rewarding to an individual<sup>(26)</sup>. Torrington, et al. (2011) stated

reward was important for team members in making bonds between each other<sup>(27)</sup>. This finding complied with the situation that the majority respondent as team members of TB prevention had appreciative reward. In detail, there was only one indicator with mean value of  $<3.2$  among four indicators. Meanwhile, it could be described that high reward for the team had an impact of integrated team cohesion.

**Table 1: The Result of Linear Regression Test**

Independent Variable	Dependent Variable	P-value	$\beta$
Reward	Team Cohesion	0.007	0.406
Communication		0.233	-0.211

The variable of communication did not influence team cohesion  $p=0.233$  and it has negative correlation. The result did not comply with other studies that found cohesion correlated with communication between members<sup>(28)</sup>. Another research found effective ways to improve unity in a team by non-verbal communication competency<sup>(29)</sup>. Besides, non-verbal communication was important in interaction among team members to improve nonaccidental messages, and it might lose those fault messages<sup>(30)</sup>. This study defined communication as an ability to deliver information. In detail, the lowest mean was the ability to deliver the information occurred in TB prevention team of Surabaya. This factor probably was the cause of negative correlation and insignificant result of influence of communication variable toward team cohesion. Clark dan Krych (2004) stated that communication ability from a leader to staffs will determine whether the employee will make a mistake or not<sup>(23)</sup>. If communication skill was not good, it would be interpreted in a different way among team members. The different response would make conflict among team members.

**Conclusion**

1. There was significant influence of reward toward cohesion team.
2. There was no influence of communication toward cohesion team.
3. The organization should increase intrinsic reward

for the team in order to improve performance because cohesion team was one of factor affecting the performance. The district health office might enhance intrinsic reward by giving a training of internal positive feedback for the head of community health center.

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**Ethical Clearance:** There search has been approved by Ethical Commission of Nursing Faculty, Airlangga University (No. 1316-KEPK). All respondents were given explanation and information including the purposes, method, and also had signed informed consent forms.

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# The Effect of Burnout on Employee Satisfaction in 9 Local Health Centers in Surabaya City

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## Abstract

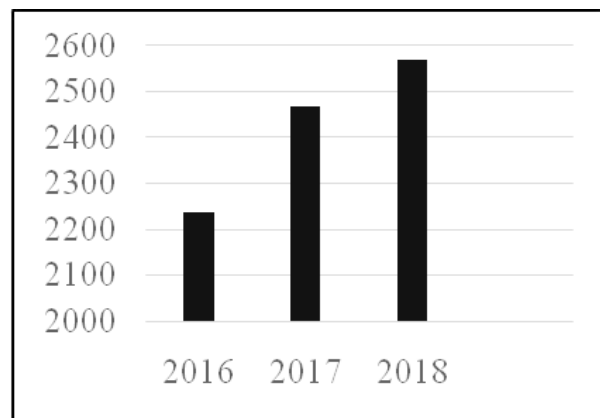
Indonesia took a significant step by using the National Health Insurance which is an integration of various forms of health insurance which have been implemented previously to achieve the target of universal health coverage. The portrait of the use of the National Health Insurance can be seen from the number of visits which increase each year. The increase in patient visits at local health center makes the local health center employees overwhelmed with a lot of tasks. Based on the initial survey at the Keputih Health Center, it was found that the burnout rate of employees in 2018 was 50.9%. The purpose of this study was to analyze the effect of burnout on employee job satisfaction in 9 local health centers in Surabaya. This research is analytical research with quantitative design. Based on the time, the design of this research is cross sectional. The population of this research is all employees of the Surabaya City Health Center who provide services for patients directly every day. The method of sampling uses a stratified non-random side technique. The data collected through survey method with questionnaire as instruments. The results showed that the likelihood of respondents with high burnout would have a higher job satisfaction 5.877 times than the respondents with low burnout. The conclusion is that low burnout will leads to the possibility of higher job satisfaction. The author's suggestion is to calculate the workload of each employee and schedule outbound activities for local health center employees.

**Keywords:** *Burnout, Job Satisfaction, Universal Health Coverage.*

## Introduction

In the Executive Board 144 summit of 2019, the WHO 13th General Program of Work is signed to achieve health target that in 2023 by all WHO member countries, including Indonesia. The target includes one billion people benefiting from Universal Health Coverage (UHC), one billion people are better protected from health emergencies, and one billion people will have a better and healthier life<sup>1</sup>. Indonesia has taken a significant step by using the National Health Insurance which is an amalgamation of various forms of health insurance which have been applied previously. The portrait of the utilization of the National Health Insurance can be seen from the number of visits which increase every year. In 2014 there were 62.3 million visits, while in 2017 there were 219.6 million visits. The implementation of National Health Insurance in all regions, including the remote areas and borders, must be balanced with equitable distribution of human resources

and the fulfillment of the availability of health care facilities<sup>2</sup>.



**Figure 1. Average Monthly Patient Visits in 2016-2018 at Keputih Health Center Surabaya**

The Surabaya city has 63 health centers in total which spread all over the region. The national health

insurance program made the local health center to have a role as gatekeeper. The Gatekeeper means it is the first level of health service facility and place of contact for patients that can be used to reduce the possibility of patient referrals to an advanced health facilities and it is function as an effort to control quality and costs<sup>3</sup>.

Based on Figure 1. it can be seen that the increase in patient visits also occurred at the Keputih health center in Surabaya. The average patient visit of each month back in 2016-2018 is 14.84%. The increase in the average visit of these patients consequently increases the workload of employees in the local health centers which leads to possibility of burnout.

Burnout is a prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by the three dimensions of exhaustion, cynicism, and inefficacy. Exhaustion is the central quality of burnout and the most obvious manifestation of this complex syndrome. Depersonalization is an attempt to put distance between oneself and service recipients by actively ignoring the qualities that make them unique and engaging people. The relationship of inefficacy (reduced personal accomplishment) to the other two aspects of burnout is somewhat more complex, It is difficult to gain a sense of accomplishment when feeling exhausted or when helping people toward whom one is indifferent. However. The lack of efficacy seems to arise more clearly from a lack of relevant resources, whereas exhaustion and cynicism emerge from the presence of work overload and social conflict<sup>4</sup>.

**Table 1. Burnout Perception of Employees at Keputih Health Center Surabaya**

Statement	Disagree		Agree	
	n	%	n	%
Physical exhaustion at the end of the work day.	12	33.3	24	66.7
Overworked.	16	44.4	20	55.6
Boredom due to work.	17	47.2	19	52.8
Stress in working directly with people.	18	50.0	18	50.0
Feeling blamed for the patient's problem.	21	58.3	15	41.7
Feeling reluctant when wake up early because you have to work.	22	61.1	14	38.9
Average		49.1		50.9

Based on table 1. It can also be concluded that the average perception of burnout experienced by the employees in Keputih Health Center is 50.9%. The

employees tend to experience physical fatigue and over worked. Additional workloads should be balanced with the fulfillment of employee's needs hence to maintain employee satisfaction. The term 'job satisfaction' refers to the attitudes and feelings people have about their work. Positive and favourable attitudes towards the job indicate job satisfaction. Negative and unfavourable attitudes towards the job indicate job dissatisfaction<sup>5</sup>. The following is employee satisfaction data at Keputih Health Center..

**Table 2. Employee Satisfaction in Keputih Health Center Surabaya**

Statement	No		Yes	
	n	%	n	%
Praise for work you have done.	10	27.8	26	72.2
Opportunity to improve.	8	22.2	28	77.8
Work system at the Local health center.	8	22.2	28	77.8
Income received.	4	11.1	32	88.9
The way sub ordinates handle complaints.	3	8.3	33	91.7
Interpersonal Relationship.	2	5.6	34	94.4
Average		15.8		83.8

Based on table 2. We can also see that the employees feel dissatisfied with the praise or reward for the work they done; and they also not satisfied with the opportunity offered to improve; and not as well satisfied with the work system at the Local health center. This is indicated by a percentage number that exceeds 20%. Overall, the initial survey at the health center in Keputih resulted in a good level job satisfaction but with a high perception of burnout. Therefore this study was conducted to learn about the effect of burnout on the work satisfaction of employees at the Surabaya city health center.

**Material and Method**

This type of this research is quantitative and the design is observational analytic. The data collection technique is the cross sectional with population of all employees of the Surabaya City Health Center who provide services to patients directly every day. The inclusion criteria in this study are health center employees who provide services for patients directly every day. While the exclusion criteria in this study are employees who provide services indirectly to patients and employees who provide services directly to patients but not every day. Hence the total population is 1890 employees.

The method of sampling in this study uses the stratified non random sampling method with a sample consists of 259 employees. The data was retrieved through survey method with questionnaire instruments. The burnout level was measured through the 1981 Maslach Burnout syndrome Inventory questionnaire<sup>7</sup>. using the Minnesota Satisfaction Questionnaire of 1977<sup>8</sup>. The results of this research are not able to be generalized due to the method of sampling is not random therefore the results of the study will illustrate the extent of its influence but not in its significance.

### Findings And Discussion

**Identification of Employee Burnout Level in 9 Surabaya City Health Centers:** Burnout has 3 dimensions, namely Exhaustion, Depersonalization, and Personal Accomplishment. The following is an identification of employee burnout levels based on 3 dimensions of burnout.

**Table 3. Identification of Employee Burnout Levels in 9 Surabaya City Health Centers**

Questions	Percentage Distribution of Score								Mean	
	1		2		3		4			
	n	%	n	%	n	%	n	%		
<b>Exhaustion</b>										
Emotional drain	26	10.04	129	49.81	89	34.36	15	5.79	2.36	3.07
Physical exhaustion at the end of the work day.	52	20.08	131	50.58	69	26.64	7	2.70	2.12	
Lazy of waking up in the morning	28	10.81	103	39.77	95	36.68	33	12.74	2.51	
Feeling depresses.	5	1.93	54	20.85	116	44.79	84	32.43	3.08	
Feeling bored	12	4.63	115	44.40	86	33.20	46	17.76	2.64	
Feeling frustrated.	3	1.16	42	16.22	96	37.07	117	45.17	3.34	
Overworked	9	3.47	123	47.49	92	35.52	35	13.51	2.59	
Causing stress.	4	1.54	52	20.08	92	35.52	111	42.86	3.20	
Stagnant life and career.	11	4.25	114	44.02	84	32.43	50	19.31	2.67	
<b>Depersonalizatio</b>										
Impersonal object.	10	3.86	33	12.74	65	25.10	151	58.30	3.38	3.19
Stiff.	10	3.86	33	12.74	86	33.20	130	50.19	3.30	
Emotionally cold	3	1.16	43	16.60	82	31.66	131	50.58	3.32	
Don't for patient	1	0.39	26	10.04	62	23.94	170	65.64	3.55	
The patient blames me	1	0.39	59	22.78	93	35.91	106	40.93	3.17	
<b>Personal Accomplishment</b>										
Understands the patient's feelings	4	1.54	27	10.42	119	45.95	109	42.08	3.29	2.53
Able to answer patient questions	0	0.00	19	7.34	108	41.70	132	50.97	3.44	
Provide a positive influence	3	1.16	25	9.65	125	48.26	106	40.93	3.29	
Feeling excited	2	0.77	16	6.18	144	55.60	97	37.45	3.30	
Creating a reaxed atmosphere	4	1.54	27	10.42	139	53.67	89	34.36	3.21	
Feeling happy	1	0,39	6	2.32	134	51.74	118	45.56	3.42	
Obtaining experience	3	1.16	8	3.09	122	47.10	126	48.65	3.43	
Coping with a problem with a cold head	7	2.70	34	13.13	139	53.67	79	30.50	3.12	
<b>Overall Average</b>									<b>2.93</b>	

Based on table 3. overall it can be seen that the burnout assessment resulted in an average value of 2.93 which can be categorized as good. All asesment indicators obtain good average scores. This is indicated by the average value of  $\geq 2.5$ .



**Identification of Employee’s Job Satisfaction Level in 9 Surabaya City Health Centers:** The descriptive analysis on the employee’s job satisfaction in 9 local health centers in Surabaya can be seen in table 4.

**Table 4. Identification of Employee’s Job Satisfaction Level in 9 Surabaya City HealthCenters**

Scale	Percentage Distribution of Score								Mean
	1		2		3		4		
	n	%	n	%	n	%	n	%	
Ability utilization	0	0.00	30	11.58	196	75.68	33	12.74	3.01
Achievement	2	0.77	40	15.44	200	77.22	17	6.56	2.90
Activity	6	2.32	61	23.55	179	69.11	13	5.02	2.77
Advancement	4	1.54	38	14.67	195	75.29	22	8.49	2.91
Authority	2	0.77	48	18.53	194	74.90	15	5.79	2.89
Company Policies and Practices	13	5.02	80	30.89	152	58.69	14	5.41	2.64
Compensation	10	3.86	44	16.99	182	70.27	23	8.88	2.84
Co-workers	1	0.39	12	4.63	203	78.38	43	16.60	3.11
Creativity	11	4.25	39	15.06	191	73.75	18	6.95	2.83
Independence	1	0.39	25	9.65	213	82.24	14	7.72	2.97
Security	9	3.47	32	12.36	203	78.38	14	5.41	2.98
Social Status	2	0.77	22	8.49	202	77.99	33	12.74	3.03
Recognition	10	3.86	26	10.04	205	79.15	18	6.95	2.89
Moral Value	14	5.41	30	11.58	193	74.52	22	8.49	2.86
Sosial Support	16	6.18	41	15.83	185	71.43	17	6.56	2.78
Responsibility	11	4.25	48	18.53	189	72.97	11	4.25	2.77
Supervision-Human Relations	26	10.04	68	26.25	149	57.53	16	6.18	2.60
Supervision-Technical	18	6.95	56	21.62	171	66.02	14	5.41	2.70
Variety	27	10.42	74	28.57	143	55.21	15	5.79	2.56
Working Condition	15	5.79	54	20.85	170	65.64	20	7.72	2.75
<b>Overall average</b>									<b>2.84</b>

Based on table 4. above it can be seen that the job satisfaction assessment resulted in the average value of 2.84. The value is categorized as good as the threshold is with an average value of > 2.5. The average value shows that respondents feel satisfied with their work

both in terms of salary, relationship to superiors and subordinates, work environment conditions and so on.

**Test Result of The Effect of Burnout on Job Satisfaction:** The following is a 3-dimensional relationship of burnout on employee job satisfaction

**Table 5. Correlation between Burnout and Employee’s Job Satisfaction in 9 Surabaya City Health Centers**

Variable	Job Satisfaction				Total	
	Low		High			
	n	%	n	%	n	%
<b>Exhaustion</b>						
Low	54	45.8	64	54.2	118	100
High	73	51.8	68	48.2	141	100
<b>Total</b>	<b>127</b>	<b>49.0</b>	<b>132</b>	<b>51.0</b>	<b>259</b>	<b>100</b>
<b>Depersonalization</b>						
Low	53	42.7	71	57.3	124	100
High	74	54.8	61	45.2	135	100
<b>Total</b>	<b>127</b>	<b>49.0</b>	<b>132</b>	<b>51.0</b>	<b>259</b>	<b>100</b>

Variable	Job Satisfaction				Total	
	Low		High		n	%
	n	%	n	%		
<b>Personal Accomplishment</b>						
Low	53	46.1	62	53.9	115	100
High	74	51.4	70	48.6	144	100
<b>Total</b>	<b>127</b>	<b>49.0</b>	<b>132</b>	<b>51.0</b>	<b>259</b>	<b>100</b>
<b>Total Burnout</b>						
Low	60	47.6	66	52.4	126	100
High	67	50.4	66	49.6	133	100
<b>Total</b>	<b>127</b>	<b>49.0</b>	<b>132</b>	<b>51.0</b>	<b>259</b>	<b>100</b>

Based on table 5. We seen that as many as 64 or 54.2% of the respondents have expericed low exhaustion and higher job satisfaction. There were 71 or 57.3% of the respondents with low depersonalization and high job satisfaction. 62 or 53.9% of respondents have low personal accomplishments and high job satisfaction. And last, 66 or 52.4% of respondents experiencing low total burnout and high job satisfaction.

Hasildariidentifikasi tingkat burnout dan tingkat kepuasan karyawan kemudian di ujimenggunakan aplikasi statistik untuk melihat pengaruh burnout terhadap kepuasan kerja. Besaran pengaruh akan digambarkan dengan nilai OR.

**Table 6. Result of Test for the Effect of Burnout on Employee Job Satisfaction in 9 Surabaya City Health Centers**

Independent Variable (Burnout)	Dependent Variable	OR
Total Burnout	Job Satisfaction	5.877
Personal Accomplishment		0.761
Exhaustion		0.495
Depersonalization		0.228

Based on table 6. It shows that total burnout has the highest OR value of 5.877 means that the likelihood of respondents with high burnout would have a higher job satisfaction 5.877 times than the respondents with low burnout. Based on these results it can be learned that the respondents who have a low total burnout have the possibility experience higher job satisfaction. The respondents who did not feel the boredom or exhaustion of work would work happily and comfortably which could increase the respondents' job satisfaction.

These results are in line with the research conducted by Andarini (2018) where Burnout syndrome has a

negative effect on job satisfaction, which means that with higher burnout syndrome, the more it will reduce job satisfaction<sup>9</sup>. The results are also in line with the research conducted by Rupita (2004) on job satisfaction and burnout in nurses at the DR. Soedarso Pontianak Hospital which resulted that there was a significant negative relationship between job satisfaction and burnout on nurses ( $r = -0.408$  and  $p < 0.05$ ), so when burnout increases, job satisfaction will automatically decrease<sup>6</sup>. The results of this research are also in line with the research of Maslach, Schaufeli, and Leiter (2001) which stated that for people who stay on the job, burnout leads to lower productivity and effectiveness at work. Consequently, it is associated with decreased job satisfaction and a reduced commitment to the job or organization. People are experiencing burnout will have a negative impact on their colleagues, both by causing greater personal conflict and by disrupting job tasks<sup>4</sup>.

Based on table 6. It is proven that depersonalization has the lowest OR value of 0.228. Based on the result it can be learned that respondents with low depersonalization have a high likelihood of better job satisfaction. Respondents tend to be comfortable and able to place themselves as a service provider. Thus the satisfaction perceived by respondents tends to be high.

It is also in line with the research conducted by Nurka et al. (2014) which found that there is a significant correlation between job satisfaction and depersonalization ( $P < 0.001$ ). The multivariate regression analysis showed a significant predictor of depersonalization, namely using knowledge and skills in the workplace<sup>10</sup>.

### Conclusions

Based on the analysis of the effect of burnout on job satisfaction, it is found that when the exhaustion;

depersonalization; and personal accomplishments dimension is low, will leads to the possibility of high job satisfaction. Overall a low burnout level will made the possibility of high job satisfaction.

Based on the results the author recommends that Local health center calculate the workload of each employee so that workload adjustments can be made for employees. Besides, local health center can take the employees for outbound at least once a year to improve interpersonal relations both between employees to superiors and fellow employees and to relieve boredom by the many demands of the work..

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# The Influence of Social and Cultural Factors on the Decision of Selecting a Place for Preeclampsia Mother Giving Birth

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## Abstract

Maternal Mortality Rate (AKI) is one indicator of state health. AKI in 2017 amounted to 79.4 per 100,000 live births in the city of Surabaya. This number still exceeded the SDGs target sey. While the most common causes of AKI is preeclampsia. Preeclampsia is a specific condition in pregnant women over 20 weeks characterized by placental dysfunction. The main sign of preeclampsia is the presence of hypertension. The case of preeclampsia in Kenjeran Subdistrict Community Health Center (Puskesmas) is one of the highest in Surabaya.

This research is an observational quantitative study. The research design used cross-sectional. The population of this study were all preeclampsia mothers in Kenjeran Subdistrict Puskesmas. The sample in this study were 127 mothers of preeclampsia. Secondary data was used as a reference to determine samples. Primary data was obtained through observation and interviews. The statistical analysis used was multinomial regression.

The results show that there is an influence between social factors (0.024) and the decision to choose the place of delivery and there is no influence between cultural factors (0.831) and the decision to choose the place of delivery.

It is recommended to improve and maintain family support as a social factor for preeclampsia mothers to immediately make a decision to choose a place of delivery. As well as the need for approaches to local customs and culture by health workers to be easily accepted by the community.

**Keywords:** *Mother Gives Birth, Decision Making, Preeclampsia.*

## Introduction

Maternal Mortality Rate (AKI) is one indicator of the health status of a country, because AKI shows the ability and quality of health services<sup>(1)</sup>. This makes an assessment of the health status and performance of

maternal health efforts. There are several provinces with a large number of maternal and neonatal deaths, one of which is East Java.<sup>(2)</sup> AKI in East Java tends to decline in the last three years, but in 2016 it increased again. In 2017, AKI East Java Province reached 91.92 per 100,000 live births. This number increased compared to 2016 which reached 91 per 100,000 live births. One of the areas in East Java that with the highest case of maternal mortality, is Kota Surabaya. AKI in Surabaya in 2017 amounted to 79.40 per 100,000 live births. AKI still exceeds the target of the Sustainable Development Goals (SDGs) of 70 per 100,000 live births. The still high level of AKI has made the government need to make improvements in maternal health services. Based on Surabaya City Health Office in 2017 the highest

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cause of death in the city of Surabaya is caused by preeclampsia or eclampsia. Preeclampsia or eclampsia as the leading cause of maternal death in Surabaya City with 29 cases from 2015 to 2017. The risk of maternal death will be high due to risk factors for delays such as late recognition of danger signs, late decision-making, and late arrival at health facilities<sup>(3)</sup>. Decision-making to choose or buy health services is influenced by several factors, namely the characteristic factors, social factors, cultural factors, and psychological factors. Preeclampsia or eclampsia is a condition included in the criteria for obstetric emergencies (4). Therefore, the need for further treatment of mothers with these conditions. Based on the exposure of the problem related to the high maternal mortality rate, it was caused due to complications especially in preeclampsia or eclampsia. Then, considering the background described earlier that the incidence of preeclampsia tends to increase. Then this is the basic reason for knowing the factors that influence the decision making of mothers with cases of preeclampsia in determining the place to give birth.

### Material and Method

This study is a type of analytic research because it analyzes the influence between two independent and dependent variables. This study was an observational study because the researcher did not give treatment to the subject under study and only did data collection. Judging from the time the research was conducted in a certain time or the same period of time when carrying out research.

The population in this study were 328 preeclampsia mothers and used sampling using proportional random sampling. The method used to determine the number of samples was using Leme show formula<sup>(5)</sup>, as shown below:

$$n = \frac{Z^2 \times N \times p \times q}{d^2 \times (N-1) + Z^2 \times p \times q}$$

**Note:**

n = Total sample

N = population

Z = Normal standard deviation for 1,96

d = degree of confidence (0,05)

p = proportion of the target population is 0,12

q = 1-p = 0,88

Then obtained a calculation as follows:

$$n = \frac{1,96^2 \times 328 \times 0,12 \times 0,88}{0,05^2 \times (328-1) + 1,96^2 \times 0,12 \times 0,88}$$

n = 108,78 workers or 109 samples

However, the samples obtained in the field in this study were 127 samples.

The variables in this study were social factors, cultural factors, and decisions on the choice of place of delivery. The instruments in this study used a questionnaire. This study used a multinomial regression test with a confidence level of 95% with a value of  $\alpha = 0.05$ .

**Findings:** Respondents in this study were mothers who were diagnosed with preeclampsia as many as 127 respondents with the following description:

**Based on this research, the distribution of respondents' data is as follows:**

**Table 1. Distribution of Respondents Based on Social Factors and Cultural Factors**

Variable	Category	Frequency	Percentage
Social Factor	Good	105	82,68%
	Not Good	22	17,32%
	<b>Total</b>	127	100%
Cultural Factor	Support	100	78,74%
	Not Supporting	27	21,26%
	<b>Total</b>	127	100%

Based on table 1, it is known that the majority of preeclampsia mothers fall into the category of good social factors as many as 105 respondents or with a percentage of 88.68%. In addition, the majority of preeclampsia mothers is included in the category of supporting cultural factors with a frequency of 100 people or with a percentage of 78.74%.

From the research that has been done, it is known that respondents who decided to choose a hospital as many as 73 people or with a percentage of 57.5%, respondents who decided to choose the practice of independent midwives as many as 40 people with a percentage of 31.5%, and respondents who decided to choose a community health center as many as 14 people with a percentage of 11.0%. This can be seen in table 2.

**Table 2. Distribution of Decisions on the Place of Delivery**

Variable	Category	Frequency	Percentage
Decision on the selection of place of delivery	Hospital	73	57,5
	Practice of Independent Midwives	40	31,5
	Community Health Center	14	11,0

Bivariate analysis produces data relating to the influence between independent variables consisting of social and cultural factors which are then related to the dependent variable, namely the decision to choose the place of delivery. The statistical test used was using a multinomial regression test.

From the results of multinomial regression statistical tests between social factors and the selection of place of delivery found that the significance of 0.024 which means it was smaller than alpha, namely 0.05 so it can be concluded that there was an influence between social factors and the decision to choose the place of delivery. While the results of the test of influence between cultural factors and the decision to choose the place of delivery obtained a significance result of 0.831 with an alpha of 0.05 thus there was no influence between cultural factors and the decision to choose the place of delivery.

**Discussion**

There are several factors that can influence consumers to decide to make a purchase or use services, namely social and cultural factors. Social factors include reference groups, families, roles and status. While cultural factors include culture, subculture, and social class. Every individual must be surrounded by people who can influence his decision<sup>(6)</sup>. Cultural factors are the most fundamental determinant of the desires and behavior of consumers to obtain a value. Culture creates perceptions, values, requests, and behaviors that can be influenced by family, friends, and society<sup>(7)</sup>.

In this study, it shows that 73 people decide to choose hospital as the place of delivery. The results of statistical test show that there was influence between social factors with the decision of selection delivery place. In this study, it was found that social factor of mothers with preeclampsia was included in the category of good. Social factors mentioned as good included is that the mother of preeclampsia had a reference group or figure that used as a role model to influence herself in making

decisions. Then, a preeclamptic woman with the support from her family. This condition can encourage mothers to immediately make decisions because they feel that there is a form of attention given from the family. This research is in accordance with the research conducted by Maleke<sup>(8)</sup> that there is an influence between social factors and decision making.

Someone who is growing and obtaining as et of values, perceptions, and preferences from the surrounding environment due to socialization that occurs will form a behavior habit created for that person. In this study, it was found that the cultural factors of preeclamptic mothers were in the supportive category. The cultural factor in question supports namely that the mother of preeclampsia would not go to shaman, there was no advice on giving birth at home, and did not have to be supported by laborers of the same sex. In this study it was found that there was no influence between cultural factor variables and the decision to choose the place of delivery. In the research conducted by Ruhamak (9), it was found that cultural factors do not significantly influence decision making. This is in line with this study that cultural factors have no influence on maternal decision making.

**Conclusion**

1. The majority of preeclamptic women already have good and supportive social and cultural factors in making decisions.
2. The majority of preeclamptic women decide to choose a hospital as their place of delivery.
3. There is an influence between social factors and the decision to choose the place of delivery. However, there is no influence between cultural factors and the decision to choose the place of delivery.

**Recommendation:**

1. Increase and maintain family support as a social factor for preeclamptic mothers to immediately make a decision to choose a place of delivery
2. There needs to be an approach to local customs and culture by health workers to be easily accepted by the community.

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# The Difference of Brain Derivat Neutrophic Factor of Mus Musculus Newborn from Adolescent and Adult Pregnancy

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## Abstract

**Background:** The brain is the main organ involved in stress adaptation, while being the target of stress. Stress activates the hypothalamic-pituitary-adrenal (HPA) axis and the system is adrenomedular Simpato thereby increasing the production of corticotropin-releasing hormone (CRH) and arginine-vasopressin (AVP) resulting in lower levels of Brain Derived Neurotrophic Factor (BDNF) in the hippocampus. Objective: The study aims to find out the difference of BDNF of *Mus musculus* newborn brain from adolescents and adults pregnancy. Method: The samples on this study were 32 mice that divided by 2 groups were adolescent pregnancy mice group and adult pregnancy mice group. *Mus musculus* newborn were born by sectio and selected three with the heaviest, medium and lightest of each mothers to sacrificed their brains did decapitated and made immunohypochemical preparations and continued examination of the Immunoreactive Score to calculate Brain Derived Neurotrophic Factor expression. Result: BDNF expression of adolescent pregnancy mice group had higher ( $5.65 \pm 1.044$ ) than adult pregnancy mice group ( $4.15 \pm 1.049$ ). Test results showed that there was differences of BDNF expression in the brain  $p = 0,000$  ( $p < 0.05$ ) with details, there were differences in the cerebrum  $p = 0,015$  and the cerebellum  $p = 0,000$  between adolescent pregnancy mice group and adult pregnancy mice group. Conclusion: BDNF expression in brain of *Mus musculus* newborn from adolescent pregnancy lower than *Mus musculus* newborn from adult pregnancy.

**Keywords:** Stress, adolescent pregnancy, expression Brain Derived Neurotrophic Factor.

## Introduction

Adolescence is defined as the developmental phase in humans whose life cycle lies between childhood and adulthood<sup>1</sup>. According to WHO about teenage pregnancy, an estimated 16 million teenage girls give birth every year, mostly in low and middle income countries<sup>2</sup>. complications from childbirth are the main cause of death among girls between the ages of 15-19 years<sup>3</sup>. Teenage pregnancy has become an issue around the world which needs to be done to reduce the problem

of the birth of adolescent mothers<sup>4,5</sup>. Teenage pregnancy causes a serious impact on physically giving birth at an early age causing high mortality of pregnant women, triggering the emergence of problems with abortion, premature birth, preeclampsia. The psychological impact is the difficulty facing the social environment, experiencing the level of depression, difficulty in accessing to continue higher education, financial difficulties, having weak and unhealthy children<sup>6</sup>

The brain is the main organ involved in stress adaptation, as well as being the target of stress<sup>7</sup>. Stress activates the HPA axis and the adrenomedular sympathetic system thereby increasing the production of corticotropin-releasing hormone (CRH) and arginine-vasopressin (AVP). This increase because of increased secretion of adrenocorticotrophic hormone (ACTH) and glucocorticoid<sup>8</sup>.

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Brain Derived Neurothropic Factor as the main factor that plays a role in the survival of nerve cells, as well as being involved in the proliferation, differentiation, and regulation of synapse function in the central nervous system. Acute or chronic stress affects BDNF and TrkB expression in the brain. Chronic stress decreases mRNA and BDNF protein expression in the hippocampus<sup>8</sup>.

The study aims was to find out the difference of BDNF of *Mus musculus* newborn brain from adolescents and adults Pregnancy.

### Material and Method

This was an analytic study and conducted at the Pathology Laboratory of the Faculty of Veterinary Medicine, Universitas Airlangga Surabaya which had been ethically legalized before. **Participants.** Sample size in this study were 32 samples and randomly divided into two groups. There were adolescent pregnant mice (treatment group) and adult pregnant mice (control group) Pregnant *Mus musculus* aged 1,5 months and fulfilled the criteria of study subjects for treatment group were healthy, weighing 15 – 20 grams and age 1,5 month and for control group were healthy, weighing 30-35 grams and age 3 month. *Mus musculus* that were sick or dies during treatment can't be used. **Intervention.** Each sample was given treatment according to the group which were Female mus musculus with 3 months old (Adult mice) and 1.5 months old (Adolescent mice) were impregnated with PMSG dose 5 IU and HCG dose 5 IU injections then mated with male mice aged 5 months. **Outcome.** Brain samples were taken after *Mus musculus* newborn were born then their brains were taken. For one preparat contains 3 brains sample with the heaviest, moderate and lightest. BDNF expression

in each sample was assessed semi-quantitatively according to the modified Remmele method. Data for each sample was observed on ten fields of view (LP) at 400 x magnification. This study was examination used *microscope miconos MCX50LED and camera optilab plus*.

The data was carried out with comparative test using non parametric *Mann Whitney* test.

**Findings:** Pregnant *Mus musculus* randomly grouped and there were 10 mice dead from treatment group and 2 mice dead from control group. *Mus musculus* newborn had 5 mice being reabsorbtion. The Shapiro-Wilk test showed a unnormal distribution ( $p > 0.05$ ) after that using *Mann whitney* test.

**Table 1. Characteristics body weight and gestational age of *Mus musculus* mothers**

		X1		X2	
		n	%	n	%
Body weight	15-20	16	100%	-	-
	21-25	-	-	3	18,75%
	26-30	-	-	10	62,5%
	31-35	-	-	3	18,75%
Gestational Age	20 day	16	100%	16	100%

X1: Adolescent pregnancy mice (Treatment group), X2: Adult pregnancy mice (Control group)

Based on the table 1, all of K1 group samples had body weight 15-20 gram and each three samples of K2 group had body weight 21-25 gram (18,75%) and 31-35 gram (18,75%) meanwhile ten samples K2 group had body weight 26-30 gram (62,5%). All of samples group with gestational age 20 day (100%).

**Table 2: Mean body weight *Mus musculus* mothers and newborn**

Group	BW Mothers			BW newborn	
	Before	After	p	Mean±SD	p
	Mean±SD	Mean±SD			
X1	16,93±1,38	26,00±2,94	0,011	0,31±0,08	0,000
X2	28,00±2,22	41,25±5,88		0,62±0,42	

X1: Adolescent pregnancy mice (Treatment group), X2: Adult pregnancy mice (Control group)

Based on the table 2, The control group (X2) had higher mean of body weight before pregnant (28,00±2,22) than treatment group (X1) (16,93±1,38). Mean of body weight after pregnant of control group (X2) had higher mean (41,25±5,88) than treatment

group (X1) (26,00±2,94).

Mean of body weight *Mus musculus* newborn control group (X2) had higher (0,62±0,42) than treatment group (X1) (0,31±0,08).

**Table 3. Characteristics BDNF expression of Mus musculus newborn.**

Group	Cerebrum			Cerebellum			Brain		
	Mean±SD	Normality	Mann Whitney	Mean±SD	Normality	Mann Whitney	Mean±SD	Normality	Mann Whitney
X1	4,47±1,28	0,019	0,015 <sup>b</sup>	3,82±0,63	0,049	0,000 <sup>b</sup>	4,15±1,049	0,000	0,000 <sup>b</sup>
X2	5,53±1,15	0,054 <sup>a</sup>		5,76±0,95	0,033		5,65±1,044	0,007	

X1: Adolescent pregnancy mice (Treatment group), X2: Adult pregnancy mice (Control group), <sup>a</sup>: Data distribution normal (p>0,05), <sup>b</sup>: significant difference (p<0,05)

**Analysis of the results in cerebrum:** Based on table 3, mean BDNF expression of control group (X2) more high than treatment group (X1) in cerebrum. The results of the normality test showed that unnormal data distribution in treatment group (X1) (p=0,019) so we used *non parametric mann whitney test*. Table 3 shown the results that there was a significant difference of BDNF expression cerebrum between group (p=0,015).

**Analysis of the results in cerebellum:** Table 3 shown that mean BDNF expression of control group (X2) more high than treatment group (X1) in cerebellum. The results of the normality test showed that unnormal data distribution then used *non parametric mann whitney test*. there was a significant difference of BDNF expression cerebellum between groups (p=0,000).

**Analysis of the results in brain:** Based on table 3, mean BDNF expression of control group (X2) more high than treatment group (X1) in brain. The results of the normality test showed that unnormal data distribution and then used *non parametric mann whitney test*. Table 3 shown the results that there was a significant difference of BDNF expression cerebrum and cerebellum (in brain) between group (p=0,000).

**Discussion**

In the adolescent group there were 10 mothers who died during treatment and 2 mothers Mus musculus in the control group who died. The gestational age of the mother mice averaged between 19-20 days, then on the 21<sup>st</sup> day a sectio caesarea was performed. Obtained adolescents pregnancy *Mus musculus* group had 3 mice abortions while the adult pregnancy *Mus musculus* group did not experience abortion. This shows that the gestational age of 1.5 months is not mature enough to reproduction function so that’s difficult to get pregnant and there are many deaths issue related to stress. In accordance with the theory which shown that the age

of productive mice which ready to be impregnated is 30-40 days, this is influenced by the readiness of the reproductive organs<sup>9</sup>. The parent of juvenile mice who experience death, neither pregnancy nor abortion (reabsorption) is the impact of unpreparedness based on the age and reproductive function of mice and the mother of mice experiencing one of the three social stresses namely isolation, new environment or crowding<sup>10,11</sup>.

From the results of the study, it was also explained that there were differences of BDNF expression between Mus musculus both groups in the cerebrum, cerebellum or both (brain). In mice experiments at prepubertal levels and mid-adolescents aged 30-50 days experienced two times longer stress compared to adult aged 70 days<sup>12</sup>. Cortisol in amniotic fluid is closely related to the maternal activity of the HPA system<sup>13</sup>. The placenta enzyme 11β-hydroxystoid dehydrogenase-2 (HSD2) can function as an enzymatic buffer against the effects of maternal glucocorticoid exposure. However, these enzymes can reduce regulation by adverse prenatal history, which is thought to reduce the capacity to protect developing fetuses<sup>14</sup>.

Maternal depression is associated with an increase in the level of glucocorticoid mRNA receptor placenta (GR) allowing placenta GR sensitivity to be changed in stressed mothers<sup>15</sup>. Chronic stress in pregnant mice results in an evaluation of the HPA (hypothalamic pituitary Axis) by measuring plasma levels of ACTH and cortisosterone<sup>16</sup>. In experimental animals, mice undergoing pregnancy can cause differential methylation of the BDNF gene in the blood and brain<sup>16</sup>.

Stress is known to change neuronal structure during development and cause atrophy in the brain<sup>17</sup>. This can jeopardize normal hippocampal connectivity and reduce hippocampal size, reduce cognitive function<sup>18</sup> BDNF is active in the first two weeks of the mice embryo and peaks 10-14 days into the postnatal period, with the

highest levels in the hippocampus. mBDNF maintains cell survival through TrkB binding and downstream paths involving Erk1-2<sup>19</sup>. Prenatal stress changes the conventional pattern of ongoing functions. BDNF genes are clearly regulated by stress and HPA axis activation<sup>20</sup>. It is widely known that chronic stress or high glucocorticoids can reduce mRNA BDNF hippocampus expression<sup>21</sup>. BDNF signals in the hippocampus can follow one of two different signaling pathways that have opposite effects on cells, such as proBDNF, it has a high affinity for p75 receptors, which increases LTD, dendritic atrophy, and cell apoptosis. For proBDNF to be split into mature forms by plasmin, the first plasminogen zymogen must be activated by landfill. After processing, mBDNF can bind to the TrkB receptor either pre or post synaptically. In that dendrite, binding induces Erk 1/2 phosphorylation, which leads to LTP, synaptic plasticity, cell survival and differentiation

Neuroplasticity is a new hypothesis in the etiology of depression. Brain derived neurotrophic factor (BDNF) is the main neurotrophic factor responsible for brain neuroplasticity and neural development. BDNF is responsible for the production, growth and differentiation of immature neurons during the stage of brain development, important for the survival of neurons. BDNF increases the development of noradrenergic and serotonergic neurons, increasing their life span by preventing them from toxic damage<sup>22</sup>. In addition, it is effective in neurogenesis and synaptic plasticity<sup>23</sup> With BDNF gene suppression, deteriorates neuroplasticity, neurons become more susceptible to pressure easily initiate apoptosis and result in atrophy<sup>23</sup>.

Hippocampus is one of the limbic structures which involves emotions and cognition. It also contributes to mood disorders such as depression, and the function of hippocampal formation and regulation of the HPA axis both change in depression<sup>24</sup>. Glucocorticoids have repeatedly been shown to reduce BDNF synthesis, which also applies to pregnancy<sup>25</sup>. Therefore, prenatal maternal HPA stress activation and fetal glucocorticoid exposure are the main mechanisms for modulating BDNF synthesis in pregnancy. Thus, prenatal maternal stress can lead to epigenetic modulation of fetal BDNF regulation, and activation of the maternal HPA system and fetal BDNF. Because free diffusion is bidirectionally between the amniotic fluid and the fetus in the skin of the fetus, placenta, and umbilical cord from 10 to 20 weeks of pregnancy, the composition of amniotic fluid becomes similar to fetal plasma during this period<sup>26</sup>.

## Conclusion

BDNF expression in brain of *Mus musculus* newborn from adolescent pregnancy lower than *Mus musculus* newborn from adult pregnancy in brain.

**Conflict of Interest:** There was no conflict of interest in this study.

**Ethical Clearance:** This study was received ethical approval from the Health Research Ethics Committee, Faculty of Dental Medicine, Universitas Airlangga.

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# The Relationship between Integrated Antenatal Care (ANC) Service and the Transmission Prevention Examination from Mother to Children in Sleman Public Health Centers in 2018

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## Abstract

**Objectives:** Maternal Mortality Rate (MMR) in Sleman Regency in 2017 amounted to 42.78 per 100.000 live births. It has decreased compared to 2016 which amounted to 56.59 per 100.000 live births. Meanwhile, the Infant Mortality Rate (IMR) was 4.20 per 1.000 live births. It increased compared to 2016 which was 3.11 per 1.000 live births. One of the efforts to reduce maternal and infant mortality is through an integrated antenatal care service program. The purpose of this study is to determine the relationship between integrated Antenatal Care (ANC) services and the Prevention of Mother-to-Child Transmission for Pregnant Women in Sleman Health Center in 2018.

**Method:** This study is analytic observational with a cross-sectional design. The research subjects were pregnant women in Sleman Health Centers. The research samples were 104 people with a purposive sampling technique. The research tools were questionnaires. The data analysis was done with univariate and bivariate.

**Results:** The significant value of 0.001 ( $p < 0.05$ ) was obtained, it means that there was a relationship between integrated Antenatal Care (ANC) services and Mother to Child Transmission Prevention (PPIA) checks on Pregnant Women in Sleman Public Health Centers in 2018, the risk prevalence is 25.71 ( $> 1$ ) and the value of CI is between 3.094 and 213.742 so that it does not exceed the number one, meaning that the variable is a risk factor.

**Conclusions:** There is a relationship between Antenatal Care (ANC) services integrated with Prevention of Transmission from Mother to Child on Pregnant Women in Sleman Health Centers.

**Keywords:** *ANC service, Prevention of Transmission from Mother to Child examination, Pregnant women.*

## Introduction

Maternal Mortality Rate (MMR), Neonatal Mortality Rate (NMR), Infant Mortality Rate (IMR) and Underfive Mortality Rate (UMR) are indicators of the public health

status. The current AKI and AKB in Indonesia are still high compared to other ASEAN countries. Based on the Indonesian Demographic and Health Survey (IDHS) in 2012, MMR was estimated to reach 359 maternal deaths per 100.000 live births. According to the 2012 IDHS, there were IMR 32 deaths per 1000 births, NMR 19 per 1000 live births, UMR 44 per 1000 live births.<sup>(1)</sup>

The direct causes of maternal death are factors associated with complications of pregnancy, childbirth and childbirth such as bleeding, preeclampsia/eclampsia, infection, congestion and abortion. Indirect causes of maternal mortality are factors that aggravate the situation of pregnant women such as four too (too young, too old, too often giving birth and too close to birth distance)

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and three late (late recognizing danger signs and making decisions, late reaching health facilities and late in handling emergencies). Other influential factors are pregnant women who suffer from infectious diseases such as malaria, Human Immunodeficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS), tuberculosis (TB), syphilis, non-communicable diseases such as hypertension, diabetes mellitus, heart disease and mental disorders experiencing malnutrition.<sup>(2)</sup>

Pregnant women who do not take care of pregnancy have a risk of abnormal occurrence 1.6 times higher than women who carry out antenatal care.<sup>(3)</sup> Research of Ariningtyas (2017) state that the implementation of PPIA in maternal and child health services can reduce mortality rates in HIV mothers. The Independent Practice Midwife Service is one of the maternal and child health services in Indonesia.<sup>(4)</sup>

The proportion of HIV/AIDS transmission from mother to baby during the transmission period of pregnancy of 5-10%, the birth delivery of 10-20% and the breastfeeding of 10-15% needs to be anticipated early. One of the efforts to reduce maternal and infant mortality is through an integrated antenatal care (ANC) service program. Integrated ANC services are quality antenatal services provided to all pregnant women in a comprehensive and integrated manner, including promotive, preventive and curative and rehabilitative efforts.<sup>(5)</sup> Clinical review results show that the use of antiretroviral drugs (ARVs) can effectively prevent transmission of HIV from mothers to babies.<sup>(6)</sup>

**Materials and Method**

This study is analytic observational with a cross-sectional design. The research subjects were pregnant women in Sleman Health Centers. The research samples were 104 people with a purposive sampling sampling technique. The research tools were questionnaires. The data analysis was done with univariate and bivariate.

**Result**

The characteristics of the respondents were mostly mothers aged 20-35 years amounted to 89 people (85.6%). Maternal pregnancy is all in the third trimester with 104 people (100.0%), frequency of pregnancy checks > 4 times amounted to 97 (93.3%) and ANC places in health facilities as many as 104 (100.0%) including ANC in Health centers with 58 (55.76%),

ANC in RB of 12 (11.53%), in Midwives for about 24 (23.07%), in the Hospital for about 10 (9.61%).

Status of ANC services for pregnant women with a good category of 90 people (86.5%) and 14 respondents (13.5%) in the bad category. PPIA examination for about 99 respondents (95.2%) of the “did” category and 5 respondents (4.8%) categories of the “did not do”.

There is a relationship between integrated Antenatal Care (ANC) services and Mother to Child Transmission Prevention (PPIA) checks on Pregnant Women in Sleman 2018 Health Center (p=0.001; RP=25.714; CI=3.094-213.742).

**Table 1. The Frequency Distribution of Characteristics of Pregnant Women in Sleman Health Center in 2018**

Characteristics	F	%
<b>Age</b>		
a. 20-35 years	89	85,6
b. > 35 years	15	14,4
<b>Age of pregnancy</b>		
a. Trimester II	0	0,0
b. Trimester III	104	100,0
<b>Examination frequency &gt; 4x</b>		
a. No	7	6,7
b. Ye	97	93,3
<b>ANC Place</b>		
a. Health facility	104	100,0
b. Non health facility	0	0,0
<b>Total</b>	<b>104</b>	<b>100,0</b>

Source: Primary Data of 2018

**Table 2. The Frequency Distribution of Integrated Antenatal Care (ANC) Services and PPIA Examination in Sleman Health Center Areas**

Variable	F	%
<b>ANC Service</b>		
a. Not good	14	13,5
b. Good	90	86,5
<b>PPIA examination</b>		
a. No	5	4,8
b. Yes	99	95,2
<b>Total</b>	<b>104</b>	<b>100,0</b>

Source: Primary Data in 2018

**Table 3. The Integrated Chi-Square Care (ANC) Chi-Square Test with Prevention of Mother-to-Child Transmission Prevention (PPIA) for Pregnant Women in Sleman Health Center Area in 2018**

ANC Service	PPIA Examination						95% CI			
	No		Yes		Total		Sig	PR	Lower	Upper
	f	%	f	%	F	%				
Poor	4	80,0	10	10,1	14	13,5	0,001	25,714	3,094	213,742
Good	1	20,0	89	89,9	99	100,0				
<b>Total</b>	<b>5</b>	<b>100,0</b>	<b>99</b>	<b>100,0</b>	<b>104</b>	<b>100,0</b>				

Source: Primary Data in 2018

## Discussion

### **Integrated Antenatal Care (ANC) Services for Pregnant Women in Sleman Health Centers in 2018:**

The results showed that 90 people (86.5%) pregnant women assessed the quality of integrated Antenatal Care (ANC) services in Sleman Public Health Centers were in good categories.

The actual condition of the integrated Antenatal Care (ANC) service for pregnant women in 2018 has been carried out in Sleman Public Health Centers, namely since the issuance of regulations from the Health Office in the form of 2017 Circular No. 444/9332 on Integrated ANC Services (10T) for pregnant women. Sleman Health Center has provided integrated ANC services to all pregnant women in Sleman Health Center area.

The results of the study are in accordance with the research that shows that the implementation of ANC service standards at Bahu health center according to the category shows that the majority of ANC services in shoulder health centers are in accordance with midwifery service standards compared to services that do not meet midwifery service standards. ANC was good (82.6%) from respondents.

Antenatal services are health services by professionals for mothers during pregnancy, which are carried out in accordance with established standards of antenatal care.<sup>(4)</sup> Quality of service is very close to its relationship to implementation.

The standardized approach of ANC care at Public Health Centers in Sleman is to produce healthy mothers and infants at the end of pregnancy by 1) preventing and handling intercurrent morbidity, 1) hypertension during pregnancy, anemia, malaria, tetanus, sexually

transmitted diseases and 2) detect mothers who have a high risk of complications during childbirth.<sup>(5)</sup>

Based on the results of previous research and the theory, it can be concluded that Antenatal Care (ANC) services for pregnant women in Sleman health centers are in a good category. The application of good service standards in the integrated Antenatal Care (ANC) service at the Sleman Public Health Centers is very useful to protect the community because the process of activities carried out has a clear basis and is able to detect early problems and diseases experienced by pregnant women.

### **Prevention of Mother-to-Child Transmission Prevention (PPIA) for Pregnant Women in Sleman Health Centers in 2018:**

The results showed that 99 people (95.2%) of Pregnant Women conducted a Mother to Child Transmission Prevention (PPIA) Examination in Sleman Health Center 2018. The results of this study supported the PPIA activity component in prong 3 namely prevention of HIV transmission from pregnant women with HIV to the baby they contain.

These results are in accordance with the research that shows that the majority of respondents conducted PITC examinations amounting to 71 respondents (98.6%).<sup>(7)</sup> Other studies in accordance with this study state that mothers who have readiness in carrying out HIV/AIDS tests are mothers who have secondary and high education that influence respondents' knowledge about HIV/AIDS itself.<sup>(8)</sup> The main goal is for babies born to mothers with HIV to be free from HIV, and mothers and babies to stay alive and healthy. PPIA general policy is in line with the national program policies for controlling HIV-AIDS and other STIs, as well as KIA program policies.<sup>(9)</sup>

Knowledge of someone will be the basis of all actions taken. Meanwhile, pregnant women who are

not willing to take part in PPIA and VCT services are mostly due to the negative stigma that exists in the community. With this stigma, people will be reluctant to carry out checks due to shame and fear if known by others.<sup>(10)</sup> Based on the results of previous research and the theory, it can be concluded that 99 people (95.2%) Pregnant women carry out Mother-to-Child Prevention of Transmission Examination (PPIA) at Sleman Health Centers in 2018. Mother's willingness to carry out Preventive Examination from Mother to Child (PPIA) on Pregnant Women in Sleman Public Health Center voluntarily is one form of participation and mothers have knowledge about HIV/AIDS prevention and good behavior.

**The relationship between the integrated Antenatal Care (ANC) service and the Prevention of Transmission from Mother to Child (PPIA) for Pregnant Women in Sleman Health Center:** The results of the study showed a significant value of 0.001 ( $p < 0.05$ ), it can be seen that there is a relationship between integrated Antenatal Care (ANC) services and Mother to Child Transmission Prevention (PPIA) checks on Pregnant Women in Sleman 2018 Health Center, Risk Prevalence 25,714 ( $> 1$ ) and the value of CI between 3,094 and 213,742 so that it does not exceed the number one, meaning that the variable is a risk factor. In this study, it was also found the upper and lower limits in the lower and upper 95% CI too far, this is because the table in the questionnaire answer where the ANC service is 100% is served in health facilities.

The actual condition of integrated Antenatal Care (ANC) services with Prevention of Mother-to-Child Transmission (PPIA) for Pregnant Women in Public Health Center in Sleman in 2018 has a very close relationship, because through this integrated ANC service, pregnant women are given education through speech/counseling about HIV disease, the causes and ways of prevention, so that pregnant women are encouraged to carry out the Prevention of Transmission Examination from Mother to Child (PPIA).

The study was in accordance with a study conducted in Kenya which stated that there was a relationship between integrated ANC services for HIV prevention. The full integration of HIV care into antenatal clinics can significantly increase overall satisfaction with care for mothers in HIV prevention.<sup>(11)</sup>

The results of other studies that are in accordance with this study indicate that there is a significant relationship

of service based on the number of ANC visits ( $p = 0.000$ ) with the participation of pregnant women in HIV testing, where the more number of pregnancy checkup visits, pregnant women tend to take an HIV test Transmission from Mother to Child (PPIA), but also participation in Preventive Examination from Mother to Child (PPIA) is not only influenced by antenatal care services but also other factors such as support by health personnel.<sup>(12)</sup>

Legiati., Et al (2012) said that the knowledge of pregnant women is influenced by the support or role of health workers. Pregnant women who have good knowledge are more likely to take an HIV test compared to pregnant women who have less knowledge.<sup>(13)</sup>

PPIA services have goals, objectives and approaches that are much in common with efforts to prevent congenital syphilis, therefore these two efforts are integrated.<sup>(7)</sup> The success of efforts to prevent HIV transmission from mother to baby is very dependent on various parties, so it does not only affect the active role of health personnel and services in providing education and information about HIV to mothers and their families, but can be done in various ways.

Efforts to successfully prevent HIV transmission can be done by increasing the role of Midwives and Private Practitioners to implement the PPIA program so that it can reach all regions, especially areas far from health centers. This is done in order to increase the knowledge and understanding of the community, especially pregnant women including the family related information about HIV AIDS and the importance of HIV testing.<sup>(14)</sup>

Based on the results of previous research and theory, it can be concluded that there is a relationship between the integrated Antenatal Care (ANC) service and the Prevention of Transmission from Mother to Child (PPIA) in Pregnant Women in Sleman Health Center. This is in line with the results of the study by Setiyawati & Meilani (2014) which showed that the initiation of health care providers or PITC (Provider Initiated Testing and Counseling) in health centers statistically showed a relationship with the behavior of pregnant women in HIV testing. The initiation of a health care provider to take an HIV test has the opportunity to take an HIV test of 21.6 times greater than that of a pregnant woman who does not receive an initiation from a health care provider.<sup>(15)</sup>

The same thing was stated by other researchers who said that by offering mothers for HIV counseling and



testing at the time the mother did ANC, the participation of mothers for counseling and testing was 1.3 times higher (95% CI = 17.3-22.0) compared to mothers not offered HIV counseling and testing.<sup>(16)</sup>

### Conclusion

There is a relationship between the integrated Antenatal Care (ANC) service and the Prevention of Transmission from Mother to Child (PPIA) for Pregnant Women in Sleman Health Center.

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**Conflict of Interest:** We declare that there is no conflict of interest.

**Ethical Approval:** The data collected will not be used for at her purposes than this research. This study was discussed by the Ethics Committee of Ahmad Dahlan University, Yogyakarta, Indonesia.

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# Correlation of Maternal Education with Parenting and Child Nutritional Status

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## Abstract

Education levels is the key to childcare. The objective of this study were to analyze the correlation of maternal education by care and nutritional status of children in Maros District in Indonesia.

**Settings and Design:** The sample were under five years old and selected by simple random sampling. Sample size were 156. The design is a cross sectional study. Data analysis by spearman correlation test at 95% confidence level

**Method and Material:** Child weight was measured by electronic SECA scale. Anthropometric data collected in Infants (0–11 mo of age). Three indexes were derived from anthropometric measures, including weight-for-age z score (WHA), length-for-age z score (HAZ), and weight-for-length zscore (WHA). This research was registered with the ethics commission of the Makassar Health Polytechnic.

**Statistical Analysis Used:** The data analyze were used to SPSS 16. Correlations between parenting style and z scores anthropometric were tested by Spearmen correlation at 95% confidence intervals.

**Results:** The Distribution of nutritional status based on WAZ, HAZ and WHZ indexes were normal (within in the basic education level) 67,1%, 53,2% and 74,5% respectively. The nutritional status based on WAZ, HAZ and WHZ indexes were normal (within the continue education level) in 75,7%, 61,4%, and 77,1% respectively. Statistical analysis that education levels were correlated with parenting in the basic educations level group ( $p=0,043$ ).

**Conclusions:** In the group of basic educated mothers, it is known that there is a correlation between the nutritional status of children according to the WAZ index.

**Keywords:** *Education, Parenting and Nutritional Status of Toddlers.*

## Introduction

The increase in the percentage of Stunting in South Sulawesi is that it continued between 2007, 2010 and

2013 which were 29.2%, 39.8% and 40.9% respectively. This percentage is a combination of children under five who are short and short status based on indicators of height for age (HAZ) from the WHO Anthropometric reference. Various factors that affect of stunting. The both the intake and infectious diseases are direct factors. Prevention of stunting is important by overcoming indirect factors, namely parenting. Parenting is intended to care for feeding, child care, seeking treatment and child hygiene care.<sup>1,2,3</sup>

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Maternal education tends to have quality care for child feeding, because the reasoning is to work outside in the home. The habit of mothers working outside in the home is entrusting children to caregivers who are also from close families or helpers who are specifically employed.<sup>4-6</sup>

The burden of the mother working outside the home seems to be a factor that correlates with the quality of child feeding care. The length of the mother’s work outside the home, especially during the critical period of growth is an aspect that deserves to be studied. Various underlying reasons include, for ethnic Bugis, whatever type of work the mother still has, she has a total role in responding to childcare.<sup>7,8</sup> Mother’s work should not neglect the care of child feeding, but at the same time sufficient skills and knowledge are needed to carry out parenting roles appropriately and efficiently. If this role is able to be carried out then the suspicion while children will not risk being short. This is what will be tested in this study.

The purpose of this study was to analyze the correlation of maternal education by care and nutritional status of children.

### Subjects and Method

The cross sectional study was conducted in Maros Regency, South Sulawesi, Indonesia, with a sample of

156 people using the random sampling method. Sample size is calculated based on proportional sample formulas.

Data were collected by trained enumerators on interview techniques and anthropometric measurements in April 2018. Questionnaires in this study had gone through trials with good validity and reliability. Question list consists of three parts. Child care patterns were divided into three parts, namely feeding, care, hygiene and medical care and were assessed based on parenting scores. Nutritional status is measured based on anthropometric data of the child’s height and weight. The indicators studied were, weight for age Z scores (WAZ), height for age Z scores (HAZ), weight for height Z scores (WHZ) The measurement uses 0.01 kg accuracy and 0.01 cm. Nutritional status for children for: Underweight: weight for age z scores < -2 standard deviations (SD) of the WHO Child Growth Standards median. Stunting: height for age (HAZ) < -2 SD of the WHO Child Growth Standards median. Wasting: weight for height Z scores (WHZ) < -2 SD of the WHO Child Growth Standards median. Overweight: weight for height Z scores > +2 SD of the WHO Child Growth Standards median. Processing data using SPSS version 16.0 from SPSS Inc. Descriptive data analysis with frequency, proportion, and median distribution. Test statistics with the spearman correlation test at 95% confidence. This study was approved by the Makassar Health Polytechnic Ethics Commission.

### Results:

The results of this study were presented in the following tables:

**Table 1. Distribution of toddlers ‘nutritional status based on parents’ education level**

Index (WAZ)										
Educational Level	Overweight		Normal		Underweight		Severely Underweight		Total	
	n	%	n	%	n	%	N	%	n	%
Basic (N=79)	2	2.5	53	67.1	18	22.8	6	7.6	79	100
Continue (N=70)	0	0.0	53	75.7	11	15.7	6	8.6	70	100
Index (HAZ)										
Educational Level	Hight		Normal		Stunting		Severely Stunting		Total	
	n	%	n	%	n	%	N	%	n	%
Basic (N=79)	2	2.5	42	53.2	28	35.4	7	8.9	79	100
Continue (N=70)	0	0.0	43	61.4	19	27.1	8	11.4	70	100
Index (WHZ)										
Educational Level	Obesity		Normal		Wasting		Severely Wasting		Total	
	n	%	n	%	n	%	n	%	n	%
Basic (N=79)	3	3.8	59	74.7	13	16.5	4	5.1	79	100
Continue (N=70)	3	4.3	54	77.1	12	17.1	1	1.4	70	100

The focus of the spotlight in this table is the percentage of malnutrition and malnutrition in both education, basic education and advanced education groups. The percentage of malnutrition + malnutrition in primary education is 30.4% while in advanced education it is 24.5%.

**Table 2. Distribution of toddler protein energy intake based on parental education level**

Intake Energy												
Energy	Severely Deficit		Heavy Deficit		Light Deficit		Normal		Over		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Basic (N=79)	47	59.5	7	8.9	2	2.5	13	16.5	10	12.7	79	100
Continue (N=70)	25	35.7	4	5.7	8	11.4	15	21.4	18	25.7	70	100
Intake Protein												
Protein	Severely		Heavy Deficit		Light Deficit		Normal		Over		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Basic (N=79)	26	32.9	3	3.8	7	8.9	13	16.5	30	38.0	79	100
Continue (N=70)	9	12.9	6	8.6	6	8.6	9	12.9	40	57.1	70	100

Table 2 presents data on energy and protein intake at both levels of basic education and advanced education. Energy very deficit in basic education reached 59.5% while in advanced education it reached 35.7%.

**Table 3. An overview of parenting, knowledge and practice of breastfeeding, in infants under the age of parents**

Parenting	Excellent		Good		Total	
	N	%	n	%	n	%
Basic (N=79)	34	43.0	45	57.0	79	100
Continue (N=70)	24	34.3	46	65.7	70	100
Knowledge of breastfeeding	Excellent		Good		Total	
	N	%	n	%	n	%
Basic (N=79)	15	19.0	64	81.0	79	100
Continue (N=70)	24	34.3	46	65.7	70	100
Breastfeeding Practice	Excellent		Good		Total	
	N	%	n	%	n	%
Basic (N=79)	29	36.7	50	63.3	79	100
Continue (N=70)	19.0	27.1	51	72.9	70	100

Table 3 presents data on parenting, knowledge and practice of breastfeeding for children for both the basic education and further education groups. Good parenting in basic education is 43% while in advanced education it is 34.3%.

**Table 4. Relationship between parenting, knowledge and practice of breastfeeding, with index Body Weight for Age (WAZ) toddlers based on the level of education of parents**

Educational Levels	Value Median		Median WAZ	p-value
Basic	Parenting	66.7	-1.7	0.043 (-0.228)
	Knowledge	54.5		0.475
	Practices	50.0		0.908
Continue	Parenting	66.7	-1.465	0.417
	Knowledge	54.5		0.414
	Practices	40.0		0.122

The results of statistical analysis of the correlation of basic education with parenting, knowledge, and practice of breastfeeding, based on the nutritional status (WAZ) in the basic education group found a negative correlation for parenting ( $p = 0.043$ ) but no correlation with knowledge and practice ( $p > 0.05$ ).

**Table 5. Relationship between parenting, knowledge and practice of breastfeeding, by Height for Age (HAZ) index of toddlers based on the level of education of parents**

Educational Levels	Value Median		Median HAZ	p-value
Basic	Parenting	66.7	-1.7	0.3
	Knowledge	54.5		0.057 (0.215)
	Practice	50.0		0.306
Continue	Parenting	66.7	-1.6	0.026 (-0.267)
	Knowledge	54.5		0.483
	Practice	40.0		0.277

The results of statistical analysis of the correlation of basic education with parenting, knowledge, and practice of breastfeeding, based on nutritional status (HAZ) were in further education found a negative correlation for parenting ( $p = 0.026$ ) but there was no correlation with knowledge and practice ( $p > 0.05$ ) specifically for further education groups

**Table 6. Relationship between parenting, knowledge and practice of breastfeeding, with WHZ index of infants based on the level of education of parents**

Educational Level	Median		Median WHZ	p-value
Basic	Parenting	66.7	-1.1	0.091
	Knowledge	54.5		0.120
	Practices	50.0		0.293
Continue	Parenting	66.7	-1.0	0.857
	Knowledge	54.5		0.657
	Practices	40.0		0.693

The results of the statistical analysis of the correlation of basic education with parenting, knowledge, and practice of breastfeeding, based on the nutritional status (WHZ) in basic education, found no positive correlation to parenting ( $p = 0.091$ ), knowledge ( $p = 0.120$ ) and breastfeeding practice ( $p = 0.293$ ).

### Discussion

Maternal education is directly related to parenting style feeding, care, treatment and personal hygiene.<sup>1</sup> Mothers were known as the main caregivers of children for the composition of roles in Indonesian society in general. Indonesian people, especially urban areas, have applied the concept of gender equality in households. Based on this view, this time the discussion highlighted the point of view of basic education and continue education as the main domain. The main domain to find the point of difference in effects based on nutritional status in all three indexes WAZ, HAZ and WHZ.

This study were found the percentage of malnourished children and combined malnutrition were both basic education group than in continue education group. These results provide shown that children’s opportunities for malnutrition were greater in children whose parents (mothers) have basic education. The parental education is an investment in improving sustainable nutrition in rural communities based on nutritional status at WAZ.<sup>8</sup>

Correlation analysis between parenting and nutritional status of children according to WAZ indicators were significant ( $p = 0.043$ ). This fact that for mothers who have basic education, namely education up to a maximum of 9 years, the actual body weight of a child is influenced by the mother’s education. Especially for basic education in Indonesia, it is divided into two groups, namely the age group of 6-12 years, and the age group 13-16 years, with a duration of 9 years of education. If the mother is only able to complete

education in a group of 6-12 years, then she has the opportunity to work outside the house is limited. If the mother has an education group of 13-16 years, then the opportunity to work outside the home is greater, even if only as an operator worker at small industries. This social phenomenon has an impact on the pattern of mother's care for their children. The value of parenting patterns will be better at a lower level than the higher ones, which is why in this study negative correlation values were found. Whereas specifically parenting knowledge and practice remains a positive and insignificant correlation.

The phenomenon of parenting in the basic education group is different from the continue education group in this study. In the continue education group a positive correlation was found in parenting with BBU nutritional status. The higher the mother's education, the better the parenting style for her child. The upbringing pattern for the mother is further educated, even though she works outside the home but is good, because her education causes her to be able to provide better child care costs, so that the quality and quantity of nutrition is better.

The results found in the above data are consistent with the HAZ indicator. It was found that the percentage of children who were short was higher in the group of children from mothers who had basic education compared to advanced education. Various research reports report that educational factors are strong variables that influence the child's height status. Height is even a good predictor for children's social future. The reported academic potential and economic potential are positively correlated with the education status of both parents. In various countries with low literacy in nutrition science theoretically they will also have low nutritional status. The concept of education as an investment in improving nutrition is found to be positively correlated.<sup>9</sup> Other research has been found that has a strong influence on community nutrition improvement strategies, measurable prevention focus.<sup>10-12</sup>

The next fact that is different based on the WHZ index, it is also found that children whose mothers were only basic education have a higher percentage of children who are thin and very thin compared to children from the advanced education group. The three differences above seem to be very strong reasons that educational factors should be analyzed further towards nutritional status.

Before discussing that, it was also found that the energy and protein intake (Table 2) in the two groups

also tended to be different. This difference can be seen from the percentage of energy deficit children in the group of children from basic educated mothers compared to advanced education. This proves that there are direct factors that cause children different nutritional status in both groups, namely energy and protein intake which is also lower in basic education than education.

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**Conflicts of Interest:** There are no conflicts of interest.

**Ethical Clearance:** No: 297/KEPK-PTKMKS/IV/2019.

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# The Correlation Between Social Support and Mental Health among Mothers of Children with Autism Spectrum Disorder

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## Abstract

**Background:** The challenges faced by mothers during caring for children with ASD are a risk factor for maternal mental health problems. One effort to maintain the mental health of the mothers who have children with ASD is to ensure the availability of social support.

**Aim:** The aim of this study is to determine the correlation between social support and mental health among mothers of children with ASD.

**Method:** This was a descriptive study with a cross-sectional approach. Eighty (80) mothers of children with ASD were selected as the respondents in this study using purposive sampling method. Bantul and Kulon Progo Regencies were chosen as the research locations. The Multidimensional Scale of Perceived Social Support (MSPSS) and General Health Questionnaire-12 (GHQ-12) were used to measure the social support and maternal mental health. The Spearman test was used to see the correlation between social support and maternal mental health problems.

**Results:** The results show that social support and maternal mental health problems have a significant correlation ( $p=0.03$ ;  $r=-0.23$ ). The univariate test shows that 44% of mothers of children with ASD indicate psychological disorders.

**Conclusion:** There is a correlation between social support and mental health among mothers of children with ASD.

**Keywords:** *Autism Spectrum Disorders (ASD), social support, mental health problems.*

## Introduction

Children with Autism Spectrum Disorder (ASD) have higher behavioral problems than other children. The behavioral problems are hyperactiveness, emotional symptoms, and problems with conduct.<sup>1</sup> A previous research shows that parents of children with ASD

experience higher levels of stress than those of children with other disabilities. This is caused by the unique challenges of caring for children with ASD, who show unpredictable behavior, no interest in an affectional bond, and indifferent attitudes.<sup>2</sup> Meanwhile, caring for children with ASD is a form of long-term commitment that requires responsibility and readiness in facing challenges that increase along with the increasing age of the children.<sup>3</sup>

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Challenges faced by mothers in parenting children with ASD can lead to maternal mental health problems. Mothers of children with ASD have a greater risk of having mental health problems than those of children without a diagnosis of ASD.<sup>4</sup> Estes & Munson (2009) reported that mothers of children with ASD show a



higher parenting stress level than those with children having problems of developmental delay without ASD.<sup>5</sup> Totsika et al. (2011) added that behavioral problems among ASD children are associated with the increasing emotional problems of their mothers.<sup>1</sup> Research by Jose et al., (2017) reported that 76.8% of mothers of children with ASD were depressed, and as many as 60% of them had mild to moderate levels of depression.<sup>6</sup>

JX et al. (2017) stated that the lack of social support for parents of children with ASD will result in mental health problems.<sup>7</sup> Social support is the availability of social networks providing psychological and material resources that can increase an individual's ability to deal with stress (Cohen, 2004).<sup>8</sup> Psychological problems are found to be higher in caregivers of children with disabilities with low social support as stated by Yamaoka et al. (2015).<sup>9</sup>

Based on the statistics of special schools (SLB) issued by the Ministry of Education and Culture (2016), Bantul Regency is one of the districts in Yogyakarta with a large number of children with ASD.<sup>10</sup> Meanwhile, Kulon Progo Regency has an Autism Center (PLA) as one of the therapy centers for children with ASD in the Special Province of Yogyakarta (DIY). The purpose of this study is to determine the correlation between social support and the mental health of mothers who have children with ASD.

## Material and Method

**Research Design and Sample:** This research was a cross-sectional study. It was conducted at Special Schools in Bantul Regency and Autism Center in Kulon Progo in July-September 2018. Eighty mothers of ASD children were selected using purposive sampling method to be the respondents in this study. The inclusion criteria in this study were: (1) mothers of children with ASD (The diagnosis was performed by a pediatrician or clinical psychologist of child development), (2) mothers who lived with a child with ASD and had the main parenting role to help meet the child's primary needs for the past 1 year, and (3) mothers who were willing to become respondents. The exclusion criteria in this study were: (1) mothers of children with ASD accompanied with other disabilities, such as intellectual disabilities, blindness, speechlessness, and deafness, (2) mothers of children with ASD who had a deceased family member in the past month, and (3) mothers who had other children with disabilities.

**Research Instruments:** The Multidimensional Scale of Perceived Social Support (MSPSS) and General Health Questionnaire-12 (GHQ-12) were used to measure social support received by mothers of children with ASD and mental health of mothers of children with ASD. MSPSS was developed by Zimet (1988) containing sources of social support received by mothers in 6 scales.<sup>11</sup> Sources of social support come from family, friends, and someone special when needed. Trifilia (2013) has modified the MSPSS into 4 scales, namely (1) strongly disagree, (2) disagree, (3) agree, (4) strongly agree.<sup>12</sup> The validity and reliability test of the 4 scale of the MSPSS is in the range 0.266-0.617, and the reliability coefficient value is 0.832.<sup>13</sup>

The General Health Questionnaire (GHQ-12) was used to measure the maternal mental health. This instrument was first developed by Goldberg (1970) which consisted of 60 questions.<sup>13</sup> In its development, this questionnaire has been modified several times, namely, version 30, 28, and 12. The GHQ-12 questionnaire focuses on two domains, namely psychological distress and social dysfunction. The mental health questionnaire used in this study was the GHQ-12 questionnaire that had been adapted by Primasari and Hidayat (2016).<sup>14</sup> This questionnaire used Likert scale ranging from 0 (better than usual) to 3 (extremely worse than usual) so that the total scores for this questionnaire were in the range 0-36. The higher the scores, the higher the mental health problems experienced by the mothers. The construct validity test of the GHQ-12 shows that all items in this questionnaire are valid. The results of the reliability test using Cronbach Alpha were in the range 0.670-0.776 with a sensitivity value of 67.80 and a specificity value of 74.75.

**Ethical Considerations:** This research has met the requirements of ethical eligibility from the Ethics Commission of the Faculty of Medicine, Public Health and Nursing (FK-KMK) of UGM (ethic number: KE/FK/0571/EC/2018).

**Data Analysis:** A descriptive statistical analysis was used to determine the description and classification of social support and mental health of the mothers. The social support was classified into 2 categories, namely high social support (36.46) and low social support (<36.46). Furthermore, the maternal mental health problems were grouped into 2 categories, namely without psychological disorders (<10) and with psychological disorders (10). Since the data were not normally distributed ( $p < 0.05$ ),

the Spearman test was used to find out the correlation between the social support and maternal mental health problems.

**Finding:**

**1. The Demographic Characteristics of the Respondents:** The respondents in this study are mothers of children with ASD at SLBs and PLA in Bantul and Kulon Progo Regency. The basic characteristics of the subjects of the research are descriptively presented in Table 1.

**Table 1. Characteristic of Mother of ASD Children (n=80)**

Characteristic	f (%)	Mean±SD
<b>Mothers</b>		
<b>Educational background</b>		
Low	60(75)	
High	20(25)	
<b>Mother's Income</b>		
Low	36(45)	
Adequate	44(55)	
<b>Mother's occupation</b>		
Housewife	52(65)	
Working	28	
Mother's age		40.41±8.14
<b>Marriage Status</b>		
Married and lived together	75(93,75)	
Married and Lived Separately	1(1,25)	
Single parent	4(5)	

Most mothers of children with ASD are married and have a high school diploma. The results show that the

ratio of male and female children with ASD is 1 to 3.70 (table 2).

**Table 2. Characteristic of Children with (n=80)**

Child's Characteristic	f (%)	Mean±SD
<b>Sex</b>		
Male	63(79)	
Female	17(21)	
<b>Children's age (3 – 23 years)</b>		11.35±5.01
<b>Therapy history</b>		
Yes	72(90)	
No	8(10)	

**2. The Social Support and Mental Health:** Most mothers have received high social support, and 44% of mothers have been indicated to have psychological disorders (table 3).

**Table 3. Social Support and Mental Health in Mothers of ASD Children (n=80)**

Variable	f (%)
<b>Social Support</b>	
High	60(75)
Low	20(25)
<b>Mental Health</b>	
Without psychological disorder	45(56)
With psychological disorder	35(44)

The description of mental health shows that 47.5%, 43.8%, and 41.3% of mothers of children with ASD feel extremely bad in terms of feeling useless, unhappy, depressed, and unconfident (table 4).

**Table 4. Mental Health of Mother's of ASD (n=80)**

No	Mental Health	Better than Usual	Same than Usual	Less than Usual	Much less than usual
		f(%)	f(%)	f(%)	f(%)
1	Able to concentrate	16(20)	53(66,30)	10(12,50)	1(1,30)
2	Loss much sleep	1(1,30)	15(18,80)	42(52,50)	22(27,50)
3	Playing useful part	30(37,50)	47(58,80)	2(2,50)	1(1,30)
4	Capable of making decision	21(26,30)	52(65)	5(6,30)	1(1,30)
5	Under stress	1(1,30)	9(11,3)	42(52,50)	28(35)
6	Could not overcome difficulties	1(1,30)	8(10)	41(51,30)	30(37,50)
7	Enjoy normal activities	28(35)	46(57,50)	5(6,30)	1(1,30)
8	Face up to problems	22(27,50)	53(66,30)	4(5)	1(1,30)
9	Feeling unhappy and depressed		4(5)	41(51,30)	35(43,80)
10	Losing confidence	2(2,60)	4(5)	41(51,30)	33(41,30)
11	Thinking of self as worthless	2(2,60)	8(10)	32(40)	38(47,50)
12	Feeling reasonably happy	36(45)	42(52,50)	2(2,50)	

**3. The Correlation between Social Support and Mental Health Problems:** The results show that there is a significant correlation between social support and mental health of mothers of children with ASD ( $p=0.03$ ;  $r=-0.23$ ). The results show a negative correlation and this show that the higher the social support received by mothers, the lower the mental health problems of the mothers.

### Discussion

In this study, the majority of the respondents are married couples and stay at the same house. This condition provides the availability of social support from someone special in life, family, and friends. The availability of social support is one factor that contributes to adaptability.<sup>15</sup> On the contrary, a research with different social support instruments conducted by Obeid and Daou (2015) shows that the perception of mothers of children with ASD on the social support is lower than those of children without developmental problems.<sup>16</sup> Costa et al., (2017) also said that parents of children with ASD have worse mental health than those of children without developmental problems.<sup>17</sup>

Behavioral problems among children with ASD will affect the mental health and the ability of parents to overcome those difficulties.<sup>18</sup> Mental health is important for the individual's development and adaptation processes.<sup>8</sup> Regarding mental health among mothers of children with ASD, the majority of the respondents in this study have no indication of psychological disorders. These results are consonant with a previous study by Zablotsky et al., (2013).<sup>4</sup> They reported that the majority of mothers of children with ASD had good mental health. Vasilopoulou and Nisbet (2016) explained that mental health problems were not found among parents of children with ASD.<sup>19</sup> This is because the increasing spiritual values among parents of children with ASD have helped parents overcome their emotional stress in parenting children with ASD. Different results were found in a study by Jose et al., (2016).<sup>6</sup> The findings showed that 76.8% of mothers of children with ASD were depressed. Costa et al., (2017) also said that parents of children with ASD had worse mental health than those of children without developmental problems.<sup>19</sup> This might be because of the big difference in the size of samples used in the study. Meanwhile, another study with different respondents has found that almost half of the caregivers of children with disabilities have mental health problems.<sup>9</sup>

The analysis show that clinically, there is a significant difference between social support in the group of those with no indication of psychological disorders with that found in the group of those with the indication of psychological disorders. Social support from spouses, families, and close friends for mothers of children with ASD may play a role in maintaining the mental health of mothers of children with ASD. Social support obtained from the environment has a role in maintaining the mental health of mothers of children with ASD.<sup>4</sup> The social support received helps mothers of children with ASD focus on positive aspects, not solely on the difficulties faced while parenting.<sup>20</sup>

Another previous research has explained that social support from families is associated with the increasing optimism, positive feelings, satisfaction with life, and mental health among mothers of children with ASD.<sup>21</sup> Meanwhile, Hsiao (2016) explained that the more social support from neighbors obtained by parents of children with ASD, the better the mental health of parents of children with ASD.<sup>22</sup> A similar research from Zalbotsky et al., (2013) also shows that mothers of children with ASD who have poor mental health are those who lack the sources of emotional and social support from the environment.<sup>4</sup>

Similar results with different respondents have also been found in a study by Yamaoka et al. (2015).<sup>9</sup> The results show that caregivers of children with disabilities who have mental health problems are those lacking the sources of social support. Johnson et al., (2011) reported that parents of children with ASD thought that it was not the behavioral problems of children with ASD that mainly affected their mental health but personal and family problems.<sup>23</sup> Different results have been found in a study by Obeid and Daou (2015). The results show that social support is not correlated with mental health of mothers of children with ASD. This may be influenced by the different number of samples and different social support questionnaires used. Therefore, the availability of social support for mothers of children with ASD is one of the factors that needs to be considered in maintaining and caring for the mental health of mothers of children with ASD.

### Conclusion

Social support in the form of social emotional support received by mothers of children with ASD show a correlation with their mental health condition. This

research encourages health workers to concern with the provision of social support to optimize the mental health of mothers of children with ASD.

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# **An Evaluation of Epidemiological Surveillance of Transport Equipment for A Prevention Strategy of Quarantinable Diseases and Pandemic Potential Diseases in the Health Office of First Class Port of Surabaya in the Working Area of Tanjung Perak Port of 2018**

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## **Abstract**

The Epidemiology Surveillance Section has the responsibility for planning, monitoring, evaluating, compiling reports, and coordinating the implementation of epidemiological surveillance of diseases, pandemic potential diseases, new emerging diseases, and re-emerging diseases. One of its programs is Transport Equipment Surveillance. This study is an evaluative descriptive research, conducted in the Port Health Office I of Surabaya in Tanjung Perak Port, Surabaya. This study used total population sampling, with the population of 5 officers of the transport equipment surveillance program. The problem identification of the input found four problems, namely officer compliance in using protective equipment, limited number of officers for local vessels inspection, no printed media for PPE use promotion, the absence of Quarantine Speed Boat facilities for middle sea boarding, and the lack of health communication effort and health promotion media. The top priority problem found in Epidemiological Surveillance of Transport Equipment was the compliance of officers in using Personal Protective Equipment (PPE) and the limited number of officers for local vessels inspection. The analysis result found that the problem were the absence of media, promoting the use of PPE in accordance with Law No. 1 of 1970 and the inconsistency of recruitment policies towards the Minister of Health Decree No. 1116 of 2003. The suggested alternative solutions were supervision and procurement of poster media which promote the use of PPE and opening recruitment for temporary workers to become technical personnel for local vessels inspection.

**Keywords:** *Epidemiological surveillance, transport equipment, prevention, quarantinable diseases, pandemic potential diseases.*

## **Introduction**

The Port Health Office (PHO) is a technical implementation unit within the Ministry of Health that is under and is responsible to the Director General of

Disease Control and Environmental Health. PHO is responsible for preventing and inhibiting the diseases to and from overseas, preventing the potential outbreaks, epidemiological surveillance, quarantine, controlling the impact of environmental health, health services and securing new emerging diseases and re-emerging diseases. One of Divisions in the Port Health Office I of Perak Surabaya is the QCES (Quarantine Control and Epidemiological Surveillance)<sup>(5)</sup>. Under this division is the Epidemiology Surveillance Section, which is responsible for planning, monitoring, evaluating, compiling reports, and coordinating the implementation of epidemiological surveillance of diseases, pandemic potential diseases, new emerging diseases and re-

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emerging diseases, and maintaining national and international epidemiological surveillance networks. It is responsible for alertness, assessment, advocacy, and outbreaks management, and disasters and post-disaster management in the health sector with one of its work programs called Transport Equipment Surveillance.

Sanitation in this case is related to the prevention of quarantine diseases and pandemic potential diseases in the PHO. Vessel sanitation is applied to all types of vessels, vessels originating from within and outside the country, and all ship passengers.

Vessels sanitation inspection is intended to certify the vessel health. A sanitation certificate will be issued after the inspection. This certificate is used to obtain Sailing Health Permit (SHP). Two different certificates will be issued after the certification process based on the level of the risk each vessel poses. An SSCC (Ship Sanitation Control Certificate) will be issued for vessels with the inspection result of high risk and an SSCEC (Ship Sanitation Exemption Control Certificate) will be issued for ones with low risk. The examination process is carried out within six months (WHO (2007)<sup>(4)</sup>.

## Material and Method

This study is an evaluative descriptive research. It systematically, factually and accurately describes the phenomenon or the correlation between two studied phenomena<sup>(3)</sup>. Its approach is an evaluation approach, which aims to collect data from policy implementation. It was conducted in the Port Health Office Class I of Surabaya in Tanjung Perak Port, Surabaya. This study used total population sampling, with the population of 5 officers of the transport equipment surveillance program.

Data were collected using two kinds of data, primary and secondary. Primary data was collected using interview to health workers and patients and direct observation on the activities of all officers in Quarantine Control and Epidemiological Surveillance (QCES) in PHO Class I in the working area of Tanjung Perak Port, Surabaya.

**Findings:** The Port Health Office (KKP) has the duty to prevent pandemic potential diseases and outbreaks, epidemiological surveillance, quarantine, safeguarding new emerging diseases and re-emerging diseases. One of the prevention efforts is the issuance of the Certificate of Pratique (CP) and Port Health Quarantine Clearance (PHQC)<sup>(4)</sup>.

The disease threat that arises as a result of increasing global transportation technology is New Emerging Infectious Diseases from other countries. Diseases that have the potential to enter Indonesia include Hanta fever, EBOLA, HFMD, Paragoniasis Pulmonalis, legionnaire's disease, SARS, Avian Influenza, and Nipah Virus.

Some of diseases are in the category of can be overcome. The Law No.1 of 1962 concerning Sea Quarantine and the Law No. 2 of 1962 concerning Air Quarantine only focus on the incoming prevention of 6 quarantine diseases, which later became 3 diseases (PES, Yellow Fever and cholera), not all of quarantine diseases could be overcome<sup>(10) (11)</sup>. Since the enactment of the Revised IHR in 2005, the law has become more irrelevant both in terms of management and law enforcement for violators<sup>(9)</sup>.

Described below is the result of direct observation, document study, and separate interview with the holders of ES of Transport Equipment Program in PHO Class I Surabaya using system approach, consisting of input, process and output. To determine the problem, separate interview was conducted with 5 informants.

Data collection and vessel data recording were carried out by 4 guard officers with two of them are from QCSE section officers while the monthly analysis was carried out by holders of the ES of Transport Equipment program. Field checks, one of the activities of collecting data on Transport Equipment ES and also called boarding activities, was carried out by 4 officers consisting of 1 team leader and doctor, 1 epidemiologist, 1 from the field of Environmental Risk Control and 1 as a member with a flexible role. Each has a specific role in carrying out Epidemiology Surveillance of Transport Equipment in the field. However, in term of human resources, this office (PHO Class I Surabaya) still requires more health workers. From the observation, most workers did not use PPE, especially safety shoes, masks, and gloves.

From the observations in the field, officers or Boarding team members have used personal protective equipment (PPE), in the form of safety helmets, safety shoes, vests and masks. However, sometimes, some officers do not wear masks while boarding to the vessels and the limited number of safety helmet and buoy becomes a barrier to the ship inspection process.

Transportation equipment is available in the form of car boarding so that the team can easily reach the port

location. However, due to the absence of Quarantine Speed Boat facilities, the office needs to rent boats in advance for boarding process in the middle of the sea. For documentation, officers used cellphone camera. The office has 4 computers for ship service, namely computer billing for billing input by agents and 3 operational computers. There were also adequate internet facilities, 2 printer machines and an ATM machine, which is used to print documents along with payment proof for ship administration. There were also printed media in the form of posters showing flowchart of the issuance of health ship letters such as Free Pratique, SSCEC and SSCC, but there is no printed media regarding the obligation to use PPE for officers.

The time needed for a single inspection for overseas vessels is approximately 30 minutes. However, if there is a risk factor for PHEIC, the ship must be quarantined. If it has been proven to be suspected of disease, quarantine and isolation will be carried out for two incubation times. Time for data collection and issuance of domestic ship sailing licenses was approximately 10 minutes for filling online and offline data. It can take longer if the system is experiencing interference.

The team has used the latest technology to facilitate the data collection and administration of Transport Equipment Epidemiological Surveillance, for examples online coordination. The used car boarding transportation is the modern one and is adequate for 5 people. Manual data recap used Microsoft Excel. The documentation tools are quite practical. The testing of samples in the laboratory has also used sophisticated technology where serological tests were carried out at the Surabaya BBKL Laboratory.

Information regarding the arrival of overseas vessels had already been notified by the agent through a notification letter on the arrival of the ship, so that the guard officer could prepare to take a health action check. The manual report on the recapitulation of ship traffic data (using Ms. Excel) is analyzed and presented in the form of monthly written and digital reports, which are input into the SIMKESPEL website and reported monthly to the main office. Every month, online data recapitulation through SIMKESPEL is also conducted so that document concordance can be easily checked, compared with the manual data recaps. The reported data is then disseminated to internal parties (Juanda Port Health Office) and external parties, cross-sector parties, such as the health staff, PT Pelindo, and others.

For the health ranks, this information will form the basis for PHEIC control decision making, planning and program evaluation. The shortcomings in the output process are the absence of reports on the results of the SE Transport Analysis in a period of 1 year so that there is no comparison of performance and findings in the unit of years of performance. These methods met the standards set in the standard operational procedure of Ship Traffic Monitoring Procedure.

The problem identification for the input found 4 problems, namely officer compliance in using Personal Protective Equipment (helmets, masks, gloves and buoys), the limited number of officers for local ships inspection, which makes the inspection is prioritized for foreign ships, no printed media for officers persuading them to use PPE, the absence of Quarantine Speed Boat facilities for boarding purposes in the middle of the sea, and lack of health communication efforts and health promotion media in monitoring ship health and cleanliness.

All stages of surveillance have been carried out by the team, including the implementation of health supervision, the issuance of health documents of vessels arriving and departing from Tanjung Perak Port of Surabaya, conducting analysis which includes calculating the number of vessels and ports of origin and portraying the characteristics of the vessels and its crew, which is proven by the existence of a quick report on the results of the ES of Transport Equipment. In its effort for health communication to the agents, captains and vessel crews, it faced constraints, limited time and no media for promoting ship health.

The determination of problem priority level is used to measure the priority scale of the problem and conclude the problem in the ES of Transport Equipment program. To determine the priority and the problem, the method of ultrasound (Urgency, Seriousness, and Growth) was employed using both quantitative and qualitative approach. The measurements process found that there were 2 top priority problems in the ES of Transport Equipment program, the officer compliance in using personal protective equipment such as helmets, masks, gloves and buoys and the limited number of human resources for local vessel inspection. As the result, checking process was more prioritized for overseas vessels than local ones. After that, problem tree was used (as quantitative results) to analysis the causes of low worker compliance in using PPE. From



the tree problem, it can be seen that there were direct and indirect factors affecting the officer compliance in using Personal Protective Equipment<sup>(1)</sup>. The primary causes were internal and external factors, while the secondary factors were education, knowledge, working years, environmental factors, media, the availability of PPE and supervision of the use of PPE (Sudarmo, Zairin Noor Helmi, 2016)<sup>(7)</sup>.

Article 14 of Law No. 1 of 1970 concerning Occupational Safety stated that there is a need for media in the form of work safety images, work safety requirements and information of law. Those should be displayed in a strategic place, so that workers can continuously read and keep the information in their mind, especially in the preparation process of ship boarding<sup>(12)</sup>. Regular supervision in the use of PPE is certainly needed. In addition, there is also a need to establish policies that obligate workers to use PPE so as to create a safe atmosphere and avoid work risks.

Problem tree was also used, as quantitative results, to analysis the causes of HR-related problems. There were direct and indirect factors in the the problem of limited human resources for local vessels inspection. The primary factor is the recruitment policy for health workers, while the secondary factor is employee qualifications and quota s et by the policies. However, there are also tertiary influencing factors. They are test results, experience, education level, short-term<sup>(8)</sup> quotas and long-term quotas<sup>(6)</sup>.

According to Minister of Health Decree number 1116 concerning Guidelines for the Implementation of Health Epidemiology Surveillance System, in the Health Epidemiology Surveillance System indicator, the required minimum numbers of HR employees and level education for employees in techinal implementation unit of Health Ministry are 2 expert epidemiologist (master degree), 4 expert epidemiologist (undergraduate), 4 skilled epidemiologist and 1 general practitioner<sup>(2)</sup>.

However, at the Health Office of Tanjung Perak Port Class I, the available human resources, especially in the QCES sub-field, are 1 expert epidemiologist (master), 4 expert epidemiology workers (undergraduate) and a general practitioner. So that, it can be concluded that this office have less human resources than the standard s et by the Ministry of Health. As an alternative solution, it is recommended for the office to recruit temporary workers to cover the shortage of skilled epidemiological

workers. The recruits can be assigned as the technical inspectors of local vessel and to maintain coordination and communication with the head office of Juanda PHO in the event of urgency.

## Conclusion

The Port Health Office (PHO) is a technical implementation unit within the Ministry of Health. It is responsible for preventing disease circulation, pandemic potential diseases and epidemiological surveillance. The top priority problem found in Epidemiological Surveillance of Transport Equipment was the compliance of officers in using Personal Protective Equipment (PPE) and the limited number of officers for local vessels inspection. The analysis result found that the problem were the absence of media, promoting the use of PPE in accordance with Law No. 1 of 1970 and the inconsistency of recruitment policies towards the Minister of Health Decree No. 1116 of 2003. The suggested alternative solutions were supervision and procurement of poster media which promote the use of PPE and opening recruitment for temporary worker to become technical personnel for local vessels inspection.

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# Does Vertigo Predict Hypertension in Cervical Spondylosis: Clinical Trail Study

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## Abstract

**Background:** Both cervical spondylosis and hypertension are common medical conditions. That is whether spondylosis leads to hypertension and whether vertigo could predict hypertension is not clear.

**Objective:** To identify the relationship between cervical spondylosis & systemic hypertension through identification of probable predictors .

**Patient and Method:** All patients were seen in Al Mowasat outpatient clinic from January 2017 to August 2019 with symptomatic cervical spondylosis .All of them were evaluated for presence of hypertension along with signs and symptoms of cervical spondylosis. Diagnosis of cervical spondylosis was based on clinical criteria and radiological findings.

**Result:** A total of 50 patients(31 males and 19 females) were studied. Hypertension was ascertained in 29(58%). Common signs and symptoms of cervical spondylosis were evaluated including headache in 89.4%, vertigo in 83.7%, chest pain in 55%, shoulder pain in 61.9%, numbness in 65.1%, abnormal reflexes in 44.7%, Babiniski sign in 17% and Body Mass Index  $\geq 30$  in 60.4%). Logistic regression analysis indicated that vertigo is significant independent predictor of hypertension in cervical spondylosis patients.

**Conclusions:** Vertigo was a predictor of hypertension in spondylosis patients.

**Keywords:** *Cervical Spondylosis, Hypertension, Vertigo.*

## Introduction

Cervical spondylosis is a degenerative disease affects intervertebral disc at different levels with osteophytes formation.<sup>1</sup> Symptoms of cervical spondylosis are variable including headache, numbness, weakness of extremities<sup>1</sup> and others but vertigo is most common symptom.<sup>2</sup> Surprisingly cervical spondylosis common among patients complaining of vertigo. <sup>2</sup> but the links between the two conditions are unclear. The disease is

age related disorder increasing with age where it is about 13%, 34%, 58% in the fifth, sixth, and seventh decades in that order<sup>3</sup>, yet many individuals above 30 years, show significant abnormalities on plain x ray<sup>4</sup>. Hypertension is common worldwide problem<sup>5</sup>

About 95% of hypertensive patients have no identifiable causes<sup>5</sup> obesity is one of common cause of secondary hypertension<sup>6</sup>

Hypertension is often asymptomatic<sup>5</sup>, the overall prevalence of hypertension in nearby cities or countries is around 26.5%<sup>7</sup>, 10%<sup>8</sup>, 10.3%<sup>9</sup> and 22%<sup>10</sup> in ThiQar (north of Basrah city), Saudi Arabia, Kuwait & Iran respectively.

The aim of this study is to evaluate the association between cervical spondylosis and systemic hypertension through probable mediators such as vertigo.

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**Patients and Method**

This was a cross-sectional study carried out in one major private hospital in Basrah city (Al Mowasat hospital) lasted for twenty months. Patients who met the criteria of having cervical spondylosis both clinically and radiological were included in the study. The study started from January 2018 until August 2019. Diagnosis of cervical spondylosis depended on radiological changes on cervical x-ray and signs and symptoms. Each patient was analyzed for symptoms of cervical spondylosis which including headache, vertigo, numbness shoulder pain, chest pain plus signs like abnormal tendon reflexes, Babinski sign, Lhermitte’s sign. Both compression and traction tests were elicited. Body mass index was evaluated at same time. For each patient, blood pressure was measured with mercurial sphygmomanometer after patients waited for at least five minutes prior to each record. Recorded blood pressure often needed two separated occasions.

Hypertension was defined as blood Pressure  $\geq 140/90$  mmHg<sup>5</sup> or patients on anti-hypertensive medication. Vertigo was defined as rotatory movement either bodily or environmental or according to clinical examination.

Compression tests were performed either by axial compression on the head with neutral head position or rotational movement on extended head, symptoms made worse by these movement indicated a positive test<sup>11</sup> traction test provoked by head traction, symptoms relief signified a positive test<sup>11</sup> diabetes mellitus diagnosed by history of diabetes mellitus, the use of insulin or other hypoglycemic agents or measurement of fasting blood sugar  $\geq 126$ mg/dl or random blood sugar  $\geq 200$ mg/dl.

Body Mass Index (BMI) is the value derived from weight and height as Weight in kg/Height in M<sup>2</sup>). Underweight patients, considered when BMI under 18,5 kg/M<sup>2</sup> while BMI between 18,5 kg/M<sup>2</sup> to 24.9 kg/M<sup>2</sup>

considered as normal, Overweight patients considered when BMI is 25 to 29.9 & BMI  $\geq 30$  is indicating obesity.

Babinski sign defined as dorsiflexion of big toe or fanning of the other toes upon stimulation of lateral planter aspect of the foot<sup>12</sup>

Lhermitte’s sign is a sense of electric shock in extremities provoked by neck flexion<sup>13</sup> radiological finding of cervical spondylosis are including narrowing disc space & marginal osteophytes<sup>14</sup>, opinion of radiologist was obtained in controversial instances.

SPSS version 21 was used, Chi-square with significant value of  $< 0.05$  adapted to assess the predictors of hypertension in cervical spondylosis. In addition logistic regression analysis was used to identify significant predictors of hypertension of the 50 patients with cervical spondylosis, 31 (62%) patients were males, and 19 (38%) were females, thus the male to female ratio was 1.6:1. The mean age was  $51.2 \pm 10.1$  years with a range of 32-72 years.

The hypertensive patients were distributed as 29 males and 9 females. The majority of patients complained of headache which was observed in 42 (89.4%). Others symptoms with relatively higher frequency were vertigo seen in 36 (83.7%). Numbness was seen in 28 (65.1%)

While Chest pain was seen in 22 (55%). BMI analysis showed that Obesity was prevalent in 29 (60.4%).

Evaluations of signs concerning cervical spondylosis were shown also. Abnormal reflexes were observed in 17 (44.7%), Lhermitte’s sign observed in 13 patients, Babinski sign elicited in 7 patients (17%). Diabetes was ascertained in 9 patients.

Logistic regression analysis to predict hypertension shows that only vertigo is independent and significant predictor of hypertension with p value of 0.026 (Table 1).

**Table 1: Logistic regression analysis predicting the hypertension in Cervical spondylosis**

Variable	B	S.E.	WALD	DF	SIG	EXP (B)
Sex	1.027	1.748	.345	1	0.557	2.793
Headache	3.183	2.485	1.640	1	0.200	24.108
Vertigo	3.985	1.791	4.949	1	0.026	53.768
Numbness	-1.967-	2.688	.535	1	0.464	.140
Age	.167	.106	2.492	1	0.114	1.181
Lhermitte’s sign	.021	1.398	.000	1	0.988	1.021
BMI	2.673	1.539	3.014	1	0.083	14.479
Shoulder pain	-1.101-	1.566	.494	1	0.482	.333
Constant	-20.990-	11.848	3.139	1	0.076	.000

## Discussion

The correlation between cervical spondylosis and hypertension had been studied since few decades in different aspects.

50 years ago Al Badran et al, reported that headache in hypertensive patients if not relieved by reduction of elevated blood pressure, is likely attributable to cervical spondylosis<sup>15</sup>

Liu & Ploumis in study published in 2012 reported that cervical spondylosis could be a possible cause of hypertension, they found more than one third of hypertensive patients are no longer need antihypertensive medicine after decompressive cervical surgery and created a term cervicogenic hypertension<sup>16</sup>

A Chinese study<sup>17</sup> by Peng B et al (2015) described some association between hypertension and cervical spondylosis, they found also that surgical treatment of cervical spondylosis had successfully controlled hypertension, This study was, however, with limited number of patients(two patients only) but, interestingly they reported important point, which is,surgical decompression of degenerative disc that contributing to cervical spondylosis is relieving hypertension as well as vertigo. In these two patients.

Our observations showed vertigo is independent predictor for hypertension .but vertigo is commonly seen in patients with cervical spondylosis<sup>2</sup>. On the other hand, studies of vertigo in hypertensive patients did not indicate that elevated blood pressure was causing vertigo,(but if existed together) it commonly attributable to other concomitant causes like central nervous system or vestibular diseases.<sup>18</sup>

MarchioriL,et al found that incidence of vertigo in hypertensive and non hypertensive patients were similar and concluded that no correlation of vertigo with hypertension could be ascertained.<sup>19</sup> In the present study and according to the logistic regression analysis to predict hypertension, vertigo was the only significant (P=0.021) and independent predictor .in spondylotic patients. Such results clearly denoted that vertigo carried significant impacts in hypertensive patients in complex mechanism need further evaluation or indeed the presence of vertigo could be accidental or possible explanations are the hypotension provoked by antihypertensive medications<sup>18</sup> or concomitant vertebrobasilar insufficiency due to atherosclerosis in hypertensive patients . It remains

plausible however to conclude that the presence of vertigo in cervical spondylosis patients strongly suggests coexistent hypertension.

## Conclusions

The presence of vertigo was strongly predict the systemic hypertension in patients with cervical spondylosis.

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# Maternal Death Model Induced Neuron Cells Apoptosis in *Rattus Norvegicus* Newborn

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## Abstract

The loss of bonding attachments to maternal deaths as a cause of neonatal stress had an impact on brain growth and development in early life. HPA axis activation responded to secrete corticotropin releasing hormone which stimulated adrenocorticotrophic hormones secretion. These hormones induced the adrenal gland cortex to secrete glucocorticoids. Excessive release of glucocorticoids would suppress BDNF expression resulting in BDNF hypofunction resulting in neuronal cell apoptosis which was characterized by an increase in neuronal cell apoptosis index. This study aimed to analyze the apoptosis index of neuron cells in the cerebrum and cerebellum of newborn *Rattus norvegicus* that were not separated from the mother until 3 days old as the control group (K1) and the cerebrum and cerebellum of newborn *Rattus norvegicus* that were separated from the mother by giving animal milk as replacement nutrition until 3 days old as a group treatment (K2). 3 *Rattus norvegicus* newborn with heaviest, medium, and lowest weights were taken from each mother then sacrificed for the brain histochemical preparations. Imonohistochemical examination was carried out to calculate the neuronal apoptosis index. The analysis results showed that the apoptotic index of neuron cells in the cerebellum and cerebrum of newborn *Rattus norvegicus* which separated from the mother were higher than those not separated from the mother.

**Keywords:** *Maternal death model, apoptosis index, neuron cells.*

## Introduction

Maternal mortality was maternal death while in pregnant or 42 days after the end of pregnancy, regardless of place or age of pregnancy.<sup>8,9,10</sup> Maternal Mortality Rate (MMR) was the number of maternal deaths during pregnancy, childbirth, and childbirth caused by pregnancy, childbirth, and childbirth, or management, and not for other reasons such as accidents or falls in every 100,000 births life.<sup>4,5,6</sup> Based on Indonesian health profile data, MMR showed 305 maternal deaths per 100,000 live births in 2015. This number had not

met Indonesia's MMR target for 2015 Millennium Development Goals (MDGs), which was 102 per live birth.<sup>4,5,6</sup>

The of maternal deaths was the direct contact loss between the baby and the mother. The loss of the baby's chance to get breast milk would dramatically affected the baby's health throughout his/her life.<sup>10</sup> Bonding attachments contributed to the baby development, such as emotions, cognition, and overall mental health. Stimulation of the baby's sensory system could directly affected brain development and stress in infants.<sup>11</sup>

Stressors at the beginning of life would caused glucocorticoid enhancement. Glucocorticoid played an important role in the BDNF regulation. Glucocorticoid function were (1) decreased activator protein-1 (AP-1) and CREB activity required in BDNF gene transcription; (2) affected the cascade of the BDNF signal via the TrkB and p75NTR receptors; (3) reduced the influx of Ca<sup>2+</sup> ions on the postsynaptic membrane; (4) inhibiting the

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signal cascade mediated by TrkB and a decrease in phospho-TrkB (pTrkB) expression; and (5) influenced the regulation of the PLC- $\gamma$  signal cascade by BDNF and inhibit the PI3K-Akt pathway thereby increasing the proapoptosis pathway of neuron cells in the brain.<sup>15,16</sup>

Physiological apoptosis played an important role in maintaining homeostasis in brain growth and development. However, apoptosis could be pathological when triggered by excessive hormonal conditions, for example in chronic stress which increased glucocorticoid levels and resulted in decreased BDNF function resulting in high neuronal cell death.<sup>15</sup> Separation of the postnatal mother from day 2-14 decreased BDNF expression in the ventral hippocampus and ventromedial prefrontal cortex. Significant reduction in BDNF expression occurred in the separation with the mother in postnatal days 3-15.<sup>11</sup>

The acceleration of neuronal apoptosis in infants would interfere with the neurons function, namely processing information in the brain and the control center. Growth and development of baby neurons disorders resulted in impaired cognitive, motor, and language development.<sup>13</sup> Based on the impact of increasing the neuron cells apoptosis index in infants as a stress response during maternal death, babies from maternal deaths needed special attention for the growth and development of their brain, especially in the first 1,000 days of life in preparation for future survival. Therefore, a study to analyze maternal mortality models that induced apoptosis of newborn *Rattus norvegicus* neuronal cells needed to be done.

## Materials and Method

This study was a true laboratory experiment with a randomized post-test only control group design study design. The study was conducted from March to May 2019 at the Experimental Animal Cage and Laboratory of the Faculty of Medicine, Airlangga University. The maternal mortality study model consisted of two groups, namely the newborn *Rattus norvegicus* which was not separated from the mother until 3 days old as the control group (K1) and the newborn *Rattus norvegicus* which was separated from the mother by giving animal milk as replacement nutrition until 3 days old as the treatment group (K2).

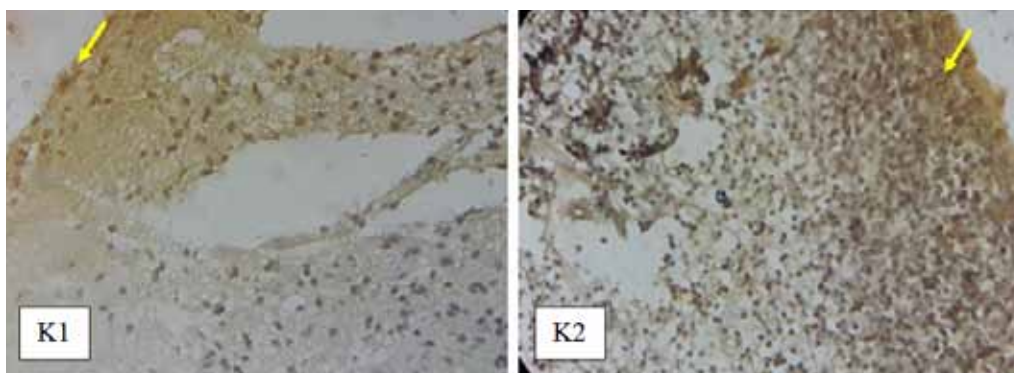
The prospective mother of *Rattus norvegicus* was impregnated through superovulation by injecting 10 IU of Pregnant mare serum gonadotropin (PMSG) hormone. 48 hours later, the prospective mother was injected with HCG 10 IU and mated by monomating. Vaginal plug examination was carried out 17 hours after monomating to ensure pregnancy. Pregnant female *Rattus norvegicus* was taken randomly. After the mother gave birth, the newborn *Rattus norvegicus* of control group remained with the mother, while the newborn *Rattus norvegicus* of treatment group was separated from the mother and given animal milk as a substitute nutrient. Care and observation were carried out for 3 days. After 3 days, 3 *Rattus norvegicus* children from each mother were taken with the heaviest, medium, and lowest weights according to the number of samples needed with the Federer formula along with a 10% correction, which was 18 per group. Samples were sacrificed and the brain was put into 10% formalin for organ preservation. Histochemical preparations were made to calculate the apoptosis index of neuron cells by immunohistochemical examination.

The expression of the Apoptosis Index in each sample was assessed semi-quantitatively using the TUNEL Assay method. The number of neuron cells that undergo apoptosis in 10 view fields was seen by magnifying a microscope 400 times and calculated per 100 cells divided by the total number of cells and multiplied by 1,000. Apoptotic cells would stain dark brown to blackish.

Normality of the data was tested using the Shapiro Wilk test to determine the required analysis. If the data was normally distributed, then the analysis carried out next was parametric analysis. Nonparametric analysis was carried out if the data was not normally distributed. Normal distributed data was continued by T test 2 samples, while data not normally distributed were followed by Mann Whitney test. This study uses a significance level of 0.05 with a confidence level of 95%.

**Findings:** The results showed that the mean of neuron cell apoptosis index in the 3-days-old *Rattus norvegicus* cerebrum in the control group (K1) was  $2.89 \pm 1.28$ , whereas the mean of neuron cell apoptosis index in the 3-days-old *Rattus norvegicus* cerebrum in the treatment group (K2) amounting to  $4.68 \pm 1.67$  (Table 1).





**Figure 1. Comparison of apoptotic expressions represented by chromogen brown color on the tissue in the cerebrum. Yellow arrows indicated the maximum expression area (immunohistochemical staining; 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera)**

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3 days old)  
 K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)

**Table 1. Average and standard deviation of cell apoptosis index in 3-days-old *Rattus norvegicus* neuron cerebrum**

Group	n	Neuron Apoptosis Index(IRS)
		Mean±Standard Deviation
K1	18	2,89±1,28
K2	18	4,68±1,67

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3 days old)  
 K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)

The results of statistical analysis with the Independent T test showed a significant difference in the apoptotic

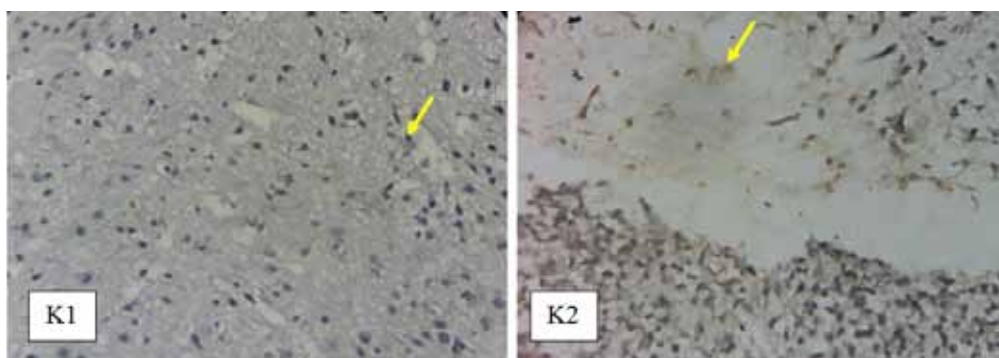
index of 3-days-old *Rattus norvegicus* cerebrum neuron cells between the control group and the treatment group with a value of  $p = 0.001$  ( $p < 0.05$ ) (Table 2).

**Table 2. Results of the Independent T-apoptosis index analysis of 3-days-old *Rattus norvegicus* cerebrum neuronal cells**

Group		p Value	Different Test Analysis
K1	K2	0,001*	Independent T test

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3 days old)  
 K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)  
 \*Significantly different  $p < 0,05$



**Figure 2. Comparison of apoptotic expressions represented by chromogen brown color on the tissue in the cerebellum. Yellow arrows indicated the maximum expression area (immunohistochemical staining; 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera)**

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3 days old)  
 K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)

The results showed that the mean of neuron cell apoptosis index in the 3-days-old *Rattus norvegicus* cerebellum in the control group (K1) was 2.74±1.06, whereas the mean of neuronal cell apoptosis index in the 3-days-old *Rattus norvegicus* cerebrum in the treatment group (K2) amounting to 4.47±1.31 (Table 3).

**Table 3. Average and standard deviation of apoptosis index of 3-days-old *Rattus norvegicus* cerebellum neuron cells**

Group	n	Neuron Apoptosis Index (IRS)
		Mean±Standard Deviation
K1	18	2,74±1,06
K2	18	4,47±1,31

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3days old)

K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)

The results of statistical analysis using the Mann Whitney test showed a significant difference in the apoptotic index of 3-days-old *Rattus norvegicus* cerebellum neuron cells between the control group and the treatment group with a value of p = 0,000 (p <0.05) (Table 4).

**Table 4. Results of Mann Whitney test analysis of apoptotic index of 3-day *Rattus norvegicus* neuronal cell cells**

Group		p Value	Different Test Analysis
K1	K2	0,000*	Uji Mann Whitney

**Information:**

K1: Control group (newborn *Rattus norvegicus* which was not separated from the mother until 3days old)

K2: Treatment group (newborn *Rattus norvegicus* separated from the mother until the age of 3 days old)

\*Significantly different p<0,05

**Discussion**

The results showed that the mean of neuron cells apoptosis index in the 3-days-old *Rattus norvegicus* cerebrum which was separated from the mother was higher than the mean index of neuronal apoptosis in the 3-days-old *Rattus norvegicus* cerebrum which was not separated from the mother. The results also showed an average apoptotic index of neuron cells in the 3-days-old *Rattus norvegicus* cerebellum separated from the mother higher than the average apoptotic index of neuron cells

in the 3-days-old *Rattus norvegicus* cerebellum which were not separated from the mother.

This study was conducted by separating the newly born *Rattus norvegicus* from its mother for 3 days as a model of maternal death. The impact of maternal death was the direct contact loss between the baby and the mother. The loss of the baby’s chance to get breast milk would dramatically affected the baby’s health throughout his life.<sup>10</sup> Bonding attachments contributed to the development of the baby, such as emotions, cognition, and overall mental health. Stimulation of the baby’s sensory system could directly affected brain development.<sup>12</sup>

The stress system in infants without attachment bonding coordinated brain activity with emotional and physical stressors and controled the release of stress hormones or cortisol (in humans) from the adrenal gland. Stress hormones modulated brain activity to produce behavioral responses, adjust homeostasis, and produce an adaptive response to survival.<sup>13</sup>

Maternal mortality initiated stress in newborns due to the attachments loss that played a role in the growth and development of newborns. Stressors would activated the HPA axis which began with the paraventricular hypothalamus to secrete CRH and then stimulated ACTH secretion by the pituitary gland. ACTH induced the adrenal gland cortex to secrete glucocorticoids (GC), namely cortisol which was an indicator of stress. Glucocorticoid bound to the glucocorticoid receptor (GR) in the cerebrum and cerebellum in the baby’s brain. In chronic stress, BDNF expression decreased. BDNF consists of two forms, namely mature BDNF and proBDNF which had receptors, namely TrK B and p75NTR. Mature BDNF would be more tied to TrK B, then activate cell survival pathways and cell growth through protein kinase B (Akt) and through activation of Ras would activate MEK/MAPK/ERK. The proBDNF bond to the p75NTR receptor activated the apoptotic pathway through co-receptor bonds, namely sortilin. Sortilin would activate jun-N terminal kinase (JNK) which would phosphorylate C-Jun. C-Jun activated proapoptotic proteins such as p53, Bad, BIM, and BAX so that it stimulated mitochondria to release cytochrome-C and finally activated caspase 3,6,9 which initiated the apoptosis process via the intrinsic pathway.<sup>7,15,16</sup>

Administration of DEX (Dexamethasone) in male rats (22-26g) was carried out for 7, 14, 21, 28 days

at a dose of 5 mg/kg/day. DEX was synthetic from glucocorticoid, a hormone that affected the stress system in the body. Giving glucocorticoids (DEX) significantly ( $p = 0.01$ ) increased the apoptosis of neuron cells in the brain to cause injury and damage to brain tissue.<sup>19</sup>

Chronic stress increased neuronal cell apoptosis. Chronic stress increases the susceptibility of neurons in the cortex of mice by using chronic unpredictable mild stress (CMS) for 5 weeks. The results showed an increase in corticosterone levels. These effects were accompanied by a detectable increase in caspase-3 positive neurons in the cerebral cortex. This showed that apoptosis occurs in neuron cells.<sup>1</sup>

### Conclusion

The apoptotic index of neuron cells in the cerebellum and the 3-days-old *Rattus norvegicus* cerebellum separated from the mother was higher than the apoptotic index of neuron cells in the cerebellum and *Rattus norvegicus* cerebellum which were not separated from the mother.

**Ethical Clearance:** This study had obtained ethical feasibility permits from the Research Ethics Commission of the Faculty of Veterinary Medicine, Airlangga University Number: 2.KE.040.04.2019.

**Source of Funding:** This study was self funding by authors.

**Conflict of Interest:** There was no conflict of interest in this study.

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# Behavioral Based Nutrition Education Intervention to Increase Fish Consumption among School Children Using Raised Bed Pool Media: Protocol for a Randomized Control Trial

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## Abstract

**Objective:** The aim of the study is to analyze the effectiveness of behavioral based nutrition education to increase fish consumption among school children using raised bed pool media.

**Method:** This is a randomized control trial involving 104 elementary school children to increase their fish consumption. Children in the intervention group will be given six-sessions nutrition education intervention for 3 months with additional raised bed pool media for education. General Linear Modeling Repeated Measure will be used to assess difference in the increase of fish consumption.

**Discussion:** Raised bed pool will serve as visual reminder to the children that magnify the effect of nutrition education. The strength of the study is that evidence on the effectiveness of nutrition education intervention using raised bed pool was scarce relatively to the abundance body of knowledge related to raised bed garden. Raised bed pool is unique as it provide potential protein source from the fish in the RBP that are lacking from the raised bed garden. The intervention offers the advantage of potentially active ingredients to support behavioral change, such as improved knowledge, attitude, perceived behavioral control and intention.

**Keywords:** *Nutrition education, fish consumption, school children, raised bed pool.*

## Introduction

Hidden hunger, a micronutrient deficiency such as iron, iodine, vitamin A, or calcium, is one of nutrition problem that still exist in developing country including Indonesia. Prevalence of anaemia in schoolchildren globally reached 37% in which found to be higher in Asian children than African<sup>(1)</sup>. Based on the IFLS

survey, the prevalence of anaemia in children aged 5-12 years declined from 36.4% in 2000 to 20.6% in 2008<sup>(2)</sup>. The latest report on Basic Health Research 2013 shows that the prevalence of anaemia in children aged 5 - 14 years is 26.4% and count as public health problem<sup>(3)</sup>. A study in one primary school in Surabaya found the anaemia prevalence in schoolchild reached 13.2%<sup>(4)</sup>.

In the short term, anaemia in schoolchildren affects the level of learning concentration due to reduced oxygen supply to the brain causes lack of haemoglobin<sup>(5)</sup>. The results of the study in Makassar showed a positive relationship between the intakes of heme protein with the incidence of anaemia in school children. School children who only occasionally consume heme protein sources (2-3 times/week) are more at risk of anaemia than those who frequently consume (4-7 times/week)<sup>(6)</sup>. Studies conducted on children in Brazil also found that children

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with protein intake <28.8 g/day had an increased risk of anaemia than children with a protein intake >44.6 g/day<sup>(7)</sup>. Similar results were also demonstrated by a study in North Boolang Mongondow, Indonesia in which children who consumed protein less than RDI were more at risk of anaemia than children with protein intake more than RDI<sup>(8)</sup>.

Fish is one source of heme protein that has good iron absorption rate. Protein content in fish reaches 18% and consists of essential amino acids. According to the Indonesian Food Exchange List, one serving of fresh fish (50 g) contains 10 grams of protein. The Total Diet Study in 2014 reported the average consumption of fish and processed fish meat. In the children group (aged 5-12 years) was 70.7 grams per person per day, with the most percentage derived from marine fish as much as 37.9 grams per person per day or equivalent to 54% of the total consumption of fish then continued by the intake of freshwater fish that accounts for 38% of total fish consumption or about 26.9 grams per person per day<sup>(9)</sup>. The annual report of the Ministry of Marine Affairs and Fisheries shows that fish consumption per capita per year has increased from 2010 to 2014. In 2010, fish consumption was still 30.48 kg/capita/year and increase to 38.14 kg/capita/year in 2014 with the highest growth reaching 8.32% per year. Fish consumption in East Java in 2010 was only 19.01 kg/capita/year up to 27.89 kg/capita/year with 46% growth level in the last 4 years<sup>(7)</sup>. In 2019, fish consumption is targeted to reach 54.49 kg/capita/year<sup>(8)</sup>.

Surabaya is included as the second largest metropolitan city in Indonesia with approximately 2.8 million people<sup>(10)</sup>. Public health issues in metropolitan city such as anaemia require a comprehensive policy approach, although in developing countries, resource limitations are often becoming a constraint<sup>(11)</sup>. However, given the magnitude of the impact of anaemia on the quality of Indonesian human resources, efforts should be made to overcome the problem with the improvement of intervention method. Nutrition education is one of the most cost-effective interventions and resulting a long-lasting impact<sup>(12)</sup>.

One of behaviour change theory that is widely used in nutrition education is *Theory of Planned Behaviour* (TPB)<sup>(13)</sup>. Behaviour is strongly influenced by intention, which is jointly influenced by attitudes, subjective norms, and perceived behavioural control. The youth garden program based on the Theory of

Planned Behaviour succeeded in improving the attitude in boys (p-value<0.001) and girls (p-value<0.001), and increased of perceived behaviour control in consuming vegetables and fruits in girls (p-value=0.014)<sup>(14)</sup>. Nutrition education interventions based on school gardens succeeded in increasing the desire and intention to try eating vegetables and fruits in children, increasing children's knowledge of the importance of eating vegetables and fruits, as well as improving children's attitudes and skills to increase vegetable and fruit consumption<sup>(15,16)</sup> also fruit and vegetable asking behaviour at home<sup>(17)</sup>.

RBP media in nutrition education serve as instant reminder for schoolchildren is expected to increase school children intention to love eating fish. The RBP Project also targets variables to increase school children perceived behaviour control to eat fish with a weekly fishmeal program, fish-game cards, and catfish-based food menu making. School gardening and raised bed pool equally prioritize the concept of mastery experience for children to be actively involved in the management of gardening programs or cultivating freshwater fish. Compared to the raised bed garden, the raised bed pool program produces an animal food source of heme-iron protein that is relatively easily absorbed by the body than non-heme iron. School children characteristics are more interested in interacting with moving objects rather than stationary objects. We hypothesize that RBP have a higher appeal to actively involve the school children than the raised bed garden. Therefore this study aimed to evaluate the effectiveness of RBP as media of nutrition education to improve protein intake and prevent anaemia among school-children.

## Method/Design

This research is a randomized control trial (RCT) with intervention in the form of nutrition education for 3 months to elementary school children 4<sup>th</sup> and 5<sup>th</sup> grade. Intervention in this study consists of a combination of 6 nutritional education sessions based on Theory of Planned Behavior by utilizing the raised bed pool in the school environment. The study will be using a parallel assignment with the two groups of samples experiencing different interventions during the same period of time.

**Setting:** The school was chosen purposively by considering the location of Sidotopo Subdistrict; the majority of the population is in the economic status of medium to low income. Selection of Sidotopo Wetan I

and II elementary school is based on easy accessibility, there is no raised bed pool, and there is no similar research before.

**Sample Size:** The sample size in this study was determined using formula of sample size for compare the mean of a continuous measurement in two samples, using a z-statistic to approximate the t-statistic with the effect size calculated from the results of McAleese, et al.<sup>(18)</sup> on increased consumption of vegetables per serving in nutritional education interventions based on school gardening (n=45, SD=1.7, ES=1.2) compared with control group. By using 80% power and alpha of 0.05, the minimum samples obtained without cluster correction were 32 subjects for each group. Then, taking into account the design effect  $1 + (p(m+1))$  using cluster size 30 and Inter-cluster Correlation Coefficient (ICC)=0.043 based on manual diabetic research<sup>(19)</sup>, the minimum sample required was 46 primary school children in each group with the consideration of 10% drop out, the sample in this study was 52 school children in each group. Based on preliminary survey conducted in both elementary schools, the total number of grade 4 and 5 students recorded is 900 children (research population). A screening then performed based on several criteria and 400 eligible subjects were retrieved. Assuming 10% of refusal to follow the study, then 104 children were eligible and willing to become research subject.

**Inclusion and exclusion criteria:** Inclusion criteria required participants to be aged 10-12 years, not allergic to fish, and not on a special diet. While the dropout criteria are the subject missing out from >50% or more than 3 times intervention sessions. The subjects were chosen because of the good literacy in 4<sup>th</sup> and 5<sup>th</sup> grade of elementary school at baseline.

**Intervention:** The RBP will be built at the school environment upon permission from the principal. Each consented participant in the intervention group will be given six sets of educational materials in the form of comic, recipe book, and info graphic. The comic describes benefit of catfish in increasing student's concentration during school hours. In addition, stationeries worth USD \$1 or about IDR 15,000 provided each participant after consenting to involve the whole study. Six education sessions for RBP group will be given once every two weeks for three months. During the nutrition education sessions, hands-on activities will be provided to help children improve their self-efficacy

toward fish consumption. The comparison group will not receive any nutrition education or exposure to raised bed pool in their school environment.

**Outcome:** Primary outcome is measured at the beginning and at the end of the study or after three months' education. The primary outcome is the change in fish consumption (gram/day). Fish consumption will be measured using food diary record. A total of three-days food diary records will be collected in a week. Dietary data will be analyzed using food processor software drawing from a database of Indonesian Food updated yearly by the Department of Nutrition, Universitas Airlangga – Indonesia. Secondary outcomes for the study are: anthropometric and body composition data, parent's characteristics, child's nutrition knowledge, and psychological variables.

**Anthropometric and body composition data:** Data will be collected including age, weight, and height of the children. Weight is going to be measured using Omron HBP-317 digital scale with 0.01 kg correction and will be measured in light clothing without shoes. Height is going to be measured to the nearest 0.1 cm using a stadiometer (SECA 213). Both weight and height is going to be measured twice to ensure the result's validity. Another measurement to assess the nutritional status of the children is body composition including body fat and body muscle percentage, as well as resting metabolic rate. These indicators are going to be measured using Omron HBF-317 that validated with SECA digital weight scale.

**Characteristics:** A general questionnaire is developed to obtain parent's characteristic data that includes parent's educational background, employment, and number of family member, literacy level, family income, and food expense. Child's nutrition knowledge is measured using previously validated questionnaire. The questionnaire consists of three parts; the first part focus on the nutrition and health knowledge with total of six questions and the second part focus on household serving size to measure how well children know about the portion, and the last part consist of questions related to MyPlate Indonesia.

**Psychological data:** All of the psychological data questionnaires were developed as Likert scale answers based on Bandura's guide for constructing attitude, subjective norm, perceived behavioral control, behavior, and intention scales. Children attitude to consume fish

as the source of animal protein will be measured using a three items questionnaire. Perceived behavioral control, behavior and intention to consume fish are going to be measured using three questions.

**Statistical analysis plan:** To analyze the difference in outcomes of control and intervention groups, a paired t-test will be used for normally distributed data and Kruskal Wallis test will be employed to data that is not normally distributed. In order to have more robust conclusion, the results will be adjusted for possible confounders such as school children characteristics, SES and household characteristics using General Linear Modeling Repeated Measure (GLM-RM). All data analyzes were performed at IBM SPSS Statistics 22.

## Discussion

This study will compare the effectiveness of six-session nutrition education intervention using RBP with control receiving only printed educational materials about the benefit of fish consumption. The study setting is in low to middle income elementary school in Surabaya City, Indonesia. It is hypothesized that participants in the intervention group (RBP) will benefit from the six sessions nutrition education developed based on the theory of planned behavior. Theraised bed pool will be served as visual reminder to the children that believed will magnify the effect of the 6 sessions of behaviorally oriented nutrition education.

One of the strengths of the study is that evidence on the effectiveness of nutrition education intervention using raised bed pool was scare relatively to the abundance body of knowledge related to raised bed garden. Raised bed pool is unique as it provides potential protein source from the fish in the RBP that are lacking from the raised bed garden. Both elementary schools involved in this study were drawn from public schools located in the low to middle income population. Generalization of the results of the intervention could be limited due to the present setting of the sample.

The intervention offers the advantage of potentially active ingredients to support behavioral change, such as improved knowledge, attitude, perceived behavioral control and intention. We will employ 2 times anthropometric measurement of the elementary school children during recruitment to reduce measurement bias. Selection bias will be reduced by random allocation of consented participants. Due to the nature of the intervention, blinding participants as well as nutrition

educators and research assistants delivering the intervention are not possible. In order to limit potential bias, all measurements were performed through standardized protocol, and all enumerators were trained prior to data collection.

## Declarations

**Competing interests:** We have no conflict of interest to report for this study.

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**Ethical Clearance:** Ethics approval for this study was received from the Institutional Review Board (IRB) at Faculty of Public Health Universitas Airlangga. This study was given Universal Trial Number (UTN=U1111-1199-992) and was registered in the Thai Clinical Trials Registry (TCTR20171207002).

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# The Actions to Control the Blood Pressure among a Community Hypertensive Elder in Denpasar City

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## Abstract

**Objectives:** To evaluate the actions of hypertensive elders in Primary Health Care among Denpasar City in maintaining blood pressure.

**Method:** The population is patients aged  $\geq 60$  years who were admitted to the Integrated Health Care for elders between 13 March to 20 May 2019. The proportional random sampling was used, remaining the selected of 210 elders from four PHC separated by four different districts. The actions were evaluated by questionnaire that used to assess what the elders do as awareness to maintain blood pressure.

**Results:** The total of 210 elders were reviewed (mean age, 67.2 years) with 120 participants (57.1%) were female. Amount 187 participants (89.04%) were categorized into elderly and the rest were old. The mean of systolic and diastolic blood pressure was 148.6/88.9. There are six kinds of medicine that have been given to elders. Elders also have other condition which contribute to illness such as diabetic, hyperlipidemia, hyperuricemia and arthritis (10%). Regular control schedule and morning blood pressure monitoring as the critical points which are need attention.

**Conclusion:** The elders have to concern with control schedule arrangement and morning blood pressure measurement to achieve BP target.

**Keywords:** *Hypertensive elders, blood pressure control.*

## Introduction

The health condition of elders, especially uncontrolled blood pressure, it still exist, contributes to the increase of cardiovascular disease. In South East Asia, low obedience of hypertensive elders in treatment was reported as factor that lead the rising number of death. A research was conducted in China in 2017 reported that degradation of medication proportion and blood pressure control need patient compliance and awareness to control hypertension (HTN) and minimize the risk of complication.<sup>1</sup>HTN in the age group  $\geq 65$ , mostly in woman, known as one of trigger factors of worldwide premature death.<sup>2</sup>

Viridis, et al. describes the aging process with arterial stiffness and changing of inner wall arteries mainly on aorta and proximal branch. Thickening of the intima cause loosing of elasticity and affect haemodynamic. When the stiffness attack large arteries, the cushioning

function was damaged, then an ejection function of the ventricle and recoil elasticity will decline. Continuity of this situation potentially increase the risk of stroke and heart failure.<sup>3</sup>

The 4th most populated country in the world based on the United Nations report in 2015, Indonesia, has an elders population that increased about two times during 50 years. At 2018, the percentage of the elder population reached 24,49 million (9.27%). It reveals that Indonesia is in transition to ageing population due to the percentage of persons aged, upper 60 years is more than 7% which is dominated by group of aged 60-69 years (63.39%). The Indonesian Central Bureau of Statistics in 2018 reported that five provinces in Indonesia as the most populated of elders, included Bali. This is a challenge of Indonesia to achieve independent and high quality elders and reduce the burden of the national development.<sup>4,5</sup>

The report of Basic Health Result in Indonesia, year

2018, was reported that the HTN of elders upper 75 years as the highest percentage in 2018 reached 69.5%. Based on this case, 13.3% have not taken any medicine and 32% irregularly medicated.<sup>6</sup> In Bali, HTN has been the second position from the 10 highest illness admission in Primary Health Care (PHC) and more than 2000 patients had been referred to hospital.<sup>7</sup>

The preliminary study was conducted in Denpasar, Central City of Bali, by counting the hypertensive elder visitation to PHC during September to December 2018, was 4088 during four months from eleven PHC.

Based on all studies, the continual study needs to perform to explore more about the awareness of hypertensive elders in controlling blood pressure. This study was involved hypertensive elders to describe the applied behavior during HTN program.

### Method

This study was approved by the Committee of Ethical Approval in the Faculty of Nursing Universitas Airlangga by number 1321-KEPK. We conducted a cross sectional study which involved hypertensive elders as a participant. Cluster sampling was used to determine four PHC in Denpasar City that separated by four different sub-districts.

The total population from average visits reached 596 patients from the selected PHC, then 210 participants was chosen by using proportional random sampling. There are PHC 1 North Denpasar (41 participants), PHC 1 East Denpasar (53 participants), PHC 1 West Denpasar (88 participants) and PHC 3 South Denpasar (33 participants). To be included in this study, elders needed to be diagnosed as having HTN with 1 year minimum duration of taking medication; have history of (BP) records with Systolic Blood Pressure (SBP)  $\geq 140$  mmHg and Diastolic Blood Pressure (DBP)  $\geq 90$  mmHg for the past two months on the health record book of elderly. Each elder has been given an explanation that involved elder's family without any force to write on the inform consent.

Data collection was started from 13 March to 20 May 2019. Information collected included demographic data, BP measurement, medication, duration of diagnosed and the actions to control HTN. The elders were asked about the actions to control BP that concern to 9 points of the control schedule, morning blood pressure measurements, consultation, physical activity,

diet, sleep, stress distraction, desire to look for health information and willingness to apply the advice from health care provider.

Researchers have a responsibility to ensure participants comfort and stop the process if the elderly need health services and help them to receive the treatment. The study was conducted with respect of the total confidentiality of data. Therefore, anonymous data were analyzed using SPSS 17 with descriptive analysis.

### Results

Hypertensive elders with the total number amounted 210 participants aged 60 to 80 (mean,  $67.24 \pm 5.096$ ) years were included and categorized into elderly (<75 years, 89%) and old ( $\geq 75$  years, 11%). Gender distribution was dominated by female (n=120, 57.14%). In this study, Omron series HEM-7121 blood pressure monitor were used to measure the BP. From 210 elders, the blood pressure was recorded for systolic with a minimum level of 120 mmHg, maximum level of 210 mmHg with mean  $146.61 \pm 13.75$ . Systolic blood pressure was categorized into  $\leq 160$  mmHg (n=170, 81.0%) and  $> 160$  mmHg (n=40, 19%). Furthermore, diastolic with result  $\leq 100$  mmHg was recorded on 174 participants (82.9%) and the rest was  $> 100$  mmHg with mean  $88.92 \pm 8.95$ .

There are 17 participants (8.09%) were used more than one kind of medicine. Five kinds of medicine that the elders consumed to control blood pressure which are calcium channel blocker (amlodipine), ace inhibitor (captopril, lisinopril, ramipril), angiotensin II receptor blocker (valsartan, candesartan, telmisartan, irbesartan), beta blocker (bisoprolol), diuretic (spironolactone), and platelet antiaggregation (cilostazol, aspilet, clopidogrel). The most of the participants used calcium channel blocker such as amlodipine (75.71%). This medicine is included in health insurance from BPJS Kesehatan (Social Insurance Administration Agency of Indonesia) as the first treatment from PHC for HTN. Another medicine is an ace inhibitor (captopril). The patients who need the other medicines, mostly are specialists referred patients in hospitals, internist or cardiologist. Every 2 weeks the patients need to check the blood pressure and receive a referral form to meet the specialist.

From all participants, 9 elders (4.28%) also have diabetes mellitus, 5 elders (2.38%) with hyperlipidemia, arthritis and hyperuricemia (2 elders, 0.95%), and history of stroke or heart attack amounted 5 elders (2.38%). Based on duration of HTN diagnosed, the participants

were categorized into three groups, 128 elders (60.95%) with duration of HTN around 1 to 5 years, 70 elders (33.33%) were diagnosed 6 to 10 years, and the rest (5.71%) is the participants who diagnosed more than 10 years.

The results of 9 aspects that describe the action of elders to control HTN are described on the table below.

**Table 1. The number of hypertensive elders in action to control HTN**

Elders action	Perform		Not perform	
	n	%	n	%
Regular control schedule	52	24.8	158	75.2
Morning BP measurement	16	7.6	194	92.4
Consul to doctor	156	74.3	54	25.7
Regular activity	138	65.7	72	34.3
Diet (sodium restriction)	192	91.4	18	91.4
Sleep duration (7-8hours/day)	169	80.5	41	19.5
Stress distraction	205	97.6	5	2.4
Willingness to learn	153	72.9	57	27.1
Willingness to apply the suggestion	174	82.9	36	17.1

Table 1 illustrates some interesting facts about what the hypertensive elders do to control BP. It allows the percentage of participants who do and do not perform that action.

- 1. Regular control schedule:** The number of elders who have arranged control schedule to PHC is only 52 persons (24.8%). It means not all elders control the health condition. Actually, the health care provider gives medicine for 2 weeks only and suggest the patient to control before the last medicine is taken. It means 1-2 days before the last tablet, the patient should come to PHC to check BP, body weight and other conditions related to HTN and receive the treatment as needed. The recommendation for hypertensive elders with ischemia is they should lower the blood pressure around <135/85 or <130/80 for elders who have diabetes mellitus or chronic kidney disease.<sup>8</sup>If the patients able to seek PHC, it beneficially helps them to perform appropriate self-management in controlling blood pressure.
- 2. Morning blood pressure measurement:** The second action only perform with less than 10%. It reveals that low awareness to BP monitoring, while it is the skill that they should have because the BP usually peaks also in the morning. Morning

BP measurement should be improved with due to both ischemic stroke and coronary events often occur.<sup>9</sup>The trained elderly to measure and interpret BP result are beneficent to prevent complications of asymptomatic high BP.

- 3. Consultation with the doctor:** From the third point, consult to doctor, counted 156 (74.3%) pay attention to seek a medical doctor if the sign and symptom of high BP still exist even though the medicine have been taken. The others were ignored and have been chosen only stay at home and take a rest. This poorly condition needs high attention, especially for the elders with complication while they should be referred to Advance Health Facilities as a recommendation from Ministry of Health Republic of Indonesia.<sup>10</sup>
- 4. Regular activity:** The total number of 138 elders perform 30 minutes activity per day. Recommendation about regular activity included walking, jogging, swimming or cycling.<sup>2</sup> Based on *American Heart Association (AHA)* recommendation, the appropriate activity for elder is 30 minutes slow walking/day or 150 minutes/week as a minimal duration to increase fitness.<sup>11</sup>
- 5. Diet (sodium restriction):** Almost elders have paid attention to sodium restriction, more than 90%. Diet restriction based on *The Dietary Approaches to Stop Hypertension (DASH)* was proven to reduce BP by increasing the consumption of fruits, vegetables, wheat, poultry meat and fish with restriction of sweetener and red meat with sodium consumption less than 5g/day.<sup>2</sup>
- 6. Sleep duration (7-8hours/day):** Only 41 participants have problems with sleep duration when 80.5% of all were sleeping for 7-8 hours/day. The research was proven that afternoon sleep >30 minutes or a night sleep >9 hours potentially increase the risk of death.<sup>12</sup> The National Sleep Foundation suggests the appropriate duration around 7 to 8 hours/day.<sup>13</sup> It will help the elders still have enough time to act in daily activities.
- 7. Stress distraction:** Almost all participants have no matter about stress distraction. They will do some hobbies like fishing, cycling or gardening to reduce the level of stress. Stress has close linkages to BP level. Stress consistently affects the systolic and diastolic blood pressure.<sup>14</sup> Therefore, the elders need more activity to help them distract from the trigger of stress.

**8. Willingness to learn:** Amounted 72.9% (153) elders are active to seek information about HTN and what they have to do to achieve normal BP. The learning process is related to the increase of knowledge and experience. The elders who aware to seek information to achieve a healthy life in consequence will have more confidence and adherence to the treatment program.<sup>15</sup> The health care provider also has responsibility to give education as Minimal Standard of Health Services based on The Law of Ministry of Health Republic of Indonesia number 43 year 2016.<sup>10</sup>

**9. Willingness to apply the suggestion:** Most of the elders (n=174, 82.9%) are aware and have desire to adhere healthy life style. The important point of willingness is how to achieve elder independence to perform self-management as the key role of successful treatment.<sup>16</sup> This is proof that the elders have willingness to prevent the deteriorate health conditions in HTN as chronic illness.<sup>17</sup> It is beneficially for elders to stay healthy after received any suggestion from a health care provider.

### Discussion

This study demonstrates the actions which are performed by community hypertensive elder to control BP. In contrast with self-management of HTN, two points that required the attention of elders to increase are regular control schedule and morning blood pressure measurement. Less than a quarter off total participants have low attention to these points. It might be the consideration of health care provider to remind and support them to be treated hypertensive elders and aware with complication reduction. The other risk factors of HTN such as low intensity of activity, diet, sleep and stress are the causes that can be controlled. Confident and adherence to the treatment program will increase when the elders aware to seek information to achieve meaningful healthy life. It is related to self-care behavior about how to preserve normal BP.<sup>15</sup>

The patient who visits irregularly or out of schedule, is potentially a loss of HTN control, while the hypertensive elders need to consume the medicine regularly and control the body weight to reduce the ischemic heart attack event. They need complex treatment because it requires continuity of caring about cardiovascular, activity and more information to achieve the target of BP.<sup>18</sup>

There are several limitations of the present study. The BP only documented at the moment of data collection without compared to the last 2 months BP. The patients who has another diagnosis beside HTN also included in this study, which might require more attention to detect more serious complication that may occur.

### Conclusion

The seven actions that have been performed by the most of hypertensive elders included awareness in consultation based on untreatable signs and symptoms, regular activity, sodium restriction, sleep duration, stress relief, willingness to learn and apply health recommendation. However, not only less than a quarter of participants do not concern to make and follow the regular control schedule to PHC, but also less than 10% elders did not perform morning blood pressure monitoring.

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# Internal Constraints and Policy Constraints on Conventional X-Rays

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## Abstract

Every organization has obstacles in every work process carried out. Existing constraints can be an obstacle to organizations to improve service quality. This research was conducted to analyze internal constraints and policies constraints on conventional X-ray at the Radiology Unit at Bhakti Dharma Husada Hospital (BDH) in Surabaya. It is an analytic observational study with an applied cross-sectional design. The measurement technique in this study uses Likert measurement scale techniques. The population in this study is the workforce in the radiology unit at BDH Hospital in Surabaya which is directly related to the production process. The results of this study indicate that internal constraint variables on sub-variable resources constraints are not constraints (273) and knowledge constraints (34) become constraints on conventional X-ray stages. Variable policy constraints with internal sub-variables policy constraints (224) are not a constraint in the conventional X-ray photo-taking stage. Limitations of knowledge are constraints on the radiology unit when making conventional X-rays. This is because there are no radiology officers so officers have low competence. To improve the quality of services in the radiology unit, it is necessary to have policies that govern directly on knowledge management.

**Keywords:** *Internal constraints, policy constraints, x-rays.*

## Introduction

Hospitals that do not improve service quality will not be able to win the competition to get to the market. According to Ferencikova<sup>1</sup>, Companies have to react to dynamic market conditions and rising customers' requirements for shorter delivery times, lower prices, and better quality and services. Service quality is an important element in customer satisfaction as product quality. After managers try to go beyond product and process conformity (or quality), they move up from process improvement to system-level improvement<sup>2</sup>.

The process of improving service quality also needs

to be measured to find out the increase that occurred. According to Kristiyanti<sup>3</sup>, an organization needs measurement to find out the quality of service that is the goal of the organization. In order to measure the level of success of an organization, there is a need for clear indicators by stakeholders. Performance indicators are quantitative and/or qualitative measures that describe the level of achievement of a predetermined goal or goal. organizations have inhibiting factors for measuring performance<sup>4</sup>. Services offer major room for improvement by applying the theory of constraints concepts and tools<sup>5</sup>.

According to Ministry of Health of Indonesia, the incidence of damage to conventional X-rays is X-rays that cannot be read by the executor<sup>6</sup>. Conventional photodamage events have increased and decreased in number every month from 2012 to 2013 in the Radiology Unit of the Bhakti Dharma Husada Regional General Hospital, Surabaya City (BDH Hospital). In 2012, the number of conventional X-ray damage in the Radiology Unit of BDH Hospital in Surabaya from January to

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December was still at 3.15% to 5.78%. Based on this it can be seen that in 2012 the number of X-ray damage in the Radiology Unit of BDH Hospital in Surabaya City has not reached hospital Minimum Service Standards (MSS) of  $\leq 2\%$ . In 2013, the incidence of conventional X-ray damage in the Radiology Unit of BDH Hospital in Surabaya City has decreased but has not yet reached MSS. The average number of X-ray damage from January 2012 to September 2013 was 2.71%.

The quarterly report on the Radiology Unit of BDH City Hospital in Surabaya in 2013 stated that the causes of conventional X-ray damage were thought to have come from human error and damage to the machine, which resulted in the film being refused to be read. Based on the causes of damage to conventional X-rays, the Radiology Unit of BDH Hospital in Surabaya added CR (Computed Radiography) machines in July, but the decline in the incidence of conventional X-rays did not occur. It can be seen that the addition of a new tool in the Radiology Unit of BDH Hospital in Surabaya is not a solution to the problem of conventional X-ray damage.

This study aims to analyze the internal constraints and policy constraints at the conventional X-rays in the Radiology Unit of BDH Hospital in Surabaya.

### Method

This research is an analytic research with an observational approach. The research variable is measured cross-sectionally so that it is obtained an overview of the conditions and activities at that time. The measurement technique in this study uses a Likert scale measurement technique<sup>7</sup>. The unit of analysis in this study was the Radiology Unit in BDH Hospital Surabaya City. The population in this study is the radiology workforce at the BDH Hospital in Surabaya City which deals directly with the production process and supplier of conventional X-ray photo production materials. The research subjects consisted of 9 respondents consisting of 6 radiographers, 2 darkroom officers, and 1 procurement officer.

Variable constraints at the conventional X-ray taking stage are identified by combining the Theory of Constraints proposed by Goldratt and Cox<sup>4</sup>, types of constraints based on Fogarty, Blackstone, and Hoffman; Schragenhim and Dettmer<sup>8,9</sup>. This research identifies constraints only limited to internal constraints and policy constraints in accordance with Goldratt and Cox<sup>4</sup>. Internal variables constraints are measured using sub-variable resources constraints and knowledge constraints.

Variable policy constraints are measured using sub-variable internal policy constraints. Measurement results from variable internal constraints and policy constraints are in the form of categories instead of constraints and constraints.

## Result and Discussion

### Resources Constraints on Conventional X-ray:

Resources constraints are defined as constraints derived from human resources (HR) and machines owned by the organization. This constraint can be in the form of the ability of production input factors such as raw materials, labor, and machinery<sup>10</sup>. The results showed that sub-variables resources constraints in the conventional X-ray photo-taking stage were included in the categories, not constraints (such as: "Table 1"). This is in line with research Lusthaus *et al.*,<sup>11</sup>, organizational performance is influenced by three main factors and one of them is organizational capacity.

Limits that prevent the system from achieving its objectives can be physical or non-physical. Physical constraints in the form of resources, raw materials, or supplies, they are relatively easy to identify by carrying out capacity analysis. However, if the constraints are non-physical, such as policies, behavior, or actions, they will be more difficult to identify<sup>12</sup>. According to Robbin<sup>13</sup>, there are 3 factors that support HR to achieve high performance, namely motivation, ability, and opportunity.

Table 1 shows the radiographer's motivation at BDH Hospital in Surabaya City is not a constraint at the conventional X-ray photo-taking stage. The results of the assessment agree with Hakim and Wuryanto<sup>14</sup>, who stated that employees with low motivation to work will also have a low commitment to do work. Employee Performance Improvement can be done by stimulating aspects that make him want to take more action to increase work productivity. However, in contrast to the results of Akbar<sup>15</sup>, motivation is the only variable that has a significance for weak influences. This shows that motivation does not play a strong role in explaining the increase or decrease in the performance of civil servants who work in the Tambaksari Subdistrict, Surabaya.

One factor that influences employee performance in a company is the development of a career in the company<sup>16</sup>. Career development will make employees happy at work so that the impact on performance improvement. The results of this study indicate that the



guarantee of the development of a radiographer's career at BDH Hospital in Surabaya City is not a constraint at the stage of conventional X-ray imaging.

According to Toha<sup>17</sup>, ability is one element in individual maturity that is related to knowledge or skills that can be obtained from education, training and an experience. The results of this study indicate that the radiographer's ability in BDH Hospital in Surabaya City is not a constraint at the conventional X-ray photo-taking the stage (as shown in Table 1). The results of this study are supported by an of Akbar<sup>15</sup>, that there is a strong influence between the level of ability level on the performance of civil servants in Tambaksari Subdistrict, Surabaya.

Basically, the organization does not only need capable and skilled workers but workers who can work harder and want to achieve optimal results and are in line with organizational goals. The ability to work for employees is an expertise that employees have when doing their work<sup>18</sup>. Table 1 shows the respondent's assessment of the dimension of opportunity at the X-ray taking stage obtained a total of 36 points and did not become a constraint on the organization.

To measure the effectiveness of production equipment companies often use overall equipment effectiveness (OEE)<sup>19</sup>. Assessment of the dimensions of the machine obtains the number of values 4 (as shown in Table 1). This is based on the calculation of the value of  $OEE = Availability \times Performance\ rate \times Quality\ rate$  is obtained by 92.9%. Based on the results of the research, it can be seen that the measurement of the effectiveness of conventional X-ray machines using the OEE method has exceeded the ideal standard of OEE JIPM (Japan Institute of Plant Maintenance), which is 84%.

The results of the study, it was found that the conventional X-ray machine in the Radiology Unit at BDH Hospital in Surabaya City did not become a constraint in the conventional X-rays. The results differ from the opinion of Goldratt<sup>20</sup>, which states that machines are one source that limits the flow of production. The machine can limit product flow due to the possibility of production flow imbalance which causes the bottleneck machine.

#### **Knowledge Constraints on Conventional X-rays:**

The results showed that the sub-variables of knowledge constraints in the conventional X-rays were included in the constraints category at the conventional X-ray

photo-taking stage (such as: "Table 1"). This results are supported by the statements of Schragenhim and Dettmer<sup>9</sup>, that constraints resources, knowledge constraints, and policy constraints have the potential to become constraints on all types of organizations.

Based on the results of the study it can be seen that the low total value in the sub-variable knowledge constraints in the Radiology Unit of BDH City Hospital of Surabaya due to the absence of policies that directly regulate knowledge management. The results of this study are in line with the research conducted by Tian, Cai, and Jiang<sup>21</sup>, the support of knowledge management organizations, knowledge management of organizational learning, and organizational support for organizational learning can significantly have a positive effect.

Table 1 shows that the lowest total value of knowledge constraints sub-variable in the conventional X-ray photo taking is competency indicator. This is because there is no training directly related to knowledge management in the Radiology Unit of BDH Hospital in Surabaya City. Knowledge management is the process of developing the knowledge and skills of each individual in an organization<sup>22</sup>. Hospital management must improve education and training programs, because with higher levels of education and training able to improve the performance of employees who will have a very positive influence on improving service quality. Education and training have a significant influence on performance<sup>23</sup>.

#### **Internal Policy Constraints on Conventional X-rays:**

According to Fogarty, Blackstone and Hoffman<sup>8</sup>, Policies constraints are defined as constraints originating from within or outside which limit organizational performance to work processes. These constraints can take the form of laws, rules, or work procedures. Table 1 shows that the results of this study indicate that the sub-variable internal policy constraints in the conventional X-ray photo-taking phase are not constraints. The results of these studies differ from opinion Dettmer<sup>2</sup>, which states that policy constraints are more often a constraint to the organization to work processes when compared with other constraints.

Based on the results of the study, it was shown that the preparation of operational procedure standards (SOP) in the Radiology Unit of BDH Hospital in Surabaya City had paid attention to important criteria for improving performance results. The results of this study support

the opinion of Natasia, Loekqijanan and Kurniawati<sup>24</sup>, the Standard Operational Procedure (SOP) is defined as a standard that must be used as a reference in providing each service. This standard operating procedure can be used to assess the performance of each agency. A good

quality management system always uses SOP as a basis that will be socialized in advance to all competent parties to implement it. SOP is an instruction set that has the power as an instruction or directive that must be done to carry out the work process.

**Table 1. Assessment of Respondents Against Internal and Policy Constraints Variables at the X-ray Photograph Stage in the Radiology Unit of BDH Hospital Surabaya City 2014**

Sub Variable	Number of Values	Total Value	Results Category	Composit Category
<b>Resources Constraints</b>				
Motivation	125	242	Total >162 = Not constraints	Not constraints
Opportunity	36			
Ability	77			
Machine	4			
<b>Knowledge Constraints</b>				
Culture	11	34	Total <36 = Constraints	Constraints
Strategy	8			
Competency	8			
Metrics	7			
<b>Internal Policy Constraints</b>				
Policy efficiency	34	224	Total >82 = Not Constraints	Not constraints
Policy effectiveness	36			
Impact policy	34			
Relevance policy	31			
Sustainability	53			
Consistency policy	36			

**Source:** Primary Data Results of the Research Questionnaire Process.

### Conclusion

Variable internal constraints do not become constraints in the conventional X-ray photo-taking stage. Sub variable resources constraints support service performance in the radiology unit. Motivation, opportunity, ability, and machine in the radiology unit support for the achievement of service performance. Whereas, sub-variable knowledge constraints become constraints at the stage of conventional X-rays. The absence of training for radiology officers to support low officer competency values. A policy related to knowledge management is needed by the management of BDH Hospital in Surabaya to support the process of developing knowledge and skills in the radiology unit. Knowledge management policies in the radiology unit are expected to improve service performance. Variable policy constraints with sub-variables internal policy constraints do not become constraints at the stage

of conventional X-rays. The preparation of standard operational procedures (SOP) in the Radiology Unit of BDH Hospital in Surabaya City has considered important criteria to be a support to improve performance results.

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# Effects of Hyaluronic Acid and Silver Sulfadiazine in Laceration Wound on Wistar Rats

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## Abstract

This study aimed to determine the effect of giving hyaluronic acid and silver sulfadiazine to the wound healing in Wistar rats. This research was an experimental study using post-test design with a control group consisting of 3 treatments groups, in which each group consisted of 3 male wistar (*Rattus norvegicus*) rats which were modeled for back incision of 3 cm and a depth 5 mm. Statistic test used Kruskal-Wallis test. All collected data were processed and analyzed using Statistical Package for the Social Sciences (SPSS) program version 22 with a significant statistic test result if P value was  $< 0.05$ . The results of the research indicate that PMN increased more rapidly in wounds given hyaluronic acid and silver sulfadiazine compared to treatment which is only given silver sulfadiazine on day 0 and day 6. The statistic results on day 0 showed a significant difference with a P-value = 0.027 and on day 6 with a P value = 0.027. In wound given hyaluronic acid and silver sulfadiazine, an increase in the number of fibroblasts is faster than that of treated with silver sulfadiazine and treatment of open wound without treatment on days 6 and 14. Statistic result on day 6 (P = 0.027) and day 14 (P = 0.027) indicates a significant difference. Granulation thickness that occurs in laceration wounds given hyaluronic acid and silver sulfadiazine and only silver sulfadiazine are still not formed on day 0 for all samples (3 samples). Granulation thickness is formed and thick on day 6 in each group compared to those treated with open treatment without treatment. Statistic results on day 6 (P = 0.027) indicates a significant difference and on day 14 (P = 0.051) all groups indicate a thin granulation which indicates a significant differences.

**Keywords:** *Hyaluronic Acid, Silver Sulfadiazine, Laceration Wounds.*

## Introduction

Definition of wound healing is a repair process of organ or tissue damage, especially skin. In wound healing, there were systemic processes that exceeded the damage itself. Previous research showed that there were stem cells and other progenitor cells involved in wound healing, so a wound healing process requires a broader perspective than only local organ damage. Wound healing is best to understand as a whole as organisms

respond to damage, without considering the location whether it is on skin, liver, or heart.<sup>1,2</sup>

There were 2 different processes related to wound healing to cause homeostasis remodeling process. The first one is various cellular matrix replacements as a patch to rearrange physical and physiological continuance of damaged organ. This process caused scar formation. The second process is a recap of the damaged organ reformation. Initial organ architecture was rebuild/reformed again by reactivating cell formation. This process was called regeneration. Wound healing can be divided into 3 phase, which is the inflammation phase, proliferation, and remodeling phase.<sup>1,3</sup> Some researchers also divide wound healing into 4 steps.<sup>4,5,6</sup>

Wound healing is a complex biological cascade consist of several sequential events aimed to restore

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damaged tissues. Extracellular matrix component plays an important role in the regulation of all the tissue repairing phase including cellular migration, inflammation, angiogenesis, remodeling, and scar/connective tissue formation. Researches have shown that extracellular matrix not only provides microenvironment for a wound but also involved in several signaling pathway activities that occurred on wound bed during the healing process. Hyaluronic acid is an extracellular matrix component with several unique characteristics which have an important role in tissue regeneration.<sup>7,8</sup>

Hyaluronic acid is a major component in the extracellular matrix and has been shown to have a positive effect in wound healing. On the other side, silver sulfadiazine is an anti-microbial agent that's very effective for most type of bacteria and has been used widely as the main component in dressings for burn injury.<sup>9</sup>

Silver sulfadiazine is a sulfonamide based ointment with antibacterial and anti-fungal activity. Silver sulfadiazine work by combined activities of silver and sulfonamide. If these chemicals interact with body fluid that contains sodium chloride, the silver ion will be released gradually and sustained on the wound area.<sup>3</sup>

Hyaluronic acid and silver sulfadiazine are extracellular matrix component that plays a role in the wound healing process. Based on those facts, the researcher was interested to do a study which aimed to assess the effects of silver sulfadiazine plus hyaluronic acid ointment to wound healing in Wistar rats.

## Materials and Method

This research is an experimental study. It was done on 2 April – 26 April 2019, using 2 laboratories which are Hasanuddin University Animal Laboratory to nurture and experiment on the animal model, and Hasanuddin University Hospital Pathology Anatomy Laboratory to make histopathology slides. Subjects are

male albino Wistar (*Rattus Norvegicus*) rat, aged 2-3 months that weights 150-250 grams. Twenty-seven rats were acquired from Hasanuddin University Animal Laboratory, which allocated to 2 treatment groups and 1 control group, each consists of 9 rats.

**Inclusion criteria:** Male albino Wistar (*Rattus Norvegicus*) rat, aged 2-3 months, weights 150-250 grams, and in healthy condition.

**Exclusion Criteria:** Biopsy sample damaged, wound infection, and subjects died before the research period is over.

Assessing the effect of timing to give topical hyaluronic acid and silver sulfadiazine ointment or topical silver sulfadiazine ointment only was done using histopathological examination to evaluate changes on damaged skin tissue structure after burn injury. Histopathological examination was carried on day 0, day 6, and day 14.

**Data Analysis:** All data were collected and analyzed using Statistical Package for the Social Sciences (SPSS) program version 22 with P value < 0.05 in statistic analysis was considered statistically significant. The measurement result will be presented in narration, graphics, tables, and figures. Data analysis was done using Kruskal-Wallis test.

## Results

**Sample Characteristics:** Research subjects were 27 rats which allocated to 2 treatment groups and 1 control group, each consists of 9 rats. Subjects' wound in group 1 was treated with a topical agent containing hyaluronic acid and silver sulfadiazine. Subjects' wound in group 2 was treated with a topical agent containing silver sulfadiazine. The wound in group 3 (control) was kept open without any treatment. Each group will then be assessed on day 0, day 6, and day 14 after treatment, as seen in Table 1.

**Table 1. Sample Distribution**

		Group			Total
		Silver Sulfadiazine	Hyaluronic Acid + Silver Sulfadiazine	Control	
Time (Day)	0	3	3	3	9
	6	3	3	3	9
	14	3	3	3	9
<b>Total</b>		<b>9</b>	<b>9</b>	<b>9</b>	<b>27</b>

Comparison of PMN amount based on group and treatment time toward wound healing shows that an initial assessment, PMN number was found significantly higher in HA + SS group (55.7) and lowest in control group (25). Post hoc test shows that mean PMN amount in the HA + SS group was significantly higher compared to SS group and control group, and mean PMN amount in the SS group was significantly higher compared to the control group. On day 6 assessment, mean PMN amount was significantly higher in the HA + SS group and lowest in the control group. Post hoc test shows that mean PMN amount in the HA + SS group was significantly higher compared to SS group and control group, and mean PMN amount in the SS group was significantly higher compared to the control group. On day 14 assessment, mean PMN amount was significantly higher in the HA + SS group and lowest in the control group. Post hoc test shows that mean PMN amount in HA + SS group was significantly higher compared to SS group and control group, and mean PMN amount in SS group was significantly higher compared to control group, as seen in Table 2.

**Table 2. PMN comparison based on Group**

Variable	Group	n	Mean	SD	P
PMN 0	SS	3	42,0	4,4	0,027
	HA + SS	3	55,7	5,1	
	Control	3	25,0	2,0	
PMN 6	SS	3	93,3	3,2	0,027
	HA + SS	3	117,3	6,1	
	Control	3	59,7	1,5	
PMN 14	SS	3	52,3	4,0	0,027
	HA + SS	3	81,0	3,6	
	Control	3	31,7	1,5	

Comparison of fibroblast amount based on group and treatment time shows that an initial assessment, fibroblast number was found significantly higher in HA + SS group (25.0) and lowest in the SS group (9.3). Post hoc test shows that mean fibroblast amount in HA + SS group was significantly higher compared to the SS group and control group, while the mean fibroblast amount in SS group was similar to the control group. On day 6 assessment, mean fibroblast amount was significantly higher in the HA + SS group and lowest in control group. Post hoc test shows that mean fibroblast amount in the HA + SS group was significantly higher compared to the SS group and control group, and mean fibroblast amount in the SS group was significantly higher compared to control group. On day 14 assessment, mean fibroblast

amount was significantly higher in HA + SS group and lowest in control group. Post hoc test shows that mean fibroblast amount in HA + SS group was significantly higher compared to SS group and control group, and mean fibroblast amount in SS group was significantly higher compared to control group, as seen in Table 3.

**Table 3. Fibroblast comparison based on group**

Variable	Group	n	Mean	SD	P
Fibroblast 0	SS	3	9,3	2,1	0,044
	HA + SS	3	25,0	6,2	
	Control	3	12,0	2,0	
Fibroblast 6	SS	3	52,7	2,5	0,027
	HA + SS	3	89,7	2,5	
	Control	3	32,7	2,1	
Fibroblast 14	SS	3	61,7	3,5	0,027
	HA + SS	3	107,0	6,0	
	Control	3	50,0	4,6	

Comparison of granulation thickness based on group and treatment time shows that an initial assessment, there hasn't been any granulation tissue on every group. On day 6 assessment, granulation thickness was significantly higher in the HA + SS group (3.5) and lowest in the control group (1.5). Post hoc test shows that granulation thickness in the HA + SS group was significantly higher compared to the SS group and control group, and granulation thickness in SS group (2.9) was significantly higher compared to control group. On day 14 assessment, there was no significant difference in granulation thickness for HA + SS group and SS group. Post hoc test shows that granulation thickness in HA + SS group was significantly higher compared to control, and granulation thickness in the SS group was significantly higher compared to the control group, as seen in Table 4.

**Table 4. Granulation thickness comparison based on group**

Variable	Group	n	Mean	SD	P
Granulation 0	SS	3	0,0	0,0	-
	HA + SS	3	0,0	0,0	
	Control	3	0,0	0,0	
Granulation 6	SS	3	2,9	0,2	0,027
	HA + SS	3	3,5	0,2	
	Control	3	1,5	0,2	
Granulation 14	SS	3	2,2	0,3	0,051
	HA + SS	3	2,2	0,3	
	Control	3	1,2	0,2	

## Discussion

In this research, subjects were 27 rats which allocated to 2 treatment groups and 1 control group, each consists of 9 rats. Results show that PMN amount in wound treated with hyaluronic acid and silver sulfadiazine were higher on day 0 (mean 55.7) and day 6 (mean 117.3) compared to the wound treated with silver sulfadiazine only on day 0 (mean 42.0) and day 6 (mean 93.3). Statistic result on day 0 showed significant difference with P value 0.027 and on day 6 with P value 0.027.

Polymorphonuclear (PMN) is the first cell to migrate to wound site. The amount will increase dramatically and reach its peak in 24-48 hours. Its main function is for bacterial phagocytosis. Increased blood vessels permeability, local prostaglandin production, and presence of chemotactil component such as complementary factor, interleukin-1 (IL-1), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), TNF- $\beta$ , platelet factor 4, or bacterial byproducts will all stimulate neutrophil migration.<sup>3</sup>

As we all know, wound healing was divided into 3 phases which is inflammation, proliferation, and remodeling phase. Inflammation phase starts since the beginning of wound until day 5. Ruptured blood vessels in wound will cause bleeding and body will react/try to stop the bleeding by the haemostatic process. Haemostatic happened due to released thrombocytes that make blood vessels glued to each other. Thrombocytes will then adhere and degranulate, and then attracting inflammatory cells such as polymorphonuclear leucocytes (PMNs, neutrophil), and monocytes. Polymorphonuclear (PMN) cells are the first cell to migrate to the wound site. The amount will increase dramatically and reach its peak in 24-48 hours.<sup>3</sup>

Fibroblast was originated from undifferentiated mesenchymal cells, releasing mucopolysaccharide, glysin amino acid, and proline which were the main component of collagen fibers that held wound edge together. This research shows that the number of fibroblast in wound treated with hyaluronic acid and silver sulfadiazine will be higher in day 6 and day 14 (mean 89.7 and 107.0) respectively, compared to wound treated with silver sulfadiazine only in day 6 and day 14 (mean 52.7 and 61.7) respectively. While wound that was kept open without any treatment in day 6 and day 14 have each (mean 32.7 and 50.0). A statistical result from day 6 shows significant difference with P value 0.027, and on day 14 with P value 0.027.

This research shows that in all samples, granulation thickness in laceration wound treated with hyaluronic acid and silver sulfadiazine or with silver sulfadiazine only during day 0 haven't been formed yet (3 samples in each treatment group). Granulation will start to form and thickened during day 6 in each group compared to wound without any treatment. Statistical results from day 6 shows significant difference with P value 0.027, and on day 14 each group shows thin granulation which has significant difference with P value 0.051.

Angiogenesis is the basic steps in wound healing in which new blood vessels will be formed from the existing one. The new blood vessels will be involved in granulation tissue formation, providing tissues with oxygen and nutrients to grow. Angiogenesis happened at the existing blood vessels. In this type of angiogenesis, there were vasodilatation process and increased permeability from existing blood vessels tissue, ECM degradation, and endothelial cells migration.<sup>1,10</sup>

Hyaluronic acid has different properties, depends on its molecule size. It has been well documented that high molecular weight hyaluronic acid will show anti-inflammation and immunosuppressive properties, while low molecular weight hyaluronic acid have pro-inflammation properties.

Researches have shown that smaller hyaluronic fragment will increase expression and induction of several chemoattractant cytokines which will increase inflammation cells inside the wound.

Hyaluronic acid will fasten fibroblast growth inside the collagen matrix, estimated by tubulin synthesis, a very important substance in fibroblast differentiation inside matrix collagen. Hyaluronic acid was also a substrate that facilitates fibroblast migration inside the extracellular matrix.

All of the things mentioned above were consistent with previous research which stated that the combination of topical hyaluronic acid and silver sulfadiazine will increase PMN and fibroblast number, as well as reinforce granulation tissues. It was also consistent with the research stated that PMN amount was higher in day 6 compared to day 14, when in early inflammation phase high molecular weight hyaluronic acid was dominant, giving anti-inflammation effect.

Silver sulfadiazine can reduce bacterial density on wound edge and inhibit negative gram bacteria

colonization, so silver sulfadiazine supplementation to wound was believed to be able to reduce wound infection expected to fasten wound healing without any obstruction, appropriate with its phase.

### Conclusion

The combination of hyaluronic acid and silver sulfadiazine topical was better in the wound healing process compared to silver sulfadiazine alone and untreated wound care by triggering the inflammatory and proliferative processes and increasing granulation.

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**Ethical Clearance:** Ethical clearance for this study was obtained from the Research Ethics Committee, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia. Number: 309/UN4.6.4.5.31/PP36/2019

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# Breast Cancer among Young Women in Baghdad, Iraq

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## Abstract

**Background:** Breast cancer is the commonly diagnosed cancer among women globally and the major reason of deaths related to cancer in developing world, although breast cancer in young women is less common and often overlooked, it is still considered a major health concern. This study aimed to study breast cancer among young Iraqi women.

**Methodology:** A retrospective study done on 50 diagnosed breast cancer cases below 40 years during period of 2017 and 2018 among women records of attendees to women health center in AL-ELWYIA maternity teaching hospital.

**Result:** Out of total diagnosed breast cancer case during period of 2017 and 2018 (264), 50(18.9%) patients were below 40 years. the peak age at presentation ranged from 35-39 years (50%), family history was detected in 24% of cases, early menarche before age of 12 years was detected in 26% of cases, 68% of patients presented with painless palpable mass, stage 2 disease were recognized in 76% of the studied sample and 86% were ductal in origin.

**Conclusion:** The breast cancer among young Iraqi women under 40 years had high incidence rate but might be less aggressive than what was reported in western countries.

**Keywords:** Breast cancer, incidence, young age, Baghdad, Iraq.

## Introduction

Breast cancer is the most common malignancy among the Iraqi population constituting one third of the registered female cancer and 17.8% are diagnosed in patients under 40 years<sup>(1)</sup> Although the diagnosis of breast cancer is much less common in women under the age of 40 years, it remains a great challenge to patients, families and health care providers and it can have a

greater impact than in older women<sup>(2,3)</sup>. In woman under 40 years of age, delay breast cancer diagnosis is a common problem due to various factors such as a lack of information about the disease and consequent delay in seeking medical care, lack of screening programs in this age group, and fast tumor growth and pattern of breast parenchyma, which can hinder the identification of lesions both on clinical examination and on certain imaging method<sup>(4,5)</sup> so the Knowledge of the clinical and imaging forms of breast cancer in young woman and correlation with the pathological finding of these cancers is important for improving the detection of mammary lesions in this group<sup>(6)</sup>. Tumors in young women are more likely to be of a higher histological grade<sup>(7)</sup> and to be classified as estrogen receptor and progesterone receptor negative<sup>(8,9)</sup>. In addition, young women are more likely to have local recurrences, to be diagnosed

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at a more advanced stage, and to have an inferior 5 year survival compared to their older premenopausal counterparts<sup>(9,10)</sup>.

The differences in tumor characteristics and clinical outcomes suggest that breast cancer arising in young women may be a distinct clinical entity. A study by Anders and colleagues<sup>(8)</sup> looked at tumor gene expression between two age specific cohorts (young, ≤ 45 years; and older, ≥ 65 years), and identified 367 gene sets that could differentiate tumors in young women from tumors in older women. This suggests that breast cancer in young women may be distinct with a unique underlying biology<sup>(11)</sup>.

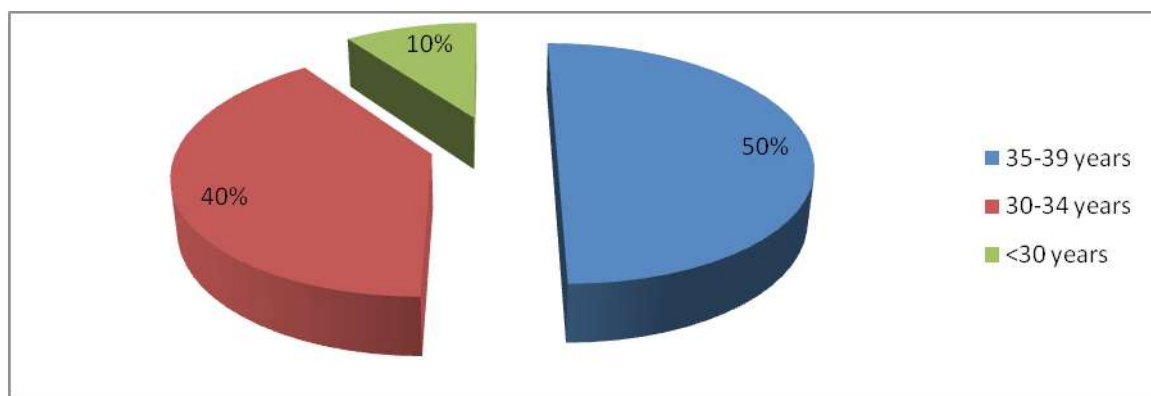
**Objectives:** To describe the clinical profile, image findings and pathological aspects of breast cancer in young women, to enhance early detection of cancer in young Iraqi women.

### Patients and Method

A retrospective study done among women records of attendees to women health center in AL-ELwya maternity teaching hospital. The required data obtained from the information system data base during a 2-years period starting from January 2017 and December 2018. 50 patients were enrolled in this study, patients proved to have breast cancer by histo-pathological study. The evaluated variables included age at diagnosis, marital status, age of menarche, number of parity, history of lactation, and first degree family history of the breast cancer, clinical presentation, clinical and radiological diagnosis were also recorded. Statistical analysis was performed and different variables were analyzed.

### Result

A total of 50 breast cancer patients below 40 years were enrolled in this study, the mean age of patients was 33.8(±3.7) years, 50%(25) of patients were between 35-39 years, figure 1.



**Figure 1: Age distribution of studied patients.**

Study of some risk factors showed, 76%(38) were married and from those 12%(6) had one or two child and 76%(38) had three or more children, only 4%(2) of patients had age of menarche more than 14 years. 24% (12) had positive first degree family history and 86%(43) of patients had lactation history more than 6 months, table -1.

**Table 1: Risk factors for studied group.**

Variable	Number (%)	
Marital Status	Married	38(76%)
	Divorced	5(10%)
	Single	4(8%)
	Widow	3(6%)

Variable	Number (%)	
Parity	Nil	6(12%)
	≤2	6(12%)
	≥3	38(76%)
Menarche Age	≤11 years	13(26%)
	12 or 13 years	35(70%)
	≥14 years	2(4%)
Family History	+ve	12(24%)
	-ve	38(76%)
Lactation History	+ve	43(86%)
	-ve	7(14%)

The ultrasound finding of those patients revealed that 76%(38) of patients had only mass, the mass was

in UOQ among 70%(35) of patients and no one patients had lesion in both breast, table -2-

**Table 2: Ultrasound finding of studied patients.**

Variable	NO (%)	
Ultrasound finding	Mass	38(76%)
	Mass with associated features	12(24%)
Site of tumor	UOQ	35(70%)
	UIQ	7(14%)
	LOQ	0
	LIQ	1(2%)
	Retroareolar	6(12%)
	More	1(2%)
	Laterality	Right breast
	Left breast	14(28%)
	Both	0

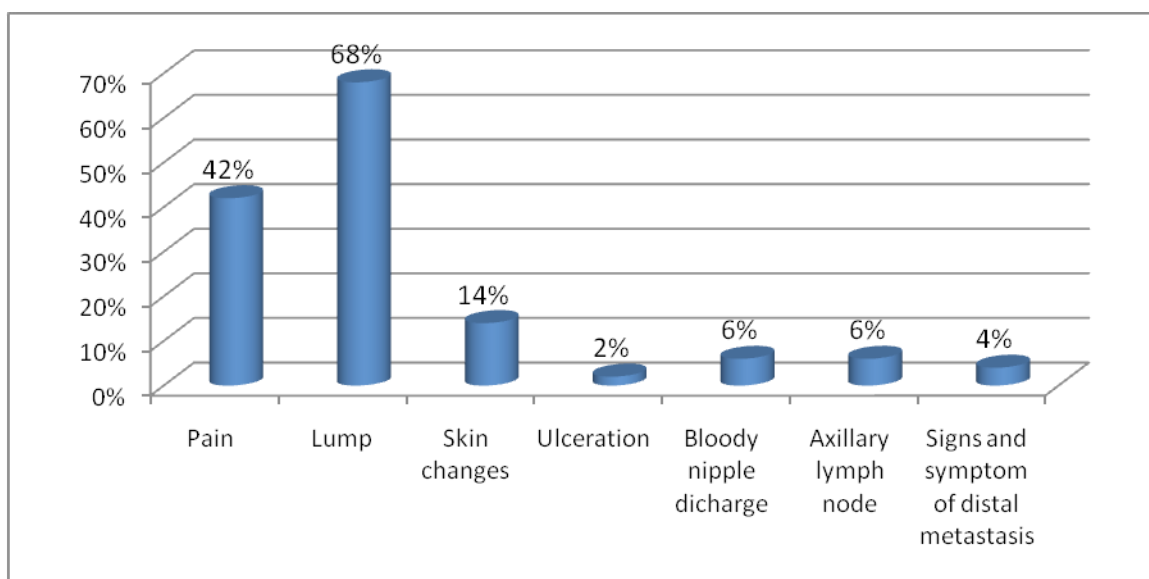
Majority of patients had stage II breast cancer (76%) and only one patient had stage IV and I. Grade

2 represent 78%(39) of studied patients and invasive ductal carcinoma found in 86%(43) of patients, table -3-

**Table 3: Histopathological finding of studied patients.**

Variable	NO(%)	
Tumor stage	Stage I	1(2%)
	Stage II	38(76%)
	Stage III	10(20%)
	Stage IV	1(2%)
Tumor grade	Grade 1	1(2%)
	Grade 2	39(78%)
	Grade 3	10(20%)
Histopathological type	Invasive Ductal carcinoma	43(86%)
	Invasive Lobular carcinoma	7(14%)
	Other	0

The clinical presentation of studied patients was showed that 68% (34) of patients had lump and 42%(21) of patients had pain, other showed in figure 2.



**Figure 2: Clinical presentation of studied patients.**

**Discussion**

Breast cancer incidence increases with age with vast majority of women being diagnosed after age of 40 years<sup>(11)</sup>, the comparison of clinic-pathological and radiological features of breast cancer arising in young women with those older ones has been the subject of discussion in several studies<sup>(12)</sup>. In the present study we have chosen to define early onset breast cancer when

diagnosed at age of 40 years and younger, breast cancer is described as young women disease in Arab World and other developing countries<sup>(13,14)</sup> compared to that observed in Western countries in which the median age for breast cancer is a decade younger and approximately two third of patients are aged under 50 years<sup>(15)</sup> this may be due to clear social, economic and population differences. A total of 264 breast cancer patients were

enrolled in this study 81.1% were 40 years and above while 18.9% were below 40 years. The latter is slightly lower than other Asian countries such as Korea<sup>(16)</sup>, Iran<sup>(17)</sup> and Saudi Arabia<sup>(18)</sup> but is significantly higher than that of western population<sup>(19)</sup>. This suggest the possibility that certain differences in pathogenesis of breast cancer may exist between young Iraqi patients and women in western population these differences may be related to race, social background factors, dietary habits, economic development level and environmental exposure among other. In this study 76% of our patients were married or had married. Married women were more likely to receive a breast examination within the last years than single (never married) or no longer married women<sup>(20)</sup>. 76% of those below 40 years had 3 or more child, Rodriquez et al found that women aged less than 35 years with early child bearing and multiparty are risk factors probably due to short term elevation in breast cancer risk for several months immediately following a birth<sup>(21)</sup>. In this study 26% of those below 40 years had early menarche before age of 12 years in compare to Najmeh et al who found that 17.6% of patients had early menarche which is considered one of the possible risk factors of breast cancer<sup>(22)</sup>. Presence of familial background has been identified as an important risk factor for developing breast cancer at an early age and to be suggestive of hereditary syndrome<sup>(23)</sup>. In this study 23.5% of those below 40 years had positive family history of breast cancer in accordance with previously reported data from sidoni et al study who found that (24%) of patients below 40 years had positive family history<sup>(24)</sup>, larger series have reported much higher proportions up to 48%<sup>(25)</sup>, while McAree et al study reveals only 13.4% had a positive family history<sup>(26)</sup>. Antoniou et al found that breast cancer at an early age is more likely to be associated with an increased familial risk, especially in women harboring a BRCA1 mutation<sup>(27)</sup>, however BRCA1 analysis was not available in our center at time of study there for the relationship between a positive family history and a positive BRCA1 mutation not properly assessed, the genetic component should be more explored, since genetic studies including young women are very scarce nationwide and there is insufficient data to provide conclusive evidence. Currently, there no routine screening program in Iraq for women less than 40 years of age for that reason most women in this age group are symptomatic and presented mostly with palpable lump. The examination finding in this study were palpable lump in 68%, axillary node, skin changes no breast cancer diagnosed in a

symptomatic women which in agreement with Agnese et al that reported that young patients under 40 years were much more likely to present with palpable lump 70%<sup>(28)</sup>. Ultrasound study reveals that 76% of patients presented with mass. Histo-pathological review of the sample of the study revealed that 86% of breast cancer were ductal (invasive ductal carcinoma) in compare to Cj Fisher et al. who found that 88% of those aged below 40 years were ductal<sup>(29)</sup> and McAree et al. found that 85.5% of breast cancer were invasive ductal type<sup>(26)</sup>. In this study 20% of patients are diagnosed at grade 3 which is lower than the result of Abdullateef et al. who found that 32.8% of patients below 40 years were grade 3<sup>(1)</sup> and also lower than the result obtained by fernandopulle et al. study that identified that 60% of patients are grade 3 in young Asian women<sup>(30)</sup> the later tumor grade at diagnosis might be related to delay diagnosis in young patients, which can be explained by work pressure or low index of suspicion by the patients and primary physician. **Conclusion:** The breast cancer among young Iraqi women under 40 years had high incidence rate. Larger studies are warranted to confirm our findings. We have to increase awareness of women regarding this disease and start screening to high risk patients in this age group.

**Ethical Clearance:** Taken from the Arabic Board of Health Specialization.

**Source of Funding:** Self-funded.

**Conflict of Interest:** no conflict of interest.

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# How Do School Nurse Programs Influence Premarital Sexual behavior In Adolescents?

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## Abstract

**Background:** Teens are very vulnerable to premarital sexual behavior. The impact includes unwanted teen pregnancy and sexually transmitted infections. Prevention efforts need to be done effectively and one important way is through school nurse programs.

**Objective:** This study aimed to identify the effects of school nurse programs on prevention premarital sexual behavior.

**Method:** This research was a quantitative, quasi-experimental study with a nonequivalent (pretest and posttest) control group design. This research was conducted in two schools from January to February 2017. Schools were determined based on preliminary studies with predetermined criteria. Determination of School A as the intervention group and School B for the control group used a simple random sampling method. The purposive sampling method was used to select 68 students for the intervention group and 66 students for the control group. The data were analyzed by paired t-tests. Ethical approval was given with permit number Ref: KE/FK950/EC/2015.

**Results:** After the school nurse program, the values of healthy dating behavior, behavior of saying no to premarital sex and behavioral decision-making ability in the intervention group were higher than in the control group:  $0.200 \pm 0.42$  vs.  $-0.203 \pm 0.20$ ,  $p = 0.000$ ;  $0.193 \pm 0.40$  vs.  $0.032 \pm 0.43$ ,  $p = 0.029$ ; and  $0.032 \pm 0.18$  vs.  $-0.251 \pm 0.23$ ,  $p = 0.000$  which were significantly difference ( $p < 0.05$ ). Meanwhile, there was also an increase in the value of self-efficacy in adolescents in both the intervention and the control groups:  $0.017 \pm 0.22$  vs.  $0.053 \pm 0.19$ ,  $p = 0.315$ , but the differences in the two groups were not significant.

**Conclusion:** School nurse programs can effectively reduce premarital sexual behavior, especially by increasing healthy dating behaviors, the behavior of saying no to premarital sex and behavioral decision-making abilities in adolescents.

**Keywords:** *Adolescents, premarital sexual behavior, school nurse program, self-efficacy, dating behavior.*

## Introduction

Premarital sexual behavior has a bad impact on adolescents. The number of adolescents who died from pregnancy and childbirth reached as many as 70,000 deaths<sup>1</sup>. Pregnancy and childbirth can cause teens to experience serious pregnancy complications. Complication rates will increase in gestational ages less than 15 years<sup>2</sup>. Adolescents are also at risk of unsafe abortion and 65% of adolescents have fistulas in their reproductive organs due to childbirth complications<sup>3</sup>.

Adolescents are also at risk of having sexually transmitted infections due to premarital sexual behavior. The number of sexually transmitted infections in female adolescents have a higher prevalence than male adolescents<sup>4</sup>. Adolescents are also a very vulnerable population to contract Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS). Very few teenagers who access and get services from health services for the prevention of these diseases. Adolescent knowledge of STD and HIV-AIDS is very

low, and adolescents who receive examinations for these diseases are extremely rare<sup>5</sup>.

The most important interventions for the prevention of pregnancy in adolescents are mostly done in schools, particularly in teenage classes. Several studies in the review reported that the intervention was also integrated with the school curriculum they received at school<sup>6</sup>. Kirby<sup>7</sup> state, there is a positive effect of school characteristics and school-specific programs on the prevention of risky sexual behavior.

School nurse programs have not been prevalent in Indonesia. School nurse as a nursing professional practitioner in charge of facilitating a positive response of child or adolescent development<sup>8</sup>. This study aimed to identify the effects of school nurse programs on preventing premarital sexual behavior as indicated by self-efficacy to prevent premarital sexual behavior, healthy dating behavior, saying no to premarital sex and decision-making behavior.

### **Material and Method**

This research was a quasi-experimental study with nonequivalent (pretest and posttest) control group design. This research design included an experimental group, that is group A and a control group, that is group B, in which both groups were selected without randomization. In both groups, pretest and posttest measurements were performed.

The sample of research was determined by School A in Jetis Subdistrict and School B in Tegalrejo Subdistrict because the number of teenage births in those sub districts were considered high in 2013. Both schools were selected based on preliminary studies conducted by researchers. Simple random sampling was conducted to determine which school would act as the intervention group and which school would be the control group.

The sample population for the research included students of the senior high school class X and XI in School A and School B. The inclusion criteria: the

students enrolled in School A and School B, still in class X and XI, who had dating experience, willing to be research respondents and attend personal and social skills training. Exclusion criteria: students who did not follow and complete the full range of personal and social skills training. Based on the results of the sample calculation with  $\alpha$  95% and  $\beta$  90%, the obtained minimum result of the sample size was 29.05. To anticipate the dropout sample, 10% of the total was added to a minimum of 32 samples per group. However, the implementation of this study included all students in class X, and XI who met the inclusion criteria<sup>9</sup>.

Students in the intervention group received school nurse programs, which contain adolescent reproductive health education through training in personal and social skills<sup>10</sup> provided by school nurses. The students in the control group received routine interventions from the public health center in the form of reproductive health education. School nurses are generalist nurses who have received special training on adolescent reproductive health education conducted by psychologists. The psychologists have had clinical experience in handling youth and are certified as trainers.

The instruments used in this study consisted of 4 instruments: 1) self-efficacy questionnaire to prevent premarital sexual behavior, 2) rubric for measuring healthy dating behavior, 3) observation checklist for measuring behavior of saying no to premarital sex, and 4) questionnaire to measure the ability to make decisions related to premarital sex. All measuring instruments have passed the tests of validity and reliability, tested in SMK C of Jetis Sub district which has similar characteristics with 145 respondents of the research, so the instruments were considered valid and reliable. Data were analyzed by unpaired t-tests to compare scores in each unpaired group and paired t-tests to compare scores in the paired groups. This research received approval from the Medical and Health Research Ethics Committee of the Faculty of Medicine Universitas Gadjah Mada with certificate number Ref: KE/FK/950/EC/2017.



**Findings:**

**1. Characteristics of respondents**

**Table 1. Student Characteristics in the Intervention and Control Group**

Participant characteristics (n=134)	Intervention Group (n=68)		Control Group (n=66)		p-value
	Number	(%)	Number	(%)	
<b>Gender</b>					
Female	35	51.47	43	65.15	0.076
Male	33	48.53	23	34.85	
<b>Class</b>					
X	30	44.11	29	43.93	0.561
XI	38	55.89	37	56.07	
<b>The order of child in the family</b>					
1-2	54	79.41	54	81.81	0.725
More than 2	14	20.59	12	18.19	
<b>The number of siblings in the family</b>					
1-2	34	50.00	25	37.87	0.122
More than 2	34	50.00	41	62.13	
<b>Father's last education</b>					
Elementary	18	26.50	28	42.40	0.052
Advanced	50	73.50	38	57.60	
<b>Mother's last education</b>					
Elementary	19	27.90	32	48.50	0.014
Advanced	49	72.10	34	51.50	
<b>Experience of getting health education</b>					
Yes	15	22.05	13	19.69	0.451
No	53	77.95	53	80.31	

**Table 2. Comparative Analysis of Self-efficacy to Prevent Premarital Sex**

Adolescence Self efficacy (n=134)	Intervention group (n=68)		Control group (n=66)		Mean Difference p-value (CI)
	Mean±SD (min-max)	Mean Difference±SD (min-max)	Mean±SD (min-max)	Mean Difference±SD (min-max)	
Pre test	3.60±0.30 (2.34 – 3.80)	0.017±0.22 (-0.78- 0.84)	3.319±0.32 (2.49-3.80)	0.053±0.19 (-0.78-0.84)	0.036 0.315 (-0.10-0.03)
Post test	3.277±0.29 (2.33 - 3.84)		3.372±0.27 (2.50-3.80)		

**Table 3. Comparative Analysis of Healthy Dating Behavior**

Healthy dating behavior (n=134)	Intervention group (n=68)		Control group (n=66)		Mean difference p-value (CI)
	Mean±SD (min-max)	Mean difference±SD (min-max)	Mean±SD (min-max)	Mean difference±SD (min-max)	
Pre test	452.452±0.41 (1.00-2.80)	0.200±0.42 (-1.20-1.20)	1.623±0.18 (1.00-2.60)	-0.203±0.20 (-1.20-1.20)	0.403 0.000* (0.27-0.49)
Post test	632.632 ±0.24 (1.00-2.00)		1.420±0.18 (1.00-2.60)		

**Table 4. Comparative Analysis of Saying No to Premarital Sex Behavior**

Saying no to premarital sex behavior (n=134)	Intervention group (n=68)		Control group (n=66)		Mean difference p-value (CI)
	Mean±SD (min-max)	Mean Difference±SD (min-max)	Mean±SD (min-max)	Mean Difference±SD (min-max)	
Pre test	1.489±0.24 (1.00-1.92)	0.193±0.40 (-0.75-1.00)	1.378±0.37 (1.00-2.00)	0.032±0.43 (-0.75-1.00)	0.161 0.029 (0.01-0.30)
Post test	1.682±0.33 (1.00-2.00)		1.411±0.31 (1.00-2.00)		

**Table 5. Comparative Analysis of Behavioral Decision-making to Prevent Premarital Sex**

Decision making to prevent premarital sex (n=134)	Intervention group (n=68)		Control group (n=66)		Mean difference p-value (CI)
	Mean±SD (min-max)	Mean Difference±SD (min-max)	Mean±SD (min-max)	Mean Difference±SD (min-max)	
Pre test	1.753±0.16 (1.23-1.92)	0.032±0.18 (-0.73-0.54)	1.729±0.19 (1.08-1.92)	-0.251±0.23 (-0.73-0.54)	0.219 0.000 (0.21-0.35)
Post test	1.786±0.15 (1.08-1.92)		1.474±0.11 (0.94-1.60)		

**Discussion**

School nurse programs in the intervention group was not been able to provide meaningful improvement in self-efficacy compared with those who did not receive school nurse program. This result is possible because of unpredictable factors not seen by previous researchers. Factors that may affect adolescent self-beliefs include religiosity. The control group with a religious background at school makes the program activities of the students more religiously oriented. Provision of religious learning and learning on how to behave well individually and socially can affect the behavior of the students. Religious learning and behavioral learning in the control school involve socio-cultural factors that influence adolescent behavior. There is a relationship between religiosity with sexual activity<sup>11</sup>.

According to the theory of social learning, self-efficacy is a contributing factor that encourages behavior change. The self-efficacy theory explains that psychological intervention can change maladaptive behavior<sup>12</sup>. Self-efficacy is also associated with a desire to test for HIV and STD<sup>13</sup>. Similar studies also observed the effectiveness of HIV-AIDS peer education programs to improve adolescent knowledge and self-efficacy<sup>14</sup>. Health education concerning sexuality helps nursing students to increase their knowledge, and explore their values and feelings about sexuality<sup>15</sup>.

The intervention group experienced an increase in healthy dating behavior, while the control group actually decreased. Dating for teenagers is also a time for recreation and a chance to have fun<sup>16</sup>. Dating is often associated with both positive and negative outcomes<sup>17</sup>. For healthy dating behavior, the most desirable outcomes are non-sexual intercourse or interventions for preventable teenage pregnancy.

The results showed an increase in the behavior of saying no to premarital sex in the intervention group, while in the control group this behavior actually decreased. The behavior of saying no to premarital sex is a change in individual behavior that will occur after being given special stimulation of the environment. This environment also enables teenagers to practice their behavior, as provided in personal and social skills training. Personal and social skills trainings also support special competencies for adolescent reproductive health, increasing adolescent self-efficacy and self-belief<sup>18</sup>.

The development of life skills helps teens to translate knowledge, attitudes and values into healthy behaviors, such as reducing health risks and adopting health behaviors that improve their quality of life in general<sup>19</sup>. The behavior of saying no to premarital sex or refusal skills according to Mellanby et al<sup>20</sup>. is one of the innovative intervention programs developed from social learning theory, where the goal is to create an

environment that can change behaviors that can stimulate changes in individual behavior. Tortorelo et al<sup>21</sup> study provides intervention in the form of safer choices where one of the outcomes is self-efficacy to declare no to premarital sex.

The provision of school nurse programs can improve two to three items of decision-making behavior more in the group who received the intervention compared with the group who did not. Behavioral decision-making ability is one component of life skills that is included in cognitive skills. Behavioral component of decision-making ability is very important in engaging in healthy activities<sup>22</sup>. Teens become capable of making complex decisions involving many factors. Some examples of factors involved in decision-making are the current desires and long-term goals, the desires of oneself and the desires of others<sup>23</sup>.

The results of this study indicated that the comparison of the average difference in the behavior of decision-making ability showed a significant difference between the intervention group and the control group. The interventions in nursing services in schools aimed to train adolescents to be able to make decisions appropriately. The situational context given in the stimulation is quite diverse from experiences with friends at school, at home, dating experience, relationships with friends, teachers and parents.

Based on the theory of cognitive control in adolescents, it is explained that the presence of cognitive control enhances the behavior of decision-making ability with long-term effects affecting the academic achievement of adolescents<sup>22</sup>. The effectiveness of the influence of an intervention on the behavior of adolescent decision-making ability can be seen in previous research by Knight et al<sup>23</sup>. The behavior of decision-making involves three tasks that relate to each other: first the normative analysis is to identify the influence that might be involved in a decision. Second is descriptive studies, i.e. individual characteristics associated with the decision can be compared with normative analysis. Third, prescriptive intervention will help someone to bridge the gap of differences in understanding.<sup>24</sup>

### Conclusions

School nurse programs involving personal and social skills training, can change the value of healthy dating behavior, behavior say no to premarital sex and behavioral decision making about premarital sex in the

intervention group is higher than the control group, with significant differences in values statistics.

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**Ethical Approval:** The study was approved by the Institutional Ethics Committee

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# Women's Involvement in Decision Making and Unmet Need for Contraception In Indonesia

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## Abstract

**Background:** The issue of gender inequality in reproductive health has a role in determining contraceptive use in women. Gender issues related to inequality in decision making are the main context in family planning interventions. The purpose of this study is to assess women's participation in decision making and its relation to unmet need.

**Method:** A cross-sectional study was conducted using IDHS data in 2012. The study involved 1516 women of childbearing age (15-49 years) with married categories in areas with high unmet need (West Papua) and the lowest unmet need area (Bangka Belitung).

**Results:** Married women in the Bangka Belitung region have more power in decision making than married women in West Papua. Involvement in economic matters and the decision to use contraception as the most dominant factor and involvement in the household have a significant relationship with the occurrence of unmet need, as well as education, wealth, and experience in using contraception related to unmet need. While age, fertility preference, husband's desire to have children, and involvement in health and mobility were not directly related to unmet need.

**Conclusions:** Better participation in decision making is higher for women in the Bangka Belitung region than in Papua. Empowerment of women in terms of the economy and the use of contraception needs to be improved so that they have power in decision making.

**Keywords:** *Unmet Need, Modern Contraception, Decision Making, Involvement.*

## Introduction

Contraceptive use is one of the government's policies to reduce the total fertility rate. Decline in TFR was not followed by a decrease in unmet need. Based on the 2012 IDHS data, the unmet need figure is still stagnant at 11%. Unmet need disparities still occur in every province in Indonesia. The highest unmet need reached 23.7% in the West Papua region while the lowest unmet need was in Bangka Belitung with a figure of 5.6%<sup>6</sup>. This is thought to have social and cultural influences that influence decisions in family planning.

Unmet need is associated with client needs that have not been fulfilled regarding the expectation of being able to delay pregnancy or the desire to be able to limit

pregnancy. The desire to fulfill these needs is based on the desire/unwillingness to have children, determine the ideal number of children and use contraception<sup>21</sup>. Related to the existence of gender issues, it shows the occurrence of inequality in terms of equality of reproductive rights. This can be seen in the differences in the desire/unwillingness to have children, the determination of the ideal number of children and contraceptive use between men and women as couples who should have a joint decision on this matter<sup>14,15</sup>.

Based on the desire to have children, almost 50% of married women say they do not want to have more children (including those who have been sterilized). But around 15% of women show the fact of pregnancy

when they don't/don't want children<sup>6</sup>. The desire to have children and determine the ideal number of children greatly affects the subject of contraceptive use. To achieve this desire, men and women must have a decision to use contraception or not to use<sup>11</sup>.

Indonesia is one of the developing countries that is still influenced by social and culture which places women in a position below men<sup>14</sup>. This affects women's participation in making decisions in all aspects. Indonesia is a patriarchal society that believes that women are inferior to men<sup>23</sup>.

This is supported by The Conference on Population and Development (ICPD) in Cairo 1994, a testament to the commitment of the international community on issues of gender, population and development with a new perspective. Decisions in contraceptive use and fertility are thought to be the influence of gender inequality especially in patriarchal societies<sup>1</sup>. Studies in Ethiopia show male dominance of women leads to an increase in the number of children<sup>20</sup>. Studies in sub-Saharan Africa also illustrate that there are indications of decision-making problems that affect contraceptive use by women without their partners knowing<sup>3</sup>.

The disparity in the number of unmet need may be caused by the existence of a strong patriarchal system in several regions. Therefore, the aim of this study is to assess women's participation in decision making and its relation to unmet need in regions with high and low unmet need in Indonesia.

## Method

**Study area and setting:** The cross-sectional study was conducted using IDHS data in 2012. Data measurements were carried out in two regions, namely Bangka Belitung as the area with the lowest unmet need numbers and West Papua as the highest unmet need number.

**Sampling:** This study involved 1516 women of childbearing age (15-49 years) with married categories. Using data from the Indonesian Demographic and Health Survey (IDHS) in 2012, the research design used was cross sectional.

**Measurement:** Participation in decisions is an

independent variable measured using the autonomy index obtained based on the literature<sup>4,9,12,22</sup>. Questions related to participation followed the questionnaire in the Indonesian IDHS survey which included women's participation in decision making in terms of economy, household, mobility and health. Questions related to decision making are categorized as having high autonomy in decisions if women are involved in all aspects of decision making. Moderate autonomy if there is  $\leq 2$  decision aspect involvement and does not have autonomy in the decision if there is  $\leq 1$  decision aspect involvement. Contraceptive use is a dependent variable with unmet need categories and not unmet need. Unmet need is indicated if women have the desire to postpone pregnancy or do not want to have more children, but do not use any contraception to prevent pregnancy. Other variables that are indirectly related to women's decision participation will also be measured such as age, employment, education, resident, fertility preference, and wealth.

**Statistic Analysis:** Data was processed using Statistical Package for the Social Sciences (SPSS) software version 15.0. Univariable, bivariable and multivariable analysis was carried out. Chi square will be used to see the closeness of the relationship between variables and logistic regression test to identify the most significant of variable.

## Result

**Socio demographic characteristics:** Most of the respondents in the two regions were in the age group 25-29. The majority of married women have education at the primary and secondary levels in both regions. But in West Papua more women with higher education than in Bangka Belitung. While the economic level in West Papua is lower than Bangka Belitung (see table 1).

**Reproductive Health Characteristic:** Regarding contraceptive use, it turned out that the dominant women used traditional method to delay pregnancy in both groups. About 27.2% of women in Bangka no longer want children, while 22.8% still plan to become pregnant. In contrast, in West Papua, there are fewer women who do not want children (17%) compared to women who still want to add children (20.1%). For more details can be seen in table 1.

**Table 1. Socio demographic variabls of married women (N= 1516)**

	Bangka Belitung (%)	West Papua (%)	Total (%)
<b>Age Group</b>			
15-19	23(1,5)	33(2,2)	56(3,7)
20-24	119(7,8)	101(6,7)	220(14,5)
25-29	162(10,7)	139(9,2)	301(19,9)
30-34	156(10,3)	149(9,8)	305(20,1)
35-39	154(10,2)	114(7,5)	268(17,7)
40-44	97(6,4)	95(6,3)	192(12,7)
45-49	102(6,7)	72(4,7)	174(11,5)
<b>Educational Level</b>			
No	30(2)	36(2,4)	66 (4,4)
Primary	394(26)	(196)12,9	590(38,9)
Secondary	323(21,3)	364(24)	687(45,3)
Higher	66(4,4)	107(7,1)	173(11,4)
<b>Wealth Index</b>			
Poorest	75(4,9)	221(14,6)	296(19,5)
Poorer	165(10,9)	115(7,6)	280(18,5)
Middle	168(11,1)	159(10,5)	327(21,6)
Richer	218(14,4)	145(9,6)	363(23,9)
Richest	187(12,3)	63(4,2)	250(16,5)
<b>Ever Used to Delay</b>			
No	90(5,9)	224(14,8)	314(20,7)
Yes outside calendar	55(3,6)	84(5,5)	139(9,2)
Yes, used calendar	668(44,1)	395(26,1)	1063(70,1)
<b>Fertility Preference</b>			
Have another	337(22,8)	298(20,1)	635(42,9)
Undecided	56(3,8)	70(4,7)	126(8,5)
No more	402(27,2)	252(17)	654(44,2)
Sterilized	15(1)	28(1,9)	43(2,9)
Infecund	2(0,1)	19(1,3)	21(1,4)
<b>Husband Desire for Children</b>			
Both want same	548(38,4)	256(17,9)	804(56,3)
Husband wants more	119(8,3)	139(9,7)	258(18,1)
Husband wants fewer	37(2,6)	18(1,3)	55(3,9)
Don't know	90(6,3)	220(15,4)	310(21,7)

**Decision making power in both area:** Overall, the power of decision making in the West Papua region is lower than Bangka Belitung. There were no significant differences in decision making in the aspects of health services, household and mobility in both groups. But in the economic aspect, the involvement of women in West Papua was lower (39.6%) compared to Babel (48.1%).

Likewise with the decision in contraception, as many as 27.8% of women in West Papua and 19.7% of women in Babylon were not involved in the decision.

**Factor Related unmet need of contraception:**

**Unmet need and socio demographic:**

**Table 2. Unmet need and characteristic of socio demographic of married women (N= 1516)**

Socio Demographic	No Unmet need	Unmet need	p value
<b>Age in Group</b>			
15-19	26(1,7)	10(0,7)	0,000
20-24	69 (4,6)	24(1,6)	
25-29	69 (4,6)	27(1,8)	
30-34	32 (2,1)	30(2,0)	
35-39	32(2,1)	25(1,7)	
40-44	12(0,8)	29(1,9)	
45-49	2(0,1)	22(1,5)	
<b>Education Level</b>			
No Education	11(0,7)	6(0,4)	0,082
Primary	61(4,0)	60(4,0)	
Secondary	134(8,9)	79(5,2)	
Higher	36(2,4)	22(1,5)	
<b>Wealth Index</b>			
Poorest	55(3,6)	48(3,2)	0,000
Poorer	48(3,2)	31(1,1)	
Middle	50(3,3)	36(2,4)	
Richer	59(3,9)	24(1,6)	
Richest	30(2,0)	28(1,9)	
<b>Ever used to delay</b>			
No	126(8,3)	60(4,0)	0,000
Yes outside calendar	17(1,1)	25(0,9)	
Yes, used calendar	99(6,5)	82(5,4)	
<b>Fertility preference</b>			
Have another	180(12,2)	58(3,9)	0,000
Undecided	33(2,2)	25(1,7)	
No more	28(1,9)	84(5,7)	
Sterilized	0	0	
Infecund	0	0	
<b>Husband desire for children</b>			
Both want same	124(8,7)	73(5,1)	0,000
Husband wants more	47(3,3)	30(1,1)	
Husband wants fewer	4 (0,3)	6(0,5)	
Don't know	66(4,6)	56(4,0)	

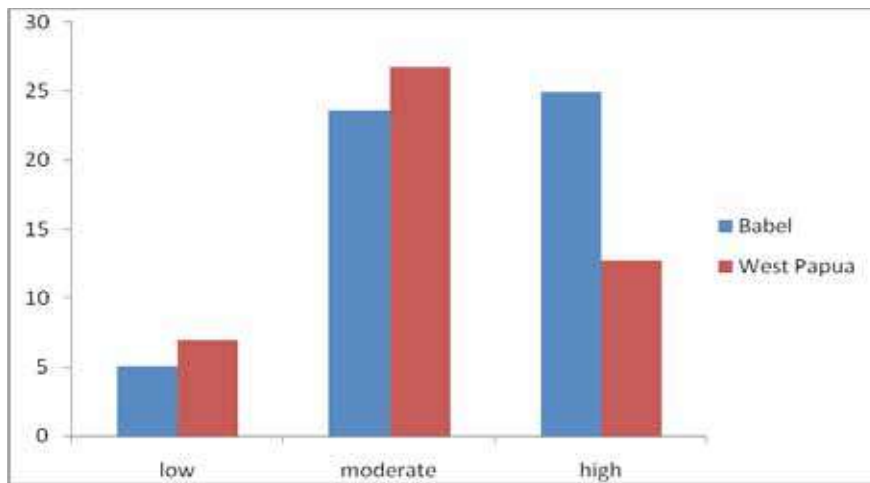


Figure 1. Power of Decision Making on Married women in Bangka Belitung and West Papua, Indonesia 2012

**Unmet need and decision making:** Involvement in health service, household and mobility aspects in both groups showed that women without cases of unmet need had better involvement than unmet need groups. Similar to the low number of women’s involvement in these three aspects, there were more women who did not experience unmet need. There are 13.9% of women in the group without unmet need involved in economic matters while in the unmet need group only around 9%. And as much as 7.5% of women without unmet need have better involvement in contraception compared to 5.2% of the unmet need group.

Table 3. Unmet need and involvement decision making of married women (N= 1516)

Decision Making	No Unmet need	Unmet need	p value
<b>Health care</b>			
Low Involvement	34 (2,2)	20 (1,2)	0,073
Better Involvement	208(13,7)	14,7(9,7)	
<b>Household</b>			
Low Involvement	48(3,2)	26(10,1)	0,159
Better Involvement	194(12,8)	142(11,2)	
<b>Movement</b>			
Low Involvement	47(3,1)	32(2,2)	0,713
Better Involvement	195(12,9)	135(9)	
<b>Economy</b>			
Low Involvement	32(2,1)	31(2,1)	0,050
Better Involvement	210(13,9)	136(9)	
<b>Contraception</b>			
Low Involvement	147(9,7)	132(9,4)	0,000
Better Involvement	113(7,5)	79(5,2)	

Discussion

Table 4. Logistic regression analysis : dependent variable-unmet need

	Significance	Odds ratio (95% confidence interval)
<b>Education Level</b>		
No Education	0,000	1
Primary	0,156	0,56(0,25-1,24)
Secondary	0,070	0,47(0,21-1,06)
Higher	0,040	0,39(0,15-0,97)
<b>Wealth Index</b>		
Poorest	0,000	1
Poorer	0,049	1,63(1,00-2,68)
Middle	0,008	1,92(1,18-3,13)
Richer	0,001	2,32(1,40-3,82)
Richest	0,060	1,67(0,97-2,86)
<b>Ever used any contraception</b>		
No	0,000	1
Yes, outside Calendar	0,000	0,17(0,11-0,28)
Yes, with Calendar	0,000	2,30(1,58-3,35)
<b>Involvement in Household</b>		
Low involvement	0,000	1
Better involvement	0,058	0,63(0,39-1,01)
<b>Involvement in Economy</b>		
Low involvement	0,000	1
Better involvement	0,007	1,90(1,19-3,03)
<b>Involvement in Contraception</b>		
Low involvement	0,000	1
Better involvement	0,000	1,80(1,30-2,48)

The results in this study to prove the assumption of participation or involvement of women in decision



making in all aspects are closely related to the incidence of unmet need.

The results of this study indicate that the dominant factor affecting the unmet need is the involvement of women in decisions in the economy and contraception. This is consistent with the research conducted by another research that Decision-making was found to be positively associated with contraceptive use and not having unmet need for contraception<sup>5,18</sup>.

Decisions in terms of economics influence decisions in contraceptive use, allegedly because finance affects authority. This is consistent with the study of Palamulenithat employment status factors influence contraceptive use in women<sup>19</sup>. This research is also found that there were no significant differences between the two regions in terms of decision making in health services and mobility. This is presumably because the government has been maximal in its efforts to equalize health both in terms of facilities and officers. While for decisions in terms of mobility, now it may have become a thing that is not rigid and taboo to do, so that cases of mobility related to visits to relatives and friends are not the dominant thing to discuss.

This study also found that low involvement in household-related decision making, economy and contraception was more dominant in the West Papua region. This is allegedly related to economic growth. This study found that the middle to upper class people based on wealth index were more dominant in the Bangka Belitung region. The situation of economic growth affects the economic level of the family. Possibly in the West Papua region, the status of work is more for men than women<sup>15</sup>. So that women in the region depend on their husband/partner's livelihood. This is also affects household decisions and contraceptive use.

Contraceptive use can be influenced by external factors related to the position of women in social life<sup>9,10</sup>. The assessment of women's position has been assessed by gender differences that place women and men in accordance with their functions and their respective roles<sup>2</sup>. Problems arise when there are gender inequalities that limit each other's rights<sup>13</sup>. Gender-based power inequalities can limit open communication between partners about reproductive health decisions and women's access to reproductive health services, which contributing to poor health outcomes The importance of partner communication is often emphasized in family

planning and research programs, this is the first step in making rational fertility decision processes<sup>17</sup>. In developing countries some women have low bargaining positions. In fact, women who are either under collective decision making with their partners or completely dependent on the decisions of male partners on the issue affect their reproductive lives<sup>8</sup>.

## Conclusion

The findings indicate that creating conditions for women who can improve their financial status by increasing women's empowerment in terms of economy can increase autonomy in maintaining the right to reproductive health itself. This research is limited by data available to measure women's empowerment. Other limitations of this study are uses cross sectional which cannot determine the temporal relationship between two variables.

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# Needs of Family Caregiver Education for Caring Stroke Patients at Home

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## Abstract

Stroke is a major cause of long-term disability. It causes the patient to be family-dependent. Caring stroke patients is a burden for the family caregivers. They must adapt to the patient's condition and be able to handle the patient. Meanwhile, the stroke incidence is unpredictable so the family does not have time to prepare themselves in caring the patient. Thus, the hospital must be able to meet the educational needs of the family in caring stroke patients at home. This study aims to explore the educational needs of family caregivers in caring stroke patients at home. This study applies a qualitative approach and data analysis using Collaizi. This research was conducted through in-depth interviews on fifteen stroke family caregivers at Haji General Hospital, Surabaya. The results of this study indicated that the needs of stroke family caregiver education are: physical education (education about medical rehabilitation training at home, mobilization and transfer of patients, training of handling patients' ADL, signs, symptoms and risk of recurrent stroke); for psychological education and structured discharge planning education.

Keywords: *Stroke family caregiver, education, needs.*

## Introduction

The World Health Organization (WHO) defines stroke as rapidly developing clinical signs of focal (global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin. According to the World Stroke Organization, strokes have now become an epidemic in the world. Worldwide, stroke is the second leading cause of death. The current trend shows that the annual number of deaths will increase to 6.7 million in 2015 if no appropriate action are taken. Aside

from being a cause of death, stroke is a major cause of long-term disability.

Disability (physical disability) results in sufferers experiencing difficulties on their daily activities, therefore they need assistance<sup>1</sup>. Family support is expected to help patients optimize the rehabilitation phase of patients so that they can improve the quality of life for post-stroke patients<sup>[1]</sup>. However, family members carry the burden of continuous treatment for the stroke patients<sup>[2]</sup>. Stroke patients and their families often report that they have not been given enough information about strokes and feel unprepared for life after returning from the hospital. The results of a study conducted by Shyu et al (2008)<sup>[3]</sup> found that families of stroke patients often felt they were not prepared enough to meet the physical, cognitive, and emotional needs of stroke patients. The patient's family only received little informations in caring the patient at home. Nurses provide less information about things that relate to patients' daily needs and how families can overcome problems that arise. Therefore, researchers are interested to explore the educational needs of stroke family caregivers.

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## Method

**Research Design:** The type of this research includes descriptive research with qualitative method, phenomenological approach. This phenomenological approach is to understand, explain and give deep meaning to the educational needs of the family caregiver about post-acute care for stroke patients at Hospital based on their perspective at the time this research was conducted. The study data was collected through in-depth interviews. The researcher also made field notes to comprehensively better ensure the completeness of the data.

**Sample:** This research was conducted in a hospital of East Java provincial government. Total of 15 stroke family care givers participated in this study. The participants consisted of fourteen women and one male. The age of participants varied from 25 to 68 years. The final education of participants in this study varied from high school to Bachelor's Degree.

**Data Analysis:** Data analysis was carried out using the Collaizi method. The order of data analysis were performing verbatim transcription, identifying the keywords, categorizing, determining sub-themes, conducting validation to participants and determining the final theme of the study.

## Result

One of the effects of stroke is the existence of limitations in carrying out daily activities. This is a burden for the family caregiver, as they have to help the patient's daily activities. Meanwhile, family caregivers have limitations in physical, knowledge and skills. Therefore, providing the family caregiver a proper education is very important. The results of the study found three themes, which were physical, psychological and structured discharge planning education needs.

**Physical Education Needs:** Education related to the patient's physical condition is the most needed requirement by the family caregiver. The physical education needed by family caregivers including: education about medical rehabilitation training at home, mobilization and transfer of patients, training of handling patients' ADL, signs, symptoms and risk of recurrent stroke.

**1. Medical rehabilitation training at home:** The majority of informants mentioned that they needed education about medical rehabilitation, i.e. how

to do the proper therapy on the legs, arms and communication for the patient. The excerpts from the interview are as follows:

"I want to get some information on how to practice lifting hands, they are heavy, right? So, how?" [Ik2, child]

"So, you know, it feels stiff to stand up. What do I have to do to make it easier to walk?" [Ik5, child]

"How to recover the way (the patient) talk? Is there a cure or exerciset to be back like normal?" [Ik11, wife]

### 2. Mobilization and transfer of patients:

Mobilization is assumed to be one of the things that health workers need to provide. Some informants said that they wanted to know how to practice walking and using a cane during walking exercises. The result of the interviews were as follows:

"My husband can already take a step, but I'm still afraid if he ask me to train him to walk. He uses a walking stick, so how to use it?" [Ik7, wife]

"She asked for a walk using a wheelchair later at home. I'm afraid she would fall when I put her on the wheelchair. I want someone to teach me how." [Ik9, husband]

"Usually, I just tilt (the patient) to the right because the left hand hurts. Of course I'm afraid when doing it. I want to be taught on how to tilt the body" [Ik4, child]

**3. Training and handling of patient's ADL:** Some informants complained about how to help assist patient's ADL. This is because patients were unable to carry out their own activities. An education about ADL assistance needed were how to help patients wearing clothes, how to bathe and how to feed the patients without making them choke.

"It's hard to help him wearing clothes because his hand can't move. What is the proper way to do it? Can I pull his hand? Because I'm afraid to do it and leaving him naked is quite impossible." [Ik8, wife]

"When I bathe him, it confuses me. It's too heavy to lift the hand, but is it okay to wipe (the hand)? I want to learn the right way to wipe the hand, how to tilt the body, and what if bathing him once a week? I want to ask about the treatment. I still find it difficult." [Ik7, wife]

"The patient sometimes choke when eating. Why is it? [...] how to avoid that?" [Ik2, child]

One participant stated that it is essential to provide the education on feeding the patients properly using nasogastric tube, the side effects, recommended lying positions during feeding, how to regulate food menus, and how to prepare food for feeding through a nasogastric tube, as expressed by one participant the following :

"How to feed (the patient) in lying position. Is it okay to feed (the patient) with this position? And if (the patient) must sit, how is the right way to sit? And then what is the side effect? I just want to know." (Ik3, child)

"How to put on diapers? Because it's hard to lift the body. I'll be doing it by myself at home later." [Ik13, child]

#### **4. Signs, symptoms and efforts to prevent the risk of recurrent stroke. The majority of informants stated that they wanted to know how to prevent recurrent stroke.**

"I once heard the stories of those people, they said don't let (the patient) fall down, or else it will worsen the condition. It's so scary. Is that true? If so, they should've told us so we would be careful" [Ik1. Wife]

"The doctor explained yesterday, said there was a golden period or something. So if (the patient) have another stroke, we must help in hours. How do you do it? This would freak me out. I would like to ask this again to the doctor again because it is quite important." [Ik2, child]

**Psychological Education Needs:** Educational needs about how to deal with patients' psychological changes are also important for the informants. They complained that they were their confused about the patient's psychological changes and how to deal with their condition who became easy to get angry, be offended, and be sad. They sometimes became emotional when dealing with angry patients. Some interview quotes were as follows:

I am so confused, why does my husband become quiet, sometimes he suddenly cries, he wasn't like that before. He just wants to talk to his child. What should I do? Who can explain this to me? [IK1, wife]

"Father gets angry easily now. When his children visit him, it seems like he wants to start a fight with them [...] How do I make him calm? That's what I want to know." [Ik2, child]

When my father gets angry, sometimes I'm so exasperated, I feel like pinching him. But sometimes I feel sorry for him too. What is the solution when it comes like this? I myself am also tired of taking care of everything [...] I want to learn how to handle this kind of situation [Ik4, child]

Moreover, education on how to motivate and encourage patients is also needed for by the caregivers. According to them, some patients feel sad and despair in experiencing their condition. The excerpt of the interview is as follows:

For me, I want to know how to get back the patient's spirit to live again. It's sad when he can only cry and doesn't want to do anything [Ik6, wife]

I don't know what to do. Please teach me to make the patient to stay motivated [I4, child]

**Structured Discharge Planning Needs:** The discharge planning given to the family caregivers has not been structured so far. All informants stated that the provision of education by the PPA (professional caregivers) related to planning the return of stroke patients was very important. The majority of informants stated that education is needed as their guide in caring their affected family members at home. This was revealed by several participants:

"Yes, I want to be told that at home, about what to do for the (muscles and joints) exercise, and what's not, so I can take care of my parent" (Ik14, child)

"Yes, about taking care of the sick, for example, taking care of the diet, bathing, the exercise for walk" (Ik 13, child)

## **Discussion**

Family caregiver requires education from caregiving professionals so that they are able to treat patients properly at home. The required information is related to physical education needs (medical rehabilitation training at home training, mobilization and transfer of patients, handling patients' ADL and early symptoms of stroke). Whereas the need for psychological education is related to the patients' psychological changes and how to handle them. All informants stated that they needed education about how to perform medical rehabilitation at home. Changes in patients' neurological deficits caused them to experience limitations and became dependent on the family caregiver. In order to avoid the long term impact

of the neurological deficit, the family caregiver must learn about the rehabilitation techniques [4].

Organ dysfunction in stroke patients causes them to depend on the family caregiver to carry out daily activities. In handling ADL (Activity Daily Living), the family must have the skills so that the patient's ADL can be handled properly and to minimize the occurrence of complications. For example, bathing the patient must be done as clean as possible to avoid the risk of decubitus, improper feeding can increase the risk of pneumonia and improper way of wearing clothes will make it difficult for the process. Safe transfer techniques are important to prevent injury. Therefore families need to get education about safety and prevention of falling down.

The majority of informants also needed education regarding explanations about the introduction of stroke symptoms and prevention of complications. This is important to provide proper and fast handling and prevent recurrent strokes. Not only that, an education about how to manage risk factors such as hypertension, heart disease, diabetes, high cholesterol, and smoking is important to prevent recurrent stroke [4].

Based on the results of the study, psychological education is also a necessity for stroke patients. This is due to the fact that stroke patients generally experience dysfunction of mental and psychological activity that is manifested by emotional lability that shows the reaction easily or inappropriately [5]. Moreover, stroke patients usually show loss of self-control, so they tend to become easily angry and offended.

Hospitals need to assess the needs of education for the family caregiver. By doing so, the education provided will be in accordance with their needs. Education needs to be given in the form of knowledge and skills improvement to obtain the ideal result.

Discharge planning is a component of an ongoing treatment system for clients and helps families to find a way to solve the problems [4]. Discharge planning aims to help patients and families achieve optimal levels of health. Discharge planning starts on the day the patient is hospitalized, followed by scheduled update according to the patient's condition. The results of the study showed that the return planning was not structured. Most participants said they had been given an explanation of how to treat stroke patients. However, it seems not quite enough because the informants do not directly practice the procedure. Moreover, there was no evaluation to

see the extent to which the informants understood the education provided. This was expressed by most participants, where they said that nurses had told them what to do, but were limited to giving information and without providing explanations on how to perform correctly. Meanwhile, some of other participants said they knew various ways to do treatment, by seeing nurses working.

The role of nurses besides providing nursing care directly, they also provide information, education and skills needed by the family caregiver. In providing the information, education and skills, their goal is to aim for families to understand about stroke and to know the proper treatment [6]. Good knowledge, attitudes and behavior of the family will encourage patient gradually become independent. Health treatment at home as part of the nursing process at the hospital. Medical surgical specialist nurses have a great role in appropriate discharge planing to the patient's condition [7]. Warhola (1980) [8] mentioned that specialist nurses play a role to planning and coordinating nursing care according to the needs of patients and families. As the executors of nursing care, specialist nurses provide and evaluate nursing care. Structured discharge planning application is very necessary to make family caregivers be independent. In order do Structured discharge planning, it is necessary to have social support from various parties such as nurses, hospital management and family caregivers. The existence of social support from various parties will make the program run smoothly [9].

## Conclusion

The results of this study indicated that the family caregiver requires education from caregiving professionals for caring stroke patients at home. This education is their provision in caring patients at home. Assessment on educational needs is important in order to meet the educational needs of stroke family caregivers. Education is given in accordance with the needs of the results of the assessment in the form of knowledge and skills. To see the extent to which family caregivers can learn about the education provided, an evaluation is needed. Hospitals are expected to be able to meet the educational needs for stroke family caregivers so that they are ready to for caring patients at home.

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# Risk Factor for Anxiety on Clients with Diabetic Foot Ulcer

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## Abstract

Anxiety is one of the psychological responses experienced by clients with diabetic ulcers that can affect glycemic control, serious complications, foot self-care behavior and slow the wound healing process. This research used to find out the factors that influence anxiety in clients with diabetic ulcers. This study was a retrospective analysis using medical records and diagnostic results of diabetic ulcers at Haji General Hospital, Surabaya, Indonesia. The sample was 951 people suffering from diabetic ulcers between January 2014 - December 2018. Samples were diagnosed with anxiety based on nursing diagnoses and fulfilling inclusion and exclusion criteria. The multivariable model of diabetic ulcer client anxiety was generated using stepwise logistic regression. There were independent variables affecting the anxiety of diabetic ulcer clients namely wound type ( $p < 0.015$ ; OR = 0.91), health insurance ( $p < 0.001$ ; OR = 0.77) and gender ( $p < 0.040$ ; OR = 0.98) with the contribution of the four independent variables at 31% and the prediction accuracy of 86.6%. Gender of patients have a risk of 0.98 times experiencing anxiety, male contribute 0.64 times compared to female, so nursing interventions can be focused on wound care.

**Keyword:** Predictive, Risk Factor, Diabetic foot ulcer, Anxiety.

## Introduction

In 2030, it is estimated that DM ranks 7th in the cause of death in the world<sup>1,2</sup>. The World Health Organization states that the prevalence of DM worldwide is estimated at 9%. One of complication of DM is diabetic foot ulcer (DFU). In Indonesia patients with chronic diseases such as DFU tend to experience anxiety because the stigma associated with DFU in society is bad. The stigma of DFU in Indonesia is associated with incurable diseases, possible amputation and death. Anxiety is one of the psychological responses experienced by DFU sufferers because of changes in health, loss of function, and non-intact conditions in the body such as injuries, amputations and affect foot self-care behavior then slow healing process in DFU and a decrease in quality of life<sup>3,4,5</sup>.

One of the effects of anxiety is the length of the wound healing process. Research conducted by Razjouyan, et al, found an association between anxiety and wound healing. DFU people with anxiety experience delays in healing wounds. Pedras, et al, found a significant relationship to anxiety and quality of life of people with DFU. Anxiety that occurs shows that they experience ineffective psychosocial adaptations<sup>6</sup>.

People with chronic diseases, such as DFU, who can adapt well will be able to accept the reality of their illness, rearrange and restructure the environment so that there is meaning and purpose in quality of life that exceeds the limitations posed by the disease<sup>7</sup>. Dealing with anxiety is the responsibility of the health care provider who, of course, includes nurses. Efforts that have been made in the treatment room to deal with anxiety are health education, pharmacological therapy, non-pharmacology and stress management but have not been optimal in reducing anxiety in clients<sup>8</sup>.

Fear, anxiety, and dread may affect a person's relationship to his or her sense of safety, whether in term of diabetes or in relation to other chronic conditions. These emotions are causal factors that influence whether or not people with symptoms seek treatment in a timely manner. Some of the most informative responses in the research presented here involve avoidance of health care visits because of the fear of being told they have developed DFU. It is important to study related causes of anxiety in patients with diabetic ulcers. Factors that can influence are individual patient factors or hospital service systems. Individual patient factors including



demographics, age, gender, education and others. service system factors are from insurance to the referral system. All hospitals in Indonesia are required to accept patients with BPJS insurance. Failure in management anxiety is due to a mismatch between the anxiety experienced with the therapy provided, so it is very important to study related anxiety itself. Nurses as one of the health professions are required to be able to facilitate the basic needs of clients, one of which is psychological needs with a nursing process that views humans as a whole and uniquely puts forward a holistic approach that includes bio-psycho-socio-spiritual and cultural <sup>9</sup>. Previous studies have been carried out and only analyze anxiety in DM patients not DFU. This study aims to find factors that influence anxiety that occur in clients with diabetic ulcers.

### Method

This research used to find out the factors that influence anxiety in clients with diabetic ulcers. This study design was a retrospective analysis.

**Ethical Clearance:** Ethical clearance was obtained from The Ethics Committee of the Hajj General Hospital, Surabaya (ethics approval number 073/13/KOM.ETIK/2019).

**Partisipant:** Data were collected by a medical record and diagnostic results of diabetic ulcers at Haji General Hospital, Surabaya. The sample were 951 people suffering from diabetic ulcer between January 2014 - Desember 2018. The inclusion criteria determined in this study were patients over 40 years old, had foot ulcers, HbA1c values above 6.5% and diagnosed with anxiety based on nursing diagnoses. The specified exclusion criteria are having a mental disorder.

**Variables:** Data collected as variables in this study were gender, duration of diabetic ulcers, use of health insurance, type of injury, length of stay and complications. Data is collected using a checklist sheet consisting of these items. The collected data then categorized based on the provisions set.

**Statistical Analysis:** The Statistical Analysis using SPSS 25 generated using stepwise logistic regression. The first step is to classify the entire data obtained by categorical 1 and 2. The next step is to crosstab the data and choose the chi-square that serves to make variable selection. Variables that have a value of  $p < 0.25$  will be

included in the multivariate logistic regression analysis with the provisions  $p < 0.05$ . The results of logistic regression are then interpreted and presented.

### Result

**Participant Characteristics:** Participant characteristics can be seen in table 1. Based on the table, there are 742 men and 209 women. BPJS users are more dominant than non BPJS. The type of infection wound is the most type and the duration of treatment more than 3 days is also dominant. Duration of diabetic ulcers more than 7 months and complication more than 1 also dominant. Of the 951 participant there are differences regarding anxiety status. Participants who experience anxiety are more around 824 and are not anxious 127

**Table 1. Characteristics of Participant**

Variabel	N = 951	N%	Mean	SD
Gender			0.78	0.41
Women	209	22		
Men	742	78		
Duration of diabetic ulcers			0.62	0.48
Less than 7 months	359	37.7		
More than 7 months	592	62.3		
Length of stay			0.78	0.42
Less than 3 days	212	22.3		
More than 3 days	739	77.7		
Health insurance			0.75	0.43
Non BPJS	242	25.4		
BPJS	709	74.6		
Wound type			0.70	0.45
Non Infectious	281	29.5		
Infectious	670	70.5		
Complication			0.63	0.48
Only 1	352	37		
More than 1	599	63		
Category of Anxiety			0.87	0.34
Anxiety	824	86.6		
Non Anxiety	127	13.4		

SD : Standart Deviation; BPJS : Social Security Administrator

Risk Factor For Anxiety On Clients With Diabetic Foot Ulcer in bivariate analyses

Bivariate tests use chi square by displaying crosstab on each variable analyzed.

**Table 2. Bivariat analyze Risk Factor For Anxiety On Clients With Diabetic Foot Ulcer**

Variablel	Anxiety (N=951)	Non Anxiety (N=951)	OR	CI (95%)	P value
Gender			1.55	1.02 - 2.36	0.048
Women	172	37	1.39	1.03 - 1.88	
Men	652	90	0.89	0.79 - 1.00	
Duration of diabetic ulcers			1.51	1.04 - 2.20	0.038
Less than 7 months	300	59	1.27	1.03 - 1.57	
More than 7 months	524	68	0.82	0.71 - 0.99	
Length of stay			0.98	0.62 - 1.54	1.00
Less than 3 days	184	28	0.98	0.69 - 1.40	
More than 3 days	640	99	1.00	0.90 - 1.10	
Health insurance			1.89	1.27 - 2.81	0.002
Non BPJS	195	47	1.56	1.20 - 2.02	
BPJS	629	80	0.82	0.71 - 0.94	
Wound type			1.66	1.13 - 2.45	0.012
Non Infectious	231	50	1.40	1.10 - 1.78	
Infectious	593	77	0.84	0.72 - 0.97	
Complication			1.25	0.86 - 1.83	0.278
Only 1	299	53	1.15	0.91 - 1.44	
More than 1	525	74	0.91	0.78 - 1.06	

CI : Confidence Interval ; OR: Odds Ratio; BPJS : Social Security Administrator

From table 2 there are 4 independent variables that fit significant criteria. The chi-square test found a wound type (p <0.012; OR = 2.4), duration of illness (p <0.038; OR = 1.03), health insurance (p <0.002; OR = 0.82) and gender (p <0.048; OR = 0.99). The type of wound is the most dominant factor in this test. Variables that have p

value <0.25 will then be made covariate variables in the next multivariate test.

Risk Factor For Anxiety On Clients With Diabetic Foot Ulcer with Multivariat analyze.

**Table 3. Multivariat analyze Risk Factor For Anxiety On Clients With Diabetic Foot Ulcer.**

Variables	OR	CI 95%	p value	Nagelkelke R Square
Gender			0.040	0.31
Women	1			
Men	0.64	0.42 – 0.98		
Wound type			0.015	
Non Infectious	1			
Infectious	0.61	0.41 – 0.91		
Health insurance			0.001	
Non BPJS	1			
BPJS	0.52	0.35 – 0.77		

CI : Confidence Interval ; OR: Odds Ratio; BPJS : Social Security Administrator

Based on table 3, the multivariate test results obtained using logistic regression and found three significant variables namely wound type ( $p < 0.015$ ; OR = 0.91), health insurance ( $p < 0.001$ ; OR = 0.77) and gender ( $p < 0.040$ ; OR = 0.98) with the contribution of the four independent variables at 31% and the prediction accuracy of 86.6%. One variable is Duration of diabetic ulcers not significant in the second model of the logistic regression test so it needs to be eliminated.

## Discussion

In this study in controlling confounding factors researchers used the restriction method by including all respondents who had the same confounding factors. This means that each respondent has the same characteristics as others so that other confounding factors can be minimized beyond the factors studied. In this study 3 variables were found which affected the anxiety of patients with diabetic foot ulcers. These variables are gender, type of injury, and health insurance. Wound type is the second dominant factor triggering anxiety in patients with foot ulcers. This can be seen from a high OR value that is 0.91 with a  $p$  value  $< 0.015$ . Wound conditions that occur in clients with diabetes can increase the incidence of depression and anxiety<sup>10</sup>. The bigger the wound will cause psychological stress, causing negative thoughts on the client. the client will feel that the wound cannot heal. The study found a correlation between wounds with depression and anxiety with measurements of HARDS and CES-D scale<sup>11</sup>. In this study it was found that infectious contributes 0.61 times greater than non-infectious conditions. Wounds experienced by diabetics often result in gangrene which is an infectious complication. This condition results in patients having difficulty doing activities and work. The study by Charalambous, Vassilopoulos, & Koulouri, found a correlation between the condition of diabetic wounds with the psychological patient. Anxiety that occurs in patients with chronic wounds is caused by bad stigma, previous injury experience, lack of support from both the family and the health care system, the presence of pain and long-term treatment that he experiences<sup>12</sup>. Research conducted by Razjouyan et al found an association between anxiety and wound healing. DFU people with anxiety experience delays in healing wounds<sup>13</sup>.

Gender is the dominant factor with OR = 0.98, between male and female is one of the factors that influence the occurrence of anxiety in patients with

diabetic ulcers with  $p$  value  $< 0.040$ . In the results of the study found differences in anxiety on the sexes. Men tend to experience anxiety 0.64 times greater than women. Sex difference is one of the determinants of anxiety conditions. Reisner et al, found a difference in anxiety response in men and women. Men tend to experience anxiety because of their role as the main support in the family<sup>14</sup>. The condition of the illness results in the inability to fulfill the duties and responsibilities in the family<sup>15</sup>. According form the research find indicate that gender selectively modulates the influence of anxiety on ambiguous decision-making, but not risk decision-making<sup>16</sup>. Niles et al found that there is a relationship between gender and psychological responses to inflammation. In cases of inflammation, a person's tendency to experience symptoms of depression and anxiety. Men are more prone to symptoms of depression but less respond to anxiety<sup>17</sup>. The whole participant is over 40 years old and has worked so that the tendency to be unable to meet the needs in the family results in anxiety. While the high proportion of male respondents in the current study is in line with other studies of diabetic foot disease affected populations, reasons for this asymmetrical gender distribution remain unclear as the prevalence of diabetes in the age group surveyed is almost the same for men and women.

Multivariate models found the effect of health insurance on the anxiety of patients with diabetic ulcers ( $p < 0.001$ ; OR = 0.77). Health insurance is one of the guarantees needed to cover all patient medical expenses. In Indonesia there is health insurance provided by the government, namely BPJS. Most hospitals in Indonesia receive services with BPJS but patients using BPJS must fulfill the entire set of administrations. The complicated process makes patients easily experience stress due to feeling that they have not been taken action by health personnel. BPJS users experience a tendency to experience anxiety 0.52 times greater than patients without health insurance. Chronic ulcers present a substantial economic burden to the health care system. Health care decision makers are encouraged to consider additional resources to preventative interventions for chronic ulcers to reduce downstream costs<sup>18</sup>. Low-cost DFU primary prevention efforts producing even small decreases in DFU incidence may provide the best opportunity for cost-savings, especially if focused on patients with neuropathy and/or PAD. Mobile phone-based reminders, self-identification of risk factors, and written brochures may be among such low-cost

interventions that should be investigated for cost-savings potential<sup>19</sup>.

All of these aspects make the patient feel frustrated, dissatisfied, insecure, fearful, helpless and uncontrolled. Individuals with injuries feel unable to carry out daily activities, and often consider themselves unable to play their role in society<sup>20</sup>. The weakness in this study is that there are still 69% of factors that contribute to increasing anxiety in patients with unknown diabetic ulcers, so further research is needed to examine all aspects of patients and other research method in revealing the results.

### Conclusion

The most dominant factor found in this study was the type of wound types of wounds that are infection have a risk of 1.65 times experiencing anxiety compared to non-infection, so nursing interventions can be focused on wound care.

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# Cyclic Fatigue Resistance of Wave One Gold, F6 SkyTaper, One Curve, and AF Blue R3 NiTi Rotary Instrumentation Systems

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## Abstract

**Objective:** This in vitro study is aimed to compare and evaluate the cyclic fatigue of four varying NiTi rotary instrumentation systems.

**Method:** Four types of rotary files were used in four groups (10 files for each group). Group A: Wave One Gold; Group B: AF Blue R3; Group C: One Curve; Group D: F6 SkyTaper. These groups were evaluated by a cyclic fatigue apparatus to measure cyclic fatigue resistance within the artificial metallic simulating canal. All the files were rotated in artificial canals until they fracture. The resistance to cyclic fatigue was determined by counting the number of cycles to fracture, and the time to failure was recorded in seconds then transformed to minutes.

**Results:** One-way analysis of variance test showed a significant difference ( $P < 0.001$ ) in the average values of cycle number and time needed for file fracture.

The t-test results indicate a significant difference ( $P < 0.001$ ) among all groups.

**Conclusions:** The study concluded that with an apical curvature of an artificial canal with an angle curvature of  $60^\circ$ , AF Blue R3 and F6 SkyTaper instruments exhibit a higher resistance to cyclic fatigue than One Curve and Wave One Gold files most possibly due to surface and alloy feature variation.

**Keywords:** Endodontics, instrumentation, cyclic fatigue.

## Introduction

Rotary instruments for root canal systems made from nickel-titanium (NiTi) alloy exhibit more elasticity than stainless steel instruments, which are rigid and unsuitable for large apical enlargement in thin-curved canals<sup>[1]</sup>. Specifically, the elastic flexibility of NiTi instruments is approximately 2–3 times greater than that of stainless-steel instruments<sup>[2&3]</sup>.

NiTi instruments feature a risk for fracture owing to cyclic fatigue and torsional shear; this condition is an important disadvantage of rotary files when rotate freely in a curved canal<sup>[4-6]</sup>. In order to increase the easiness and speed of root canal preparation procedure for practitioners, a single file NiTi rotary systems with

either complete rotation or reciprocation motion were introduced<sup>[7]</sup>. Wave One Gold files manufactured by Dentsply Maillefer in Switzerland are a new version of Wave One files. The geometry, dimensions, and cross-section are modified while maintaining reciprocation motion. The files are made by gold, which is heated at first and then slowly cooled for file production; these files also exhibit two cutting edges with a parallelogram cross-section, which may increase file flexibility as claimed by the manufacturer<sup>[8]</sup>.

The F6 SkyTaper manufactured by Komet, Brasseler GmbH & Co. in Germany is a new generation of single-file, one-use NiTi system comprising one available instrument with five diverse sizes (20, 25, 30, 35, and 40) and showing a constant taper of 0.06, which

is critical for shaping of the root canal. These files are distinguished by their cross-sectional design, which is a unique double-S cross-section. The F6 SkyTaper instrument is produced for use in a continuous clockwise rotation motion [9].

One Curve file manufactured by MICRO MEGA in France is a heat-treated C-wire with a regulated memory of NiTi and a potential to prebending to facilitate access to the root canal. It's also a single-use, single instrument rotary file employed in continuous rotation. The variable cross-section ensures excellent cutting efficiency and debris removal up to the medium and coronal parts of the canal with a perfectly centered trajectory [10 & 11].

AF Blue R3 manufactured by Fanta Dental Materials Co.,Ltd. in Shanghai is a special heat-treated wire used for producing endodontic rotary files. However, NiTi files display a high possibility of unnoticed fracture inside root canals, different from the stainless-steel files, which are most likely to show plastic deformation signs. AFTM-Wire is a developed NiTi alloy and features excellent mechanical strength properties. The flexibility of AFTM-Wire avoids canal transportation. Meanwhile, its hardness is large enough to allow for good cutting efficacy. Fanta AFTM-Wire offers three levels of flexibility depending on the crystallographic phases present in the alloy and rectangular cross-section of AF BLUE R3 [12].

The null hypothesis indicates that the tested rotary NiTi instruments show no differences in their cyclic fatigue resistances.

This in vitro study is aimed for comparison and evaluation the cyclic fatigues of Wave One Gold, F6

SkyTaper, One Curve, and AF Blue R3 NiTi rotary instrumentation systems.

### Materials and Method



Figure 1: The artificial simulating canal



Figure 2: Cyclic fatigue testing device.

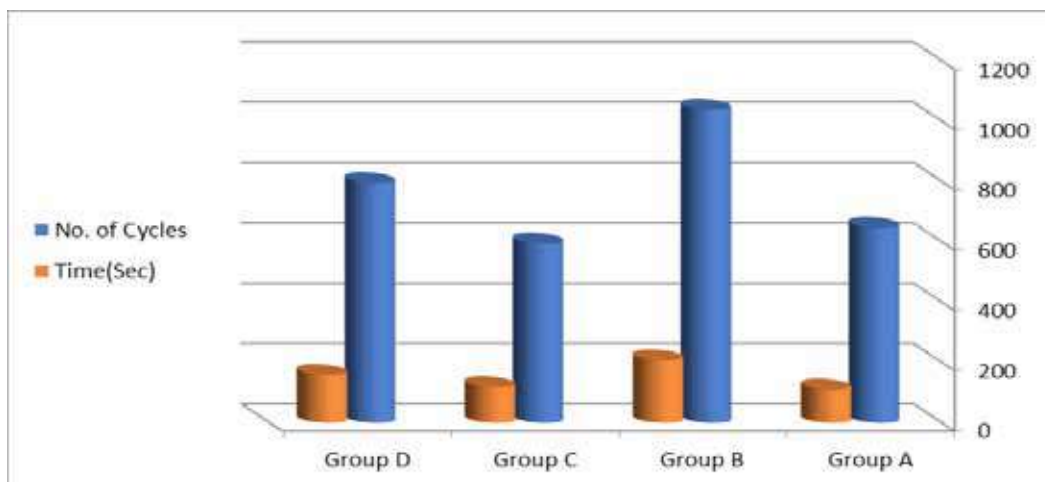


Figure 3: Time in seconds and number of cycles to fracture among groups

Four different rotary instruments were used, and 10 instruments for each type were investigated in the four groups.

**Group A:** Wave One Gold (primary, #25.07), 25 mm length, and NiTi rotary instruments (350 rpm/5 N cm).

**Group B:** AF Blue R3 (#25.06), 25 mm length, and NiTi rotary instruments (300 rpm/2.6 N cm).

**Group C:** One Curve (#25.06), 25 mm length, and NiTi rotary instruments (300 rpm/2.5 N cm).

**Group D:** F6 SkyTaper (#25.06), 25 mm length, and NiTi rotary instruments (300 rpm/2.2 N cm).

The instruments were tested within an artificial simulating canal (angle curvature: 60°; Figure 1). The curvature radius was 5 mm, whereas canal width was 1.5 mm. The simulated canal constructed within stainless-steel blocks covered by a swiveling glass allowed for observation of files rotating in the canal and discard of broken instruments after each test<sup>[13]</sup>.

To eliminate binding in the simulating canal, the files were created to be slightly wider than those used in the test (0.3 mm wider than the instruments used), granting a modest lateral movement inside the canal<sup>[14&15]</sup>.

The cyclic fatigue testing apparatus utilized in this study, as shown in Figure 2. The apparatus consists of a wood main frame attached with an electric hand piece and a simulating canal carved in a stainless-steel block. The electric hand piece is supported to a movable apparatus, allowing accurate and repeated placement of each instrument inside the simulating canal<sup>[16]</sup>.

The testing canal was filled with a lubrication medium (3-In-One Multi-Purpose Oil manufactured by WD-40, USA) to minimize the friction produced by the tested file with the canal walls<sup>[17]</sup>. A glass cover was

fixed by the clipper to facilitate file insertion inside the canal and to prevent the instrument from slipping out, thus also providing a clear view of the instruments.

A button on the electric motor was pressed to initiate rotation. Meanwhile, a digital stop watch was also operated. Instrument rotation was monitored by the operator until the file fractured, the corresponding time was recorded. The electric motor button was pressed again once to stop rotation during fracture of the instrument. The slide was opened, and the fractured file was replaced by a new one.

The time needed for instrument fracture from the beginning of the rotation was recorded in seconds then transformed into minutes. Afterward, time (T) in minutes was multiplied by revolutions per minute (RPM) to conclude the number of cycles needed for each instrument to fracture (NCF) as in the following equation:

$$NFC = RPM \times T$$

Statistics, including maximum, mean, minimum, and standard deviation(S.D.), calculated for the cycle numbers needed to fracture each file. The data were obtained and noted using SPSS (program version 18) and used in statistical analysis.

One-way analysis of variance (ANOVA) was utilized to determine any statistical difference between the mean cycles needed for fracture occurrence for the different rotary instruments. A separate t-test was performed to assess the significance of variance between a pair of instruments. P values of more than 0.05 were considered statistically non-significant, whereas P values equal or less than 0.05 were regarded as significant. On the other hand, P values less than 0.01 were regarded as highly significant

## Results

**Table (1): Descriptive Statistical analysis for the time (Seconds) and number of cycles to fracture**

Groups	Type of test	Min	Max.	Mean	±SD
A	Time	108.42	113.13	110.94	1.870
	No. of cycles	632.45	659.92	647.18	10.908
B	Time	190.79	214.89	207.66	10.105
	No. of cycles	953.95	1074.45	1038.31	50.527
C	Time	114.14	121.82	118.91	2.900
	No. of cycles	570.7	609.1	594.59	14.500
D	Time	152.13	164.21	159.06	5.189
	No. of cycles	760.65	821.05	795.3	25.946



**Table (2): ANOVA test for the time and number of cycles to fracture**

Type of test	S. O. V.	SS	Df	MS	F-test	P-value
Time	Between	47166	3	15722	715.67	0.000
	Within	615	28	21.968		HS
	Total	47781	31			
Number of cycles	Between	947894.2	3	315964.7	568.61	0.000
	Within	15558.9	28	555.67		HS
	Total	963453.1	31			

**Table (3): t-test for the difference in time and number of cycles to fracture between each two groups**

Comparison Groups	t-test time	p-value	t-test number of cycles	p-value
A & B	19.240	0.000	15.280	0.000
A & C	5.165	0.007	6.480	0.003
A & D	16.821	0.000	9.996	0.001
B & C	19.884	0.000	19.884	0.000
B & D	13.546	0.000	13.546	0.000
C & D	13.616	0.000	13.616	0.000

Table 1 summarizes the descriptive statistics for each system. The average cycle-to-fracture values of the AF Blue R3 group were the highest among all groups, whereas the lowest was observed in the Wave One Gold group.

The data inspected by one-way ANOVA demonstrated significant difference (P<0.001) in the NCF mean values among all groups (Table 2).

Using t-test, further comparisons among groups were conducted to determine where the significant difference occurred (Table 3). The t-test results reveal a significant difference among all groups (P<0.01), except for Group A (Wave One Gold) and Group C (One Curve) (P< 0.05), where is not a statistically significant differences in variation were reached (P=0.05).

**Discussion:**

The fracture of rotating NiTi instrument is one of the most critical complications that develop during canal preparation [18]. Diverse classes of rotary NiTi instruments show variation in resistance to fatigue failure owing to differences in numerous factors, such as their manufacture [19&20].

In this study, the resistance of rotary files to cyclic fatigue was tested under simulating conditions to reduce the effect of other failure mechanisms, e.g., canal diameter and length. As other studies, the test was

evaluated using stimulating canals made of stainless steel [21 & 22]. Considering that this study aimed to examine the physical properties of NiTi rotary files, the extracted teeth were unsuitable models as no two root canals are exactly identical [23]. One operator has examined the files, whereas the other has operated the stopwatch [24]. The Wave One Gold, AF Blue R3, One Curve, and F6 SkyTaper NiTi rotary instrumentations were selected given their differing cross-sections, processing metallurgic alteration, and rotation axes. Comparisons were conducted with files of similar curvature and diameter to minimize the *confounding variables*. The Blue R3 files were the most resistant to cyclic fatigue, followed by F6 SkyTaper, One Curve, and Wave One Gold files. The t-test results showed a significant difference among all groups (P<0.01). However, the difference between Wave One Gold and One Curve (P<0.05) groups showed no statistical significance. In the AF Blue R3 files, the cyclic resistance may be related to a more metal mass and a larger cross-sectional area due to its rectangular cross-section in addition to the AF-R Wire Technique, which depend on the crystallographic phases present in the alloy. The files are manufactured with NiTi, which undergoes an innovative heat treatment, altering its molecular structure, to achieve an increase in cyclic fatigue resistance; surface treatment of the file involves chemical polishing, and additional flexibility and a distinct blue color are also added [12]. However, no data were published until the date of evaluation of the

cyclic fatigue resistance of the roots by using AF Blue R3 files. Therefore, comparison of our results with other studies is impossible. The F6 SkyTaper instruments showed more cyclic fatigue resistance compared with the One Curve and Wave One Gold instruments. This observation may be related to the decreased cross-sectional area associated with the unique double S-shaped cross-section design of F6 SkyTaper. Plotino *et al.* noted an inverse relation between cyclic fatigue resistance and cross-section metal mass of NiTi files [25]. This result agrees with that of a study concluding that Wave One Gold shows low resistance to cyclic fatigue [26&27]. This difference in the cross-section between files might also contribute to their cyclic fatigue resistance.

Wave One Gold instruments were less resistant to cyclic fatigue and were fractured within a short period possibly due to their cross-section design (parallelogram-shaped cross-section), which should be regarded for conclusions of this study. The thermal processing increased the temperature of austenitic transformation of nickel-titanium alloy and improved its crystal structure arrangement [28 & 29]. These factors may improve instrument performance. One Curve files are manufactured with a C-wire by applying controlled heat treatment with the property of regulated memory, thus improving file resistance to cyclic fatigue. Parashos *et al.* noted that small core diameter enhances instrument resistance to cyclic fatigue [30]. One Curve features a low core diameter (approximately 48.327  $\mu\text{m}^2$ ). All these findings explain the enhanced fatigue resistance of One Curve files.

### Conclusion:

Considering the outcomes in this article, we can conclude that AF Blue R3 file exhibits the highest resistance to cyclic fatigue in comparison with F6, One Curve, and Wave One Gold files. Further research is advised to assess the resistance to cyclic fatigue of these files by using different canal lengths and curvatures. The clinical performance of these new files should also be evaluated.

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**Conflict of Interest:** None

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# Dietary habits among former athletes in Saudi Arabia

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## Abstract

The purpose of this study is to investigate dietary habits in retired athletes in Saudi Arabia. Seventy (70) former athletes, aged between 20-60 years old, who had participated in international and national competitions, and had since stopped competitive sport were recruited for this study. Sports history, age, height, and weight, dietary habits were collected using an online questionnaire. The study results showed that 47.14% of the participants are overweight and 22.86% are obese. It also indicated that 84.29% of the former athletes were eating fast food, whereas, the prevalence of drinking fizzy drinks was 71.43%. Also, the results of this study found out that there is no significant relationship between eating fast food and drinking fizzy drinks and obesity.

**Keywords:** Former athletes; obesity; dietary habits; fizzy drinks.

## Introduction

The dietary habits and lifestyle behaviours among individuals in developing countries has been changed due to the adoption of the western lifestyle, which is making them becoming overweight and obese and consequently more prone to develop cardiovascular disease (CVD), type 2 (T2D), high cholesterol, and hypertension, which all together are the main cause of mortality over the world<sup>(1,2)</sup>. According to Mohammad H. Al-Qahtani (2016), the type and amount of the diet constitute a main role in the process of pathogenesis of the previous diseases.

Health and eating behaviours in any society may be a good indication for the public health and the level of

their risks to have the lifestyle disease such as T2D and high BP<sup>(2)</sup>. Saudi Arabia is one of those countries that have very high prevalence of overweight and obesity<sup>(2,3)</sup>. Furthermore, the trend of consuming western food is very popular among Saudi people, and they are very much prone to eating burgers, pizzas, and sweets with increased drinking of soft drinks and low level of physical activity is prevalent among them.

It has been reported that there is a significant association between unhealthy diet consumption (fast food) and sedentary lifestyle<sup>(1)</sup>. However, a findings of study in Brazil have shown there is a positive relationship between physical activity (PA) and increased intake of healthy diet such as fruits and vegetables, whereas sedentary behaviours was associated with an increase in the intake of unhealthy diet such fat food<sup>(1)</sup>. According to Khabaz et al., (2017) who stated that the mixture of intake of an unhealthy diet and sedentary behaviour might lead to overweight and obesity, independent of decreased physical activity. Khabaz and his colleagues also showed that overweight and obesity was widespread among people who consume too much offast food and unhealthy food. Fast food is described as food that is made and served in very quickly<sup>(4,5)</sup>. Fast Food generally consists of a big size of portion and high energy density

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from fat and saturated fat, moreover, it contains high amount of salt, sugar, and low amount of fibres which increase the risk for overweight, obesity, and high BP<sup>(4-6)</sup>.

Former athletes are more likely to eat unhealthy foods than they were in competitive years. Eating high energy foods are considered as a health-risk habits among former athletes and the increase in body weight might goes hand in hand with shifting from active lifestyle to retirement phase<sup>(7,8)</sup>. A recent results of several studies revealed that the prevalence of obesity and overweight in former athletes is high and all these may involve in the development of many disease<sup>(7-9)</sup>.

Several studies have reported the prevalence and impact of dietary behaviours of people in Saudi Arabia, the majority of these studies reported that the dietary behaviours in people is unhealthy and people generally are not following the international recommendation requirement<sup>(2,5)</sup>. However, in literature, the dietary behaviours of former athletes are seldom studied, equally, at international level, the dietary behaviour of former athletes are not critically studied, also in Saudi Arabia, to the best of our knowledge, we do not found any research on the dietary behaviours among former athletes.

Thus, there is need for a comprehensive evaluation of dietary behaviors in former athletes that could help to diagnose such problems earlier so that preventive measures can be taken to avoid adverse effects. Therefore, this study was designed to find out dietary habits among former athletes.

## Method

An online questionnaire was administered to participants. The link to the questionnaire was sent to the Saudi Athletics Federation, asking them to send a request to former athletes to participate in this research. This study was approved by a panel of experts who were considered to be an ethical committee for the school of education at the University Technology Malaysia (UTM). All participants provided informed consent electronically before participation in this study. Subsequently, seventy (70) individuals agreed to participate. The research participants were former male athletes who had participated in international and national competitions and had ceased participating in

competitive sport. The inclusion criteria was that the participant must be 20 years old or above. The online, self-administered questionnaire collected data on sports history, age, height, weight, and dietary behaviours. BMI was defined as weight (in kilograms) divided by the square of the height (in meters). For the comparisons between our groups and data from the World Health Organization (WHO), overweight was defined as a BMI of 25-29.9, and obesity was defined as a BMI  $\geq 30$  kg/m<sup>2</sup>.

**Statistical Analysis:** Statistical analysis was performed using software SPSS version 23. P-values of  $<0.05$  were considered to be statistically significant. The Data are reported as mean, standard deviations, or number (percentage, %). A chi-square test was performed to analysed categorical variables. Chi-square was also applied for testing relationships between categorical variables.

## Results

The results are derived from the data obtained from the online self-reported questionnaire. The total number of participants in this study was 70, all of whom were former athletes from Saudi Arabia. Table 1 presents the demographic variables, and Figure 1, 2 & 3 show the percentage of fast food, fizzy drinks, and smoking status among former athletes. As shown Table 1, the mean height and weight of the participants were 174.61 cm (SD = 7.605) and 83.99 kg (SD = 14.568), respectively. The mean age of the participants was 39.73 years old (SD = 7.75) and ranged from 24 to 59 years old. The majority of the participants were track & field players (34.3%), footballers (24.3%), and Karate practitioners (20.0%). The prevalence of overweight was 47.14% and obesity was 22.86%.

The findings, as shown in Figure 1, demonstrate that the majority of the former athletes were eating fast food (84.29%), whereas, the prevalence of drinking fizzy drinks was 71.43%. The study found no relationship between eating fast food and drinking fizzy drinks.

**Table 1. Physical Variables**

Demographic Variable	Mean $\pm$ SD
Age (Years)	39.73 $\pm$ 7.75 (24; 59)
Height (cm)	174.61 $\pm$ 7.605 (157; 194)
Weight (kg)	83.99 $\pm$ 14.568 (62; 130)
BMI (kg/m <sup>2</sup> )	27.6244 $\pm$ 58630 (17.17; 43.94)

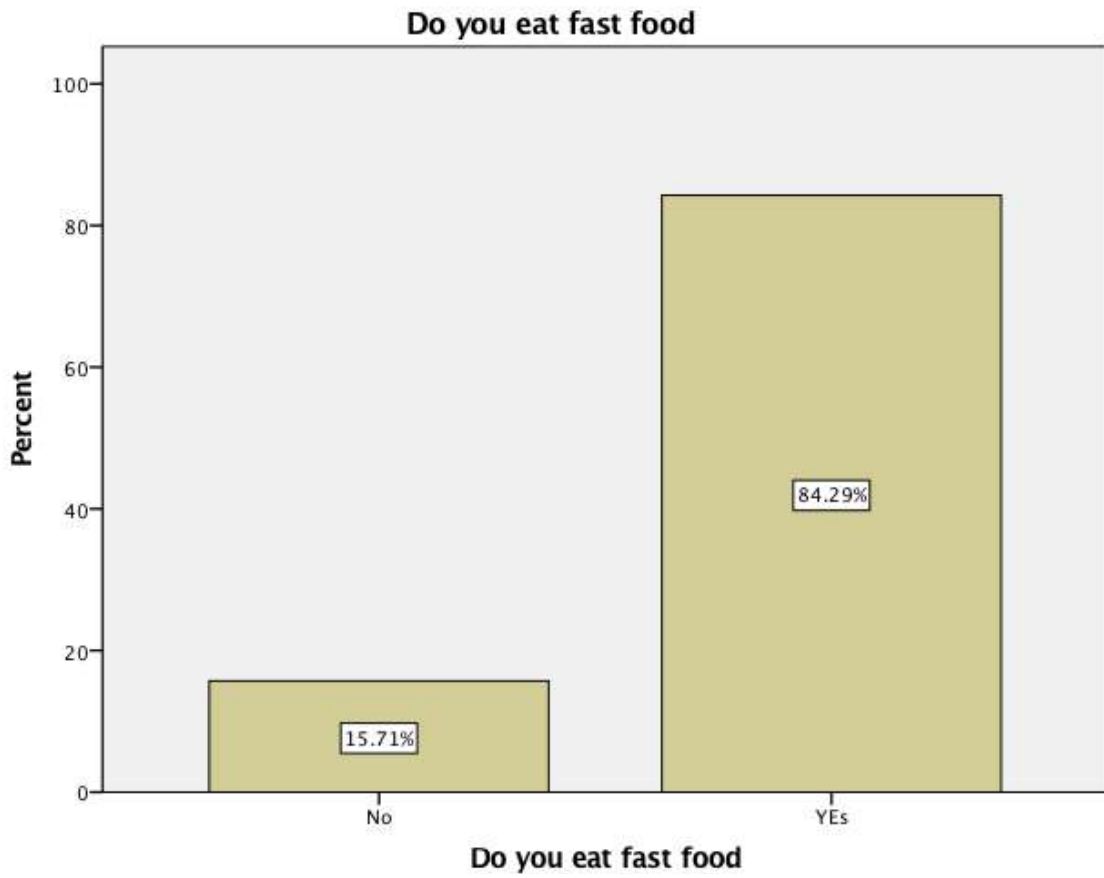


Fig. 1: Percentages of former athletes who eat fast food

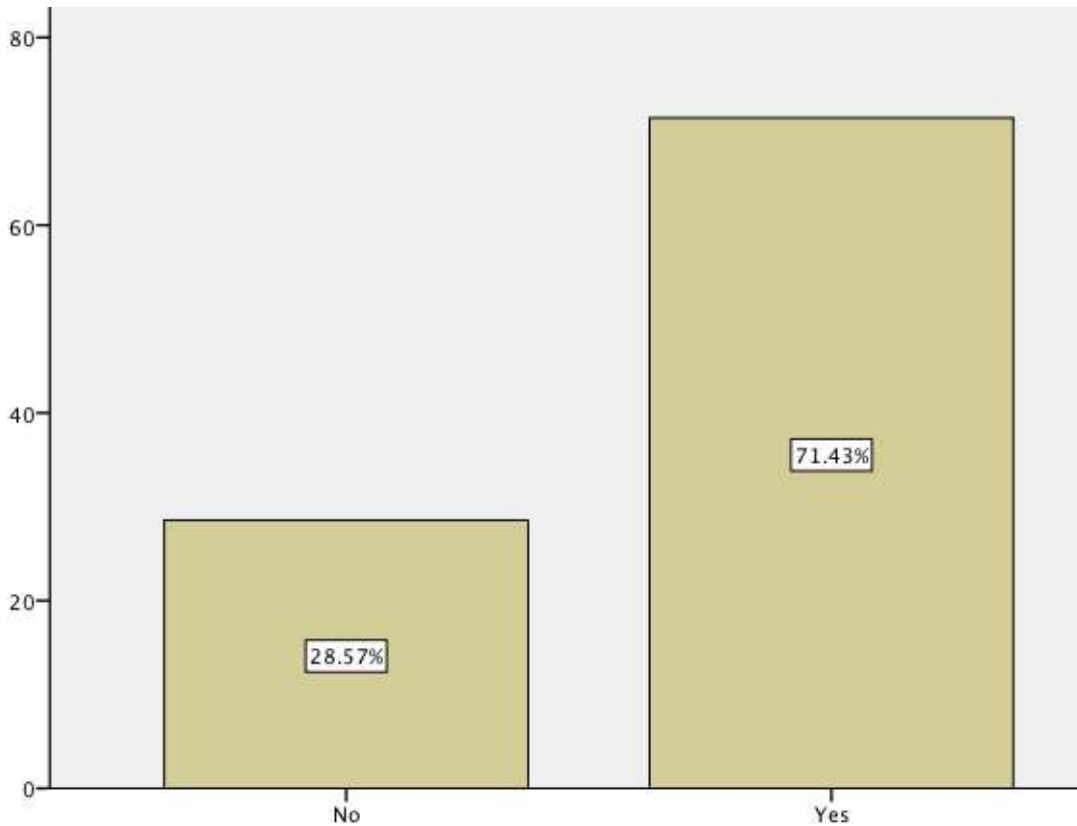


Fig. 2 Percentages of former athletes who drink fizzy drinks

## Discussion

It is accepted that engagement in regular physical activity can lead to a better health and a long life<sup>(8,10–12)</sup>. However, several studies have reported that the risk of long-term diseases increase when the athletes adopted a sedentary lifestyle after ceasing to participate in competitive sport<sup>(9,13)</sup>.

It has been reported that former athletes generally keep active and live a healthier lifestyle when they get older<sup>(10,12–14)</sup>. However, several studies have indicated that a significant number of former athletes reduce their level of physical activity and or engage in sedentary behaviours after ceasing to participate in competitive sport<sup>(8,13)</sup>. It has been reported that there are several reasons why former athletes do not participate in physical activities: for example, long-term injuries might prevent former athletes from carrying out physical activity<sup>(8)</sup>. Furthermore, the process of ageing may play a significant role in increasing the body composition and reducing the cardiorespiratory functions<sup>(11,15,16)</sup>.

Although many studies have focused on the current health of former athletes<sup>(9,14,17)</sup>, there is a lack of research associated with athletes who had engaged in regular exercise before they had retired. The findings, which used a group of seventy (70) former athletes that included men from 13 different sports, found that the percentages of overweight and obese individuals in the study sample were high, similar to those of the general Saudi population<sup>(3,18–22)</sup>.

According to the study findings, a significant number of former athletes are now eating fast food and drinking fizzy drinks (Figure 1 & 2), which may contribute to increasing the prevalence of overweight and obesity among former athletes.

The study findings are consistent with results from several studies conducted in Saudi Arabia<sup>(1,2,5,23)</sup>, which shows that the percentage of fast food and drinking fizzy drinks is high. According to Najlaa Mandoura et al., (2018), about 86% of participants were eating fast food. A recent study also stated that former professional footballers had higher body weight and BMI scores<sup>(8)</sup>. It is accepted that unhealthy diet is a risk factor for several long-term illness, such as CVD, T2D, hypertension, and some cancers<sup>(9,16)</sup>. It has been reported that high BMI often occurs as a result of a lack of physical activity or high intake of foods<sup>(8)</sup>.

Although this is a small study, it is in fact the first study to determine the prevalence of fast food and fizzy drinks in former athletes in Saudi Arabia, and therefore the outcomes are of great importance, in spite of the small number of participants.

**Limitations:** This study depended on self-reported survey via the former athletes which may result in reporting bias. The study sample size is relatively small. Moreover, the study assessed only the prevalence of consuming fast food without assessing the frequency of use and the portions size, which might give more information about the fast food behaviours among former athletes. Despite these limitations, the study provided a clear evidence on the high prevalence of fast food and fizzy drinks consumption among former athletes.

## Conclusion

The outcomes of this research revealed that the majority of former athletes are consuming fast food and drinking fizzy drinks. Also, the study indicated that the majority of overweight and obese people are consuming fast food. Additionally, the study reported that there is no significant relationship between eating fast food and BMI.

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# Evaluation of the Efficacy of Diode Laser in Maturogenesis of Immature Teeth with Necrotic Pulps: An in Vivo Study “Part One”

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## Abstract

**Context:** The present study was performed to evaluate the Efficacy of Diode Laser in maturogenesis of Immature Teeth with Necrotic Pulps in comparison to conventional technique of revascularization using triple antibiotic mix. Immature necrotic permanent maxillary anterior teeth of medically free patients 8-16years old were used to perform regenerative endodontic procedures (revascularization) and divided into 3 groups (n = 10) : group I: Ten teeth were disinfected by triple antibiotic paste then Revascularization was done using the standard method. Group II: Ten teeth were Laser disinfected; Revascularization was done using the standard method. Group III: Ten teeth were disinfected by triple antibiotic paste then Revascularization was done using the standard method followed by diode laser bio-stimulation. Follow-up was done at 3, 6, 9 and 12 months intervals and included clinical examination for signs and symptoms and radiographic evaluation for increase in root length, increase in root thickness, a decrease in apical diameter, and a decrease in lesion size, and the antibacterial efficacy of the Diode laser (980) nm and triple antibiotic disinfection method on the colony forming units. It was resulted that, the colony forming unit's results revealed non-significant difference in percent change after treatment between triple antibiotic paste and laser disinfection. It was concluded that: Diode laser irradiation seems to be a valuable tool in the eradication of polymicrobial nature of root canal infection. Diode laser could be used instead of triple antibiotic paste for disinfection of root canals in revascularization. Diode laser decontamination showed no teeth discoloration as opposed by the triple antibiotic paste.

**Keywords:** Diode Laser, Triple Antibiotic Paste, Revascularization, Canal Disinfection, Immature Necrotic Teeth.

## Introduction

The treatment of immature permanent teeth with necrotic pulp constitutes a challenging situation facing

endodontists. Such conditions present difficulty in root canal debridement and obturation because of the open apex. Moreover, they are more prone to fracture because of thin weak dentinal root canal walls. Such cases were traditionally treated by apexification procedures using calcium hydroxide<sup>(1)</sup>. Such management requires long-term placement of calcium hydroxide inside the root canal to induce the formation of an apical hard tissue barrier. Recently, many authors advocated the placement of an ortho-grade apical plug<sup>(2)</sup>. Mineral trioxide aggregate (MTA) proved to be an excellent candidate; however,

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apical plugs do not solve the problem of the thin and weak dentinal root canal walls<sup>(3)</sup>.

Periapical tissues in immature teeth are rich in blood supply and contain stem cells that have the potentiality for tissue regeneration<sup>(4)</sup>. Under suitable conditions, stem cells can be programmed for self-regeneration to restore the lost part. Hence, the concept of regeneration of immature non-vital teeth was advocated. Eradication of bacteria from the canal space is mandatory for successful regenerative endodontic procedures. Research with topical antibiotics showed that a combination of metronidazole, minocycline, and ciprofloxacin could be effective against common endodontic pathogens in vitro and in vivo<sup>(5)</sup>. However, a disinfected empty canal space cannot support the ingrowth of new regenerated tissues on its own so a scaffold is needed for support. Advances in tissue engineering research focused on three key elements for tissue regeneration<sup>(6)</sup>: stem cells that have the ability for proliferation and differentiation; scaffold, which is a three, dimensional structure that supports the regenerated tissue integrity; and growth factors, which are secreted signals governing morphogenesis and differentiation.

Laser is an acronym for light amplification by stimulated emission of radiation. It is classified according to power into low power lasers (LPL) which is also called low intensity lasers (LIL) and low level laser therapy (LLL) which is used in bio-modulation, stimulation of healing, decreasing inflammation, decontamination and pain relief<sup>(7)</sup>.

The beneficial effect of (LLL) on bone was proved by many authors. It was observed that the collagen production, osteoblastic activity and increased bone mineral density, also it was found that (LLL) promotes bone regeneration and improves bone density in several studies<sup>(8)</sup>.

The aim of the study was to evaluate the Efficacy of Diode Laser in maturogenesis of Immature Teeth with Necrotic Pulp in comparison to conventional technique of revascularization using triple antibiotic mix.

## Methodology

**Group I: Triple antibiotic paste disinfection then revascularization using the standard method:**

**The disinfection visit:** Swab for bacterial culture were taken and sent to the bacteriology lab. The root

canals were copiously and slowly irrigated with 20 ml of 1.5%<sup>(9)</sup> sodium hypochlorite (NaOCl) solution for 5 minutes alternatively with 20 ml of 17% ethylene diamine tetra acetic acid (E.D.T.A) solution for 5 minutes with intermediated rinse of distilled water with paper point dryness in between irrigations.<sup>(10)</sup> The triple antibiotic paste was prepared using metronidazole, ciprofloxacin and doxycycline. The doxycycline capsule content was evacuated in a sterile mortar; a tablet of metronidazole and a tablet of ciprofloxacin were crushed and ground into homogenous powder in the same mortar using a pestle. Saline drops were added and mixed using the pestle until a creamy paste was achieved<sup>(9)</sup>. The canals were dried with paper points and medicated with triple antibiotic paste; the access cavity was sealed with intermediate restorative material (I.R.M).

**The revascularization visit:** The revascularization visit was scheduled when the tooth was asymptomatic with no signs of discharge. The tooth was isolated, and then the I.R.M was removed. Local anesthesia without a vasoconstrictor (Scandonest 3% plain) was administered. The antibiotic paste was washed out with saline with gently agitation of small file to remove the antimicrobial medicament. Swab for bacterial culture were taken and sent to the bacteriology lab, the blood initiation and MT placement was done, and the cavity was finally restored with light cure composite resin.

**Group II: Laser disinfection with revascularization using the standard method:**

**The disinfection visit:** Preoperative radiograph, access cavity, and irrigation were performed in a similar way as previously described during Group I disinfection visit then, the diode laser decontamination and disinfection was applied with the parameter of Power: 1.5 watt, Mode: pulse: SP:  $T_{on}=10ms$ ;  $T_{off}=10ms$  50Hz (50% pulse mode), for 5 seconds in spiral movement in apical to coronal direction no stop with non-initiated endodontic tip 200 micron diameter and 15 mm length three times. Irrigation with NaOCl, irradiation with the laser, then irrigation with E.D.T.A and irradiation with the laser, followed again by NaOCl irrigation and laser irradiation.<sup>(11)</sup> final irrigation with E.D.T.A followed by final rinse of distilled water with paper point dryness in between irrigations.. Swab for bacterial culture were taken and sent to the bacteriology lab, the access cavity was sealed with I.R.M.

**The revascularization visit:** The revascularization

visit was performed in a similar way as previously described in Group I.

**Group III: Triple antibiotic paste disinfection then Revascularization using the standard method followed by diode laser bio-stimulation:**

**The disinfection visit:** The disinfection visit was performed in a similar way as previously described during Group I.

**The revascularization visit:** The revascularization visit was performed in a similar way as previously described in Group I then, the diode laser bio-stimulation was applied using Wiser Diode Laser.

**Bacterial sampling “culture”:**

**Pretreatment bacteriologic sampling, colony forming units (CFU /ml):** Canals were swapped with sterile paper point. A sterile paper point #40 was placed in the root canal to the working length, allowed to saturate and transformed into sterile tubes containing 1 ml of sterile saline solution. Before placing the paper point into the tubes, the mouth of each tube was heated on the flame to prevent contamination. Each sample was carefully homogenized by being vortexed for 10 seconds.

**Serial dilution agar plat count technique:** Antibacterial activity of the different swaps was evaluated by using serial dilution agar plate technique. The media was prepared by dissolving the following in 1 Liter of distilled water; (tryptone 5.0 gm, yeast extract 2.5 gm, glucose 1.0 gm, agar bios LL 15.0 gm, pH 7.0 +/- 0.2) was weighed on a piece of aluminum foil using an electronic sensitive balance. The pH was adjusted to 7.2 and brought to boil to be dissolved completely then sterilized in autoclave at 121°C.

After vibrating the samples in a vortex to get a homogenous mix and transfer the bacteria from the swap to the solution. For the pour plate technique, the agar was liquefied by autoclaving, and then the bottle of molten agar was placed in a 50°C water bath and allowed to cool. The required details were marked on the base of sterile agar plates (Petri dishes); about 20 mL of molten agar was poured into each of the plates. 1 mL of each of the diluted swap was poured into the base of the labeled plates using a separate pipette to avoid carryover errors, gently swirling each plate to mix the 1 mL of diluted sample into the agar.

The test was performed in triplicates. Single sterile channel micropipette tip was used to add 1 ml of the standard microbial media to each plate. All the procedures were carried out under aseptic condition in a laminar flow cabinet in an area of no more than 10 cm away from a glowing torch to avoid any contamination during the procedure.

The plates were left without moving for at least 15 minutes to allow the agar to solidify. When the agar was set, it was inverted and incubated at 37 °C temperature and 100% relative humidity, for 48 hours. The endpoint for evaluation was the mean number of colony-forming units (CFUs) per mL.

After 48 hours, petri dishes were examined for bacterial growth by colony counter apparatus and the colony forming units (CFU) per ml were counted. Visible colonies were counted in each plate and then transformed into actual counts based on the known dilution factors (x10). The total colony forming units (CFU) considered as a baseline pretreatment count.

**Post treatment bacteriologic sampling and bacterial count:** When root canal disinfection procedure was completed, post treatment bacteriologic sampling and count were performed in a similar way as previously described during the Pretreatment bacteriologic sampling.

**Results**

**Comparison of bacterial count in different groups:** Comparison of mean bacterial count (log 10) in groups I & II is presented in Fig. (1) & Table (1)

Pre-treatment, the highest mean value (4.89±0.79) was recorded in triple antibiotic group. Independent t test revealed a highly significant difference between both groups (p=0.0056).

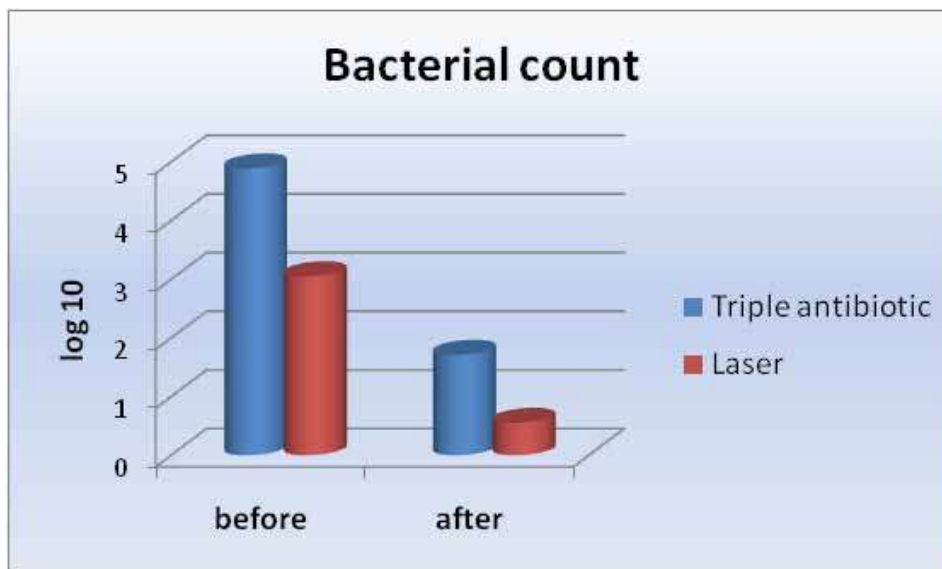
Post-treatment, the highest mean value (1.71±0.85) was recorded in triple antibiotic group. Independent t test revealed a highly significant difference between both groups (p=0.004).

The percent change in bacterial count after treatment was calculated and compared between the 2 groups. A greater percent decrease (-84.7±20.66) was recorded in triple antibiotic group. Independent t test revealed non-significant difference in percent change after treatment between both groups (p=0.635), (Table 1).

**Table 1: Comparison between groups I & II regarding mean bacterial count (log 10) and percent change after treatment (independent t test)**

	Triple antibiotic	Laser	t	P
Pre (log10)	4.888±0.793	3.049±1.671	3.144	0.0056*
Post (log10)	1.712±0.848	0.552±0.097	4.298	0.0004*
Percent change (%)	-84.70±20.66	-79.94±23.30	0.483	0.635ns

Significance level P<0.05, \*significant, ns=non-significant



**Fig. (1):**Column chart showing mean bacterial count (log 10) in triple antibiotic and laser groups

**V-b-Comparison of bacterial count before and after treatment within the same group:** Comparison of mean bacterial count (log 10) before and after treatment within the same group is presented in (Table 2).

Both groups revealed a highly lower mean bacterial count after treatment (p=0.00, p=0.0002 in in triple antibiotic and laser groups respectively).

**Table 2: Comparison of mean bacterial count (log 10) before and after treatment within the same group (paired t test)**

	Triple antibiotic	Laser
Pre (log10)	4.888±0.793	3.049±1.671
Post (log10)	1.712±0.848	0.552±0.097
T	8.67	4.72
P	0.000*	0.0002*

Significance level P<0.05, \*significant

### Discussion

The colony forming unit’s results revealed non-significant difference in percent change after treatment

between triple antibiotic paste and laser disinfection (Fig 1, Table 1). Unfortunately, there were no available studies comparing the antibacterial efficiency of both disinfection method used, however several studies revealed the antibacterial effect of the triple antibiotic paste (12-15). The effects of the triple antibiotic were discussed earlier in this discussion. *Moritz et al (1997)* (16) showed the bactericidal effect of a diode laser (810 nm) at 3 W during 5 x 5 s against intracanal *Escherichia coli* and *Enterococcus faecalis* in extracted teeth. Irradiation at 4 W was even more effective although associated with a temperature rise of 6°C. The same result with a diode laser (810 nm) at 3 W during 30 s was reported by *Gutknecht et al (2000)* (16) against intracanal *Enterococcus faecalis*. While our results disagreed with *Bago et al (2012)* (17) who found that Photo-activated disinfection and EndoActivator were significantly more effective than diode irradiation and single NaOCl irrigation in reducing CFUs, this result could be attributed to the protocol used with the pulsed diode laser group, in which the disinfection was done in dry field Root canals were irradiated with a pulsed diode laser For 20 s, repeated three times at intervals of 10 s

between each one, which contradict the protocol used in this study and proposed by (*Benedicenti et al 2008*)<sup>(11)</sup> in which the 980 diode laser decontamination and disinfection was applied with the parameter of Power: 1.5 watt, Mode: pulse: SP: T<sub>on</sub>=10ms; T<sub>off</sub>10ms 50Hz (50% pulse mode), for 5 seconds in spiral movement in apical to coronal direction no stop with non-initiated endodontic tip 200 micron diameter and 15 mm length three times. irrigation with NaOCl, irradiation with the laser, then irrigation with EDTA and irradiation with the laser, followed again by NaOCl irrigation and laser irradiation, final irrigation with E.D.T.A followed by final rinse of distilled water.<sup>(11)</sup>

Thus, it's worth mentioning that the known drawbacks of the triple antibiotic paste such as toxicity to the Dental pulp stem cells, discoloration of the tooth and development of the bacterial resistance can be eluded by using lasers in disinfection for regenerative purpose.

### Conclusion

1. Diode laser irradiation seems to be a valuable tool in the eradication of polymicrobial nature of root canal infection.
2. Diode laser could be used instead of triple antibiotic paste for disinfection of root canals in revascularization.
3. Diode laser decontamination showed no teeth discoloration as opposed by the triple antibiotic paste.

**Conflict of Interest:** No

**Source of Funding:** Self-funding.

**Ethical Clearance:** every patient in this study had given their informed consent for inclusion before their participation. Which is conducted in accordance with the declaration of Helsinki, it was approved by the ethics committee of minya university number (133).

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# Comparative Study Between Effects of Epidural Magnesium Sulphate on Intraoperative and Postoperative Analgesic Requirements in Cancer Thoracic Surgery: A Randomized Controlled Trial

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## Abstract

**Background:** The epidural infusion of local anesthetic and opioid achieves effective postoperative analgesia in thoracic surgery patients. Nevertheless, high dose of opioids may induce dose-dependent undesired effects. Recent reports showed that adjuvant epidural magnesium administration significantly improve intra and postoperative analgesic outcomes. The present randomized trial aimed to assess the intra and postoperative analgesic effect of continuous epidural infusion of magnesium sulphate in patients undergoing elective cancer thoracic surgery.

**Method:** Sixty ASA III patients undergoing elective cancer thoracic surgery were randomized in 1:1 ratio to receive adjuvant epidural magnesium sulphate or 0.9% sodium chloride solution. The primary outcomes in the present study were intra and postoperative analgesic requirements, and postoperative pain score.

**Results:** The magnesium sulphate group showed a statistically significant lower number of required fentanyl doses than the control group (74.3% needed two or more doses in magnesium sulphate group versus 94.4% in the control group,  $p = 0.026$ ). A similar finding was observed for need for ketorolac 30mg ( $p = 0.017$ ). The postoperative VAS was significantly lower in magnesium sulphate group from the 12<sup>th</sup> hour ( $p = 0.033$ ) to the 48<sup>th</sup> hour postoperatively ( $p < 0.001$ ). The magnesium sulphate group showed more stable hemodynamics. No major side-effects were observed in any of the study groups.

**Conclusion:** Epidural magnesium sulphate is a potent adjuvant analgesic that reduced opioid consumption and postoperative pain in patients undergoing thoracic surgery.

**Keywords:** Thoracic Surgery; Epidural Analgesia; Magnesium Sulphate

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## Introduction

Lung cancer is the second most common cancer type in both gender with reported 220,000 new cases and 158,080 deaths in 2016 in United States alone<sup>1</sup>. Up to 25% of the lung cancer patients are diagnosed during early stages (stage I or II) which is usually treated by anatomical surgical resection. For longtime, open



thoracotomy was the surgical approach of choice for surgical resection of lung cancer, with acceptable five-year overall survival<sup>2</sup>. However, postoperative pain is a major challenge in patients undergoing thoracotomy, it was reported that thoracotomy is commonly associated with postoperative, sometimes severe, pain that can impair respiratory functions with subsequent hypoventilation and respiratory failure<sup>3,4</sup>. Moreover, ineffective management of immediate postoperative pain may lead to chronic pain syndrome in a considerable proportion of the patients undergoing thoracotomy<sup>5</sup>. The occurrence of postoperative pain following thoracic surgery was proposed to be a consequence of tissue damage and neuroplastic changes; thus, preemptive analgesia is one of the main management options to avoid the occurrence of such neuroplastic changes<sup>6</sup>.

However, the management of postoperative pain is particularly difficult in patients undergoing thoracic surgery, the majority of those patients are classified as American Society of Anesthesiology (ASA) class III due to associated comorbidities, impaired pulmonary function, and old age<sup>7,8</sup>. Multimodal regimens and narcotic-based patient controlled analgesia (PCA) are not effective options in many cases due to technical complexity –in high risk patients- and serious side-effects<sup>9</sup>. To date, epidural analgesia is the gold standard for postoperative pain relief after thoracic surgery<sup>10</sup> local anesthetic wound infiltration, systemic N-methyl-D-aspartic acid (NMDA). The epidural infusion of local anesthetic and opioid achieves effective postoperative analgesia with low rates of central nervous system (CNS) and respiratory complications<sup>11</sup> and therefore regional analgesia has been intensively studied in this procedure. Thoracic epidural analgesia is commonly considered the “gold standard” in this setting; however, evaluation of the evidence is needed to assess the comparative benefits of alternative techniques, guide clinical practice and identify areas requiring further research. **Method:** In this systematic review of randomized trials we evaluated thoracic epidural, paravertebral, intrathecal, intercostal, and interpleural analgesic techniques, compared to each other and to systemic opioid analgesia, in adult thoracotomy. Postoperative pain, analgesic use, and complications were analyzed. **Results:** Continuous paravertebral block was as effective as thoracic epidural analgesia with local anesthetic (LA). Nevertheless, high dose of opioids may lead to dose-dependent adverse events such as nausea, vomiting, impaired intestinal motility, and respiratory depression<sup>8</sup>.

Recently, a growing body of evidence has proposed that magnesium is an effective, adjuvant, local and systemic analgesic due to its blockade of N-methyl-D-aspartate (NMDA) receptors and calcium channels<sup>12</sup>. Epidural magnesium sulphate showed better analgesic and reduced the need for rescue analgesics when added to epidural fentanyl in surgical patients<sup>13</sup> including intravenous, intrathecal, and epidural in different dosage regimens. The effect of single bolus dose of magnesium as an adjuvant to fentanyl for postoperative analgesia has not been studied. This prospective randomized controlled trial was done to evaluate the efficacy of single bolus administration of magnesium epidurally as an adjuvant to epidural fentanyl for postoperative analgesia in patients undergoing total hip replacement under combined spinal epidural anesthesia. **Method:** Sixty patients received combined spinal-epidural anesthesia with 2 mL of 0.5% hyperbaric bupivacaine intrathecally. After the surgery, patients were randomized into Group F [epidural fentanyl (1 µg/kg). However, there is a scarcity in the published literature that assessed the analgesic effect of epidural magnesium sulphate, as adjuvant to epidural fentanyl in patients undergoing thoracic surgery. The present randomized controlled trial aimed to assess the intra and postoperative analgesic effect of epidural infusion of magnesium sulphate in patients undergoing elective open thoracotomy.

## Material and Method

We confirm that the present trial run in concordance with international ethical standards and applicable local regulatory rules. The Ethical Committee of Cairo University National Cancer Institute, Institutional Review Board, provided ethical approval for this study (Ethical Committee No. 201617007.3- IRB00004025-FWA00007284). A written informed consent was obtained from every patient prior to study enrollment. We followed Consolidated Standards of Reporting Trials (CONSORT) guidelines during the preparation of this randomized controlled trial<sup>14</sup>.

**Study Design and Patients:** Adult, ASA III, lung cancer patients, who were scheduled to undergo elective open thoracotomy and agreed to sign the informed consents, were included in the present trial. Patients with major liver or kidney impairment, neuromuscular disease, second or third degree atrioventricular block, extreme obesity were excluded. We excluded patients exposed to opioids and/or calcium channel blockers before surgery as well.

The present study was a phase II, randomized, controlled trial that was conducted at the operating theatre of Anaesthesia, ICU and pain management department of Cairo University National Cancer Institute. Eligible patients were randomized in 1:1 ratio to receive either epidural magnesium sulfate or sodium chloride using computerized randomization schedule. Pre operatively, patients underwent routine assessment and were made familiar with the use of the visual analogue scale (VAS).

**Technique:** In all patients, cardiovascular function was monitored by electrocardiography and invasive blood pressure measurement, oxygenation by pulse oximeter, ventilation by capnography, level of neuromuscular blockade by a Train of Four (TOF) Guard neuro stimulator (Organon, Tehnika), and level of hypnosis by bispectral index (BIS) determination on a BIS monitor (Datex-Ohmeda).

In magnesium sulphate group, patients were injected with 25 mg 0.5% levobupivacaine and 50 mg 10% MgSO<sub>4</sub> via epidural catheter (Th 4-Th 6) 15 minutes before induction of general anesthesia. In the control group, patients were injected with 25 mg 0.5% levobupivacaine via epidural catheter (Th 4- th5 or th5 Th 6) 15 minutes before induction of general anesthesia. Anesthesia was induced with midazolam at a dose of 0.03 mg/kg, fentanyl 0.3-0.6 µg/kg, and propofol 1 mg/kg. After the induction of anesthesia, magnesium sulphate group received continuous epidural infusion of 10% MgSO<sub>4</sub> at a dose of 50 mg/h, whereas the control received the same volume of epidural 0.9% NaCl.

In all patients, neuromuscular blockade achieved with muscle relaxant rocuronium at a dose of 0.7 mg/kg to facilitate endotracheal intubation. All patients mechanically ventilated with 1:1 air/oxygen mixture. Hypnosis was maintained by continuous sevofluran according to BIS values 40-60, and myorelaxation according to TOF = 1 by continuous rocuronium infusion. Intraoperative elevation of the mean blood pressure and pulse by  $\geq 20\%$  of the initial values was defined as inadequate analgesia. These patients received a fentanyl bolus dose of 0.2 µg/kg. At the end of the operation, sevofluran discontinued on skin closure and neuromuscular blockade was antagonized by the administration of sugammadex. The patients were extubated when the BIS values reached 80 and the TOF ratio was  $> 0.8$ .

Postoperatively, during the first 48 hours,

magnesium sulphate group received the 50 mg/ hour magnesium sulfate in addition to levobupivacain 2.5mg /hour continuous epidural infusion and systemic opioid fentanyl 0.3-0.6 µg/kg, whereas control group received epidural the same volume 0.9 % Na Cl and local anesthetic levobupivacain 2.5mg /hour and systemic opioid (fentanyl). The value of VAS  $\leq 4$  was maintained by adjusting the rate of infusion in both groups. Hemodynamic parameters (central venous pressure, non-invasive systolic and diastolic blood pressure, heart rate) urine output and respiratory rate were recorded 48 hours postoperatively.

**Efficacy Measures:** The primary outcomes in the present study was to determine cumulative doses of intraoperative administered fentanyl and cumulative doses of fentanyl administered during 48 hours postoperatively. The secondary outcomes were VAS score for rest and movement every 4 hours, level of sedation, cardiovascular, respiratory and neurological complications, incidence of postoperative shivering, nausea and vomiting, and global patient satisfaction.

**Statistical Analysis:** Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean  $\pm$  standard deviation (SD). Qualitative data were expressed as frequency and percentage. Independent-samples t-test of significance was used to compare between quantitative data, while Chi-square test of significance was used in order to compare proportions between qualitative parameters. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant  $< 0.05$ .

## Results

The present study included seventy patients who were assigned in 1:1 ratio to either magnesium sulphate group or control group. Both groups were comparable regarding the demographic data. There was no statistically significant difference between the two groups in baseline MAP and heart rate.

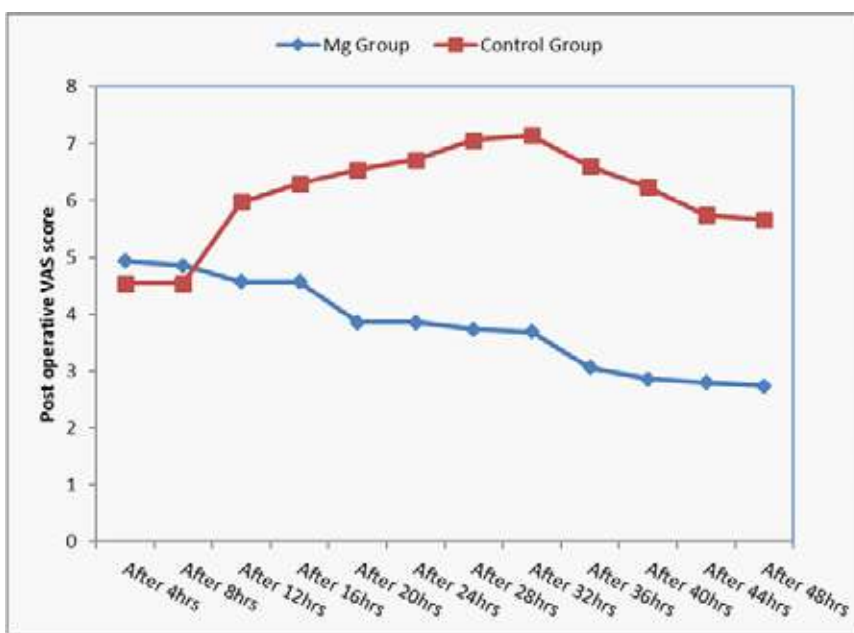
With regard to our primary outcomes, the total dose of fentanyl was significantly higher in control group than the magnesium sulphate group (2575 versus 1850 doses, respectively,  $p = 0.0265$ ). The magnesium sulphate group showed a statistically significant lower number of required fentanyl doses than the control group (74.3% needed two or more doses in magnesium sulphate group

versus 94.4% in the control group,  $p=0.026$ ). A similar findings was observed for need for ketorolac 30mg ( $p=0.017$ ; **Table 1**).

**Table 1: Comparison between groups according to needs for analgesic**

Needs for analgesic	Mg Group (n=35)	Control Group (n=35)	x2	p-value
<b>NSAID doses ()</b>				
1	13 (37.1%)	4 (11.4%)	12.029	0.017*
2	13 (37.1%)	10 (28.6%)		
3	6 (17.1%)	9 (25.7%)		
4	3 (8.6%)	8 (22.9%)		
5	0 (0.0%)	4 (11.4%)		
Total Dose	3450	5150		
<b>Fenanyl doses (0.3 m/kg)</b>				
1	9 (25.7%)	2 (5.7%)	11.045	0.026*
2	16 (45.7%)	12 (34.3%)		
3	7 (20.0%)	9 (25.7%)		
4	3 (8.6%)	10 (28.6%)		
5	0 (0.0%)	2 (5.7%)		
Total Dose	1850	2575		

The postoperative VAS was significantly lower in magnesium sulphate group from the 12th hour ( $4.57\pm 0.50$  versus  $5.97\pm 1.18$ , respectively;  $p=0.033$ ) to the 48th hour postoperatively ( $2.74\pm 0.66$  versus  $5.66\pm 1.03$ , respectively;  $p<0.001$ ; **Figure 1**). A statistically significant higher proportion of patients were satisfied in magnesium sulphate group than control group (80% versus 22.9%, respectively,  $p<0.001$ ).



**Figure (1): Line chart between groups according to postoperative VAS score.**

The MAP was significantly lower in magnesium sulphate group than control group 12 hours postoperatively ( $80\pm 2.1$  versus  $96.29\pm 7.89$ , respectively;  $p=0.012$ ; **Figure.2**); these finding was stable till 48 hours postoperatively. Six hours after the operation, the

heart rate was significantly lower in magnesium sulphate group than control group ( $81.77\pm 9.39$  vs.  $96.86\pm 8.95$ , respectively;  $p=0.023$ ), and the trend was consistent till 48 hours after the operation ( $p<0.001$ ; **Figure 3**).

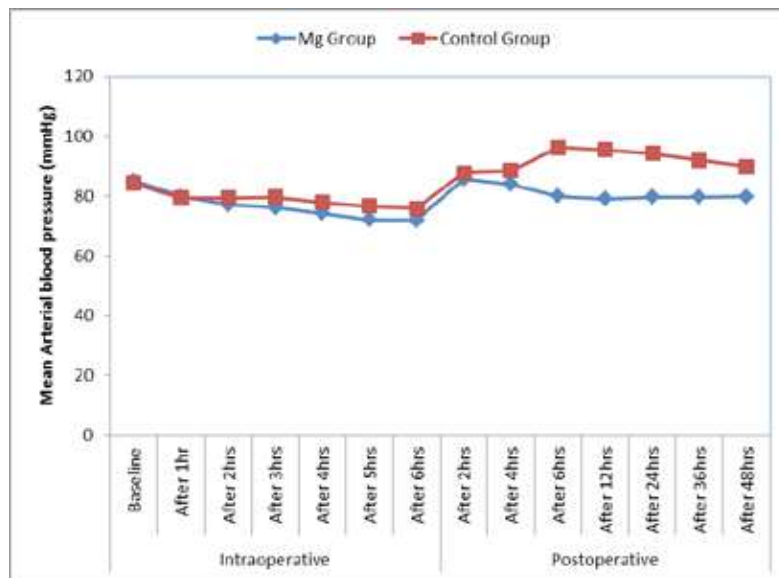


Figure (2): Line chart between groups according to mean arterial blood pressure (mmHg).

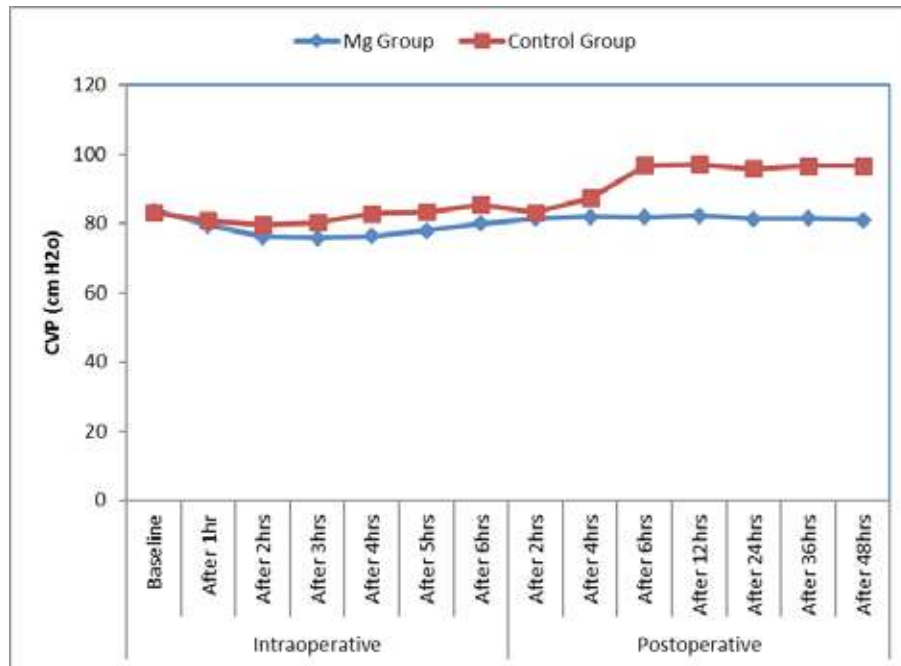


Figure (3): Line chart between groups according to heart rate (Beat/min).

The incidence of nausea and vomiting was significantly higher in the control group than the magnesium sulphate group ( $p < 0.001$ ; Table 2). No major adverse events were observed in both groups.

Table 2: Comparison between groups according to side effects

Side effects	Mg Group (n=35)	Control Group (n=35)	$\chi^2$	p-value
Nausea & Vomiting	5 (14.3%)	24 (68.6%)	21.253	<0.001**
Cardiovascular	5 (14.3%)	28 (80.0%)	30.328	<0.001**
Increase respiratory	6 (17.1%)	9 (25.7%)	0.343	0.558
CNS	4 (11.4%)	5 (14.3%)	0.128	0.721

## Discussion

The present study randomized, controlled, trial assessed the analgesic effect of epidural magnesium sulphate as adjuvant to the conventional combination of local anesthetic and opioid in patients undergoing thoracic surgery. Our randomized controlled trial showed that epidural magnesium sulphate significantly reduced the cumulative doses of intraoperative administered fentanyl and cumulative doses of fentanyl administered during 48 hours postoperatively; as well as the need for rescue analgesic. In addition, epidural magnesium sulphate led to statistically significant lower postoperative pain scores. Moreover, magnesium sulphate group showed more stable hemodynamics than control group, although the difference was clinically subtle. We did not observe any major adverse events in both groups, however, the incidence of nausea and vomiting was significantly higher in the control group than the magnesium sulphate group.

Over the past decades, a growing body of evidence has suggested a significant role of glutamate receptors on peripheral nociceptive sensation; thus, an effective blockade of glutamate receptors, such as N-methyl-D-aspartate (NMDA) receptor, can alleviate different type of pain including postoperative pain<sup>15</sup>. Magnesium sulphate has emerged as an effective, adjuvant, local and systemic analgesic due to its effective blockade of NMDA receptors and calcium channels after systemic absorption<sup>12</sup>. It also increases the number of nerve fibers affected by bupivacaine and therefore potentiates its conduction block<sup>16</sup>. Thus, we proposed that adjuvant infusion of epidural magnesium sulphate to the standard combination of epidural infusion of local anesthetic and opioid can lead to better opioid consumption and postoperative analgesia. Our trial confirmed this hypothesis by showing that the epidural magnesium sulphate significantly reduced the cumulative doses of administered fentanyl and postoperative pain scores. In concordance with our findings,

However, we acknowledge that the present trial has some limitations. The reduced pain scores and reduced requirements for postoperative analgesia in the magnesium group could be a result of the longer block, rather than a reduction in nociception. The study did not allow a separation of the longer spinal blockade versus the potential analgesic effect of magnesium.

In conclusion, the present randomized trial showed that epidural magnesium sulphate is a potent

adjuvant analgesic that reduced opioid consumption and postoperative pain in patients undergoing thoracic surgery. For patients undergoing elective lung cancer resection, it is recommended to have a magnesium sulphate as adjuvant because this improves the quality and duration of postoperative analgesia. Further trials are required to validate these findings.

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# Risk Factors of TB in Southern Iraq with Specific Focus on Governorates with Marshland Populations

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## Abstract

**Background:** This study is designed to study factors associated with tuberculosis in marshlands of Iraq

**Method:** This is a case control study conducted in three governorates containing marshlands in the south of Iraq. Cases were new pulmonary TB case aged over 14 years and Control were age, sex and district matched other than TB patients seeking for health care in primary health care centers. Analysis used the following tests: Chi-square, T-test and Mann-Whitney tests.

**Findings:** The study sample composed of 455 new TB cases and 444 controls. Males constituted 47% of both study groups. Mean age was 41.1±17.4 year for TB cases and 40.4±14.3 year for control group. Underweight was found more among TB cases (19% in cases and 6.9% in control group) ( $P < 0.05$ ). Employment rate in cases was half that of control and housewives were more among cases (43.4% in cases and 28.2% among control) ( $P < 0.05$ ). Duration of smoking was significantly longer in TB cases (18.6±13.7 year) than in control group (12.8±9.6 year) ( $P < 0.05$ ). Diabetes rate was significantly higher among cases (16.6%) than in control (10.2%) ( $P < 0.05$ ). Length of Dexamethasone use was significantly higher in TB patients ( $P < 0.05$ ). It was significant to find TB cases more to have rooms without windows. Family size was higher in cases ( $P < 0.05$ )

**Conclusion:** Main factors associated with TB in south of Iraq were underweight, unemployment, period of smoking, diabetes, period of Dexamethasone use, living in rooms devoid of windows and large family size. Poverty related factors are likely behind having TB in marshlands.

**Keywords:** Tuberculosis, Marshlands, diabetes, smoking, poverty

## Introduction

Tuberculosis (TB) is contagious and airborne. It ranks as the second leading cause of death from a single infectious agent [1]. In Iraq, WHO estimates 45 new and relapsed TB cases and more than 3000 death annually [2].

Three Iraqisouthern governorates have marshland areas (Misan, Thiqr, and Basrah) with a population exceeds five million (20% living in Marshlands).

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Marshlands in south Iraq experience poor health services, poor infrastructure development and population living near polluted sites and industrial plants. Extensive ecological damage to this area, with the accompanying displacement of much of the indigenous population, was identified as one of Iraq's major environmental and humanitarian disasters in post-conflict assessments by international organizations<sup>[3]</sup>.

Factors lead to causation of TB anywhere include low education level<sup>[4, 5]</sup>, income<sup>[5]</sup>, employment<sup>[4]</sup>, malnutrition<sup>[5]</sup>, smoking<sup>[2,8]</sup>, diabetes<sup>[4,5, 6]</sup>, HIV<sup>[7]</sup>, household contact<sup>[7]</sup>, living and working conditions<sup>[8, 9]</sup>, crowding<sup>[4, 7]</sup>, poverty<sup>[4,9]</sup>, poor ventilation<sup>[9]</sup>, use of solid fuel for cooking<sup>[10]</sup>

However, little is known about many other risk factors within marshlands in Iraq. This study is designed to study the factors associated with TB with a specific focus on marshlands area.

### Subjects and Method

This study conducted in three southern governorates of Iraq (Basrah, Thiqr and Misan). Out of 18 districts, six of them are marshland areas containing marshland population and number of TB management units (TBMUs), PHCCs and TB cases registered during 2011.

This is Case Control Study that cases (new TB cases) registered in NTP registered during time of data collection from the three governorates and control (non-TB patients and non-TB suspects attending PHCCs belong to same three governorates during the time of data collection)

**Case:** All TB cases older than 14 years who were newly registered in National TB Control Program in southern governorates from the day of the implementation of the study, not a case of TB relapse or retreatment

Controls were chosen in a way they match cases in age (not more than five years older or younger than TB cases), sex, and locality (nearest PHCC to the cases locality).

#### Data were collected during 2013:

**Statistical Analysis:** A statistical package SPSS20 was used for data analysis. Chi-square, T-test and Mann-Whitney test were used in analysis. Level of significance was set at 0.05.

**Findings:** Study sample composed of 455 new cases of TB and 444 controls. Males constituted 47% of both study groups ( $P > 0.05$ ).

Mean age for TB cases group was  $41.1 \pm 17.4$  year and for control group was  $40.4 \pm 14.3$  year. Mean **Body Mass Index** (BMI) was  $23.0 \pm 5.9 \text{ kg/m}^2$  for cases and it was significantly lower than mean BMI in control group which was  $25.9 \pm 7.8 \text{ kg/m}^2$  ( $P < 0.05$ ). **Underweight** condition was found more among TB cases (19% in cases and 6.9% in control group) and overweight and obesity observed more among control (70% in control and 30.5%) and this distribution is found significant in this study ( $P < 0.05$ ).

Regarding occupation; interesting findings were **employed** people were double among control compared to cases (24.6% in control and 11.9% in cases), and **housewives** were much more among cases compared to control group (43.4% in cases and 28.2% among control) ( $P < 0.05$ ).

Smoking status was not significantly associated with tuberculosis ( $P > 0.05$ ) while **the duration of smoking cigarettes** was significantly longer in TB cases ( $18.6 \pm 13.7$  year) than in control group ( $12.8 \pm 9.6$  year) ( $P < 0.05$ ).

**Family history of TB** is significantly associated with recent TB disease (22.4% of cases have a positive family history for TB compared to 12.7% in control group) ( $P < 0.05$ , table 1).

Finding BCG scar was significantly found less frequent in cases ( $P < 0.05$ , table 1).

This study found **allergic bronchitis** is less frequent in TB cases than in control ( $P < 0.05$ , table 1).

Regarding having positive history for tumors; there was no significant association between tumors and TB disease ( $P > 0.05$ , table 1).

**Diabetes Mellitus** disease was significantly higher among cases (16.6%) than in control (10.2%) ( $P < 0.05$ , table 1).

History of anemia showed no significant association with TB ( $P > 0.05$ , table 1).

History of cortisone or steroid therapy was not significant with TB disease ( $P > 0.05$ , table 3) but the longer duration of Dexamethasone use was significantly related to TB disease ( $P < 0.05$ , table 1).



**Table 1: Distribution of participants according to study group and to related medical history:**

Variables	Study Group				P Value
	Case		Control		
	N	100.0%	N	100.0%	
Family history of TB	101/451	22.4%	56/441	12.7%	<0.001
Scar of BCG	266/450	59.1%	303/441	68.7%	0.003
Allergic Bronchitis	91/446	20.4%	126/437	28.8%	0.004
Tumors	9/448	2.0%	8/437	1.8%	0.847
Diabetes	75/452	16.6%	45/442	10.2%	0.005
History of Anemia	113/445	25.4%	100/442	22.6%	0.471
History of Cortisone or steroid treatment	39/451	8.6%	52/442	11.8%	0.224
History of use of Dexon	65/442	14.7%	78/438	17.8%	0.454
Months of Dexon use; M±SD	13.2±21.3		4.1±6.1		<0.001

TB patients were significantly more frequently residing near to health facilities than control ( $P < 0.05$ , table 2).

It was significant to find TB cases more to have rooms without windows than control ( $P < 0.05$ , table 2).

Family size found to be higher in cases group ( $P < 0.05$ , table 2).

Frequency of drinking non-sterile milk was significantly higher among TB cases (19.0%) than in control (5.7%) ( $P < 0.05$ , table 2).

Tuberculosis patients at southern governorates in Iraq are less likely to work in polluted environment ( $P < 0.05$ , table 2).

**Table 2: Distribution of environmental factors for each study group:**

Variables	Study Group				P Value
	Case		Control		
	N	100.0%	N	100.0%	
Home is built from					0.055
• Reeds & papyrus	4/452	0.9%	1/440	0.2%	
• Clay	50/452	11.1%	31/440	7.0%	
• Plates	5/452	1.1%	2/440	0.5%	
• Bricks	393/452	86.9%	406/440	92.3%	
Windows per room					0.031
• No windows	25/453	5.5%	12/443	2.7%	
• Only one	292/453	64.5%	315/443	71.1%	
• More than one	136/453	30.0%	116/443	26.2%	
Family size	8.8±4.3		8.3±3.5		0.048
Crowding Index	2.9±1.3		3.0±1.4		0.049
Drink non-sterile milk	86/452	19.0%	25/442	5.7%	<0.001
Pollution at workplace					0.002
• Dust and sands	118/449	26.2%	159/436	36.3%	
• Smoke	29/449	6.4%	19/436	4.3%	
• Exposure to animals	29/449	6.4%	14/436	3.2%	
• No pollution	273/449	60.7%	244/436	55.7%	

## Discussion

TB cases distribution in this study characterized by the significant dominance of the younger age group (15-45 year) which is consistent with TB epidemiology in high growth population [12]. Compared to this young age group, risk for TB occurrence is more than double after the age of 65 which is consistent with the vulnerability to develop active disease at such ages [12].

Generally speaking; TB patients have lower BMI compared to control this could be attributed to the fact tuberculosis patients are more likely to be poor and malnourished. These findings are consistent with previous literatures that underweight is a risk factor for TB [4,5,11].

Single people are twice at risk to develop TB than others a finding shared by another study in Croatia [4]

Education level less than intermediate education increases the risk of TB around two times or more [11] and high education protects from TB [5].

Regarding occupation; hard work/farming, student status and unemployment are more prone to develop TB compared to other occupations [4,11].

According to this study; tobacco smoking and duration of smoking were not significant predictors of TB disease. A study in Northern India did not find this association is significant [10], while other studies found Tobacco smoking a risk factor for TB [4, 11].

Family history of TB is associated with TB. Contacts of TB cases are prone to infection and disease development [4].

This study found a protective effect for allergic bronchitis (asthma) from tuberculosis. Community control were found less frequent to have asthma than TB patients, this finding was encountered in a study included three countries in West Africa [13]. In addition, a putative link between exposure to mycobacteria and a decreased risk of atopic disease was suggested by a Japanese study [14]

Tumors or malignancies showed no significant association with TB disease despite the risk of low immune status brought by its treatment [4]. Tumors have low public importance due to low prevalence despite strong evidence for causal association [11].

Diabetes Mellitus increases the risk of developing

TB according to some literatures [4, 6, and 11]. This study found a significant association of diabetes with TB.

Taking into consideration that steroid therapy suppresses immunity and increase the risk for developing active TB [15, 16], systemic steroids therapy over long periods causes a significant increase in TB incidence [17-19]. Related findings in this study were not significant apart from increased risk with longer use of Dexamethasone medications.

Homes with no windows i.e. with improper ventilation with fresh air and poor sun-light illumination, is a significant predictor for TB [8]

Unlike a study [5] found no significant association between house hold size and TB; in this study “family size” including “number of family members older than 15” slightly significantly increased the risk of TB occurrence. Crowding increases risk of TB transmission and there are no good data on strength of association with developing TB disease [11].

Workplace environment polluted with dust or sands decrease the risk of TB occurrence in this study while workplace environments polluted with smoke, exposure to animals, or other pollutants which showed no significant risk for TB in this study. Literatures states that indoor air pollution (smoking [20], fuel combustion – solid biomass fuel [20] or kerosene [21]) and outdoor air pollution risks for lung tissue damage and increased susceptibility to develop TB disease [22].

Taking into consideration among the key correlates of poverty and under the category of household and individual characteristics; among the most important are [23, 24] demographic (household size, age structure, dependency ratio, gender of head), economic (employment status, hours worked, property owned) and social (health and nutritional status, education, shelter).

This study found some factors that are shared between TB and poverty, including:

**Under weight:** it is an indicator of poor nutritional status.

**Low education level:** Literacy and schooling are key determinants of poor people’s ability to take advantage of income-earning opportunities [23].

**Unemployment:** The overall unemployment rate in Iraq is high [25].

**Living environment:** living in non-urban residence, homes built from mud and homes not provided with windows.

Living in such conditions questions the availability and the use of drinking water, communications services, electricity, and other energy sources, the level of sanitation, the degree of isolation (availability of roads and paths which are usable at all times, length of time and availability of transportation to get to work) and the degree of personal safety<sup>[23]</sup>.

**Large family size:** A possible correlation between household size and level of poverty<sup>[23]</sup>. The poor tend to live in larger households<sup>[24]</sup>.

This study illustrated the link between poverty and TB, a link which is already known for many years<sup>[25]</sup>, and as a disease of poverty, Tuberculosis is responsible for the loss of many years of healthy life<sup>[26]</sup>; Effort cut this vicious cycle between poverty and TB are needed to alleviate both of them in a country where poverty level continues to remain high (23% of the population living under the national poverty line of US\$ 2.20 per day)<sup>[27]</sup>.

### Conclusion

Main factors associated with TB in south of Iraq were underweight, unemployment, period of smoking, diabetes, period of Dexamethasone use, living in rooms devoid of windows and large family size. Poverty related factors are likely behind having TB in marshlands.

**Conflict of Interest:** there is no conflict of interest

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**Ethical Clearance:** was obtained prior to conduct of the study.

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# Relationship Antenatalcare (ANC) with Neonatal Death in Indonesia (Data Analysis 2017 IDHS)

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## Abstract

**Background:** The results of the Indonesian Demographic and Health Survey (IDHS) in 2017 show an NMR of 15 per 1.000 live births. These figures are still lower than the Sustainable Development Goals (SDG's) Sustainable Development Goals target, with the target that in 2030 neonatal mortality rate (NMR) no more than 12 per 1.000 live births by 2030. Neonatal mortality comes from poor maternal health, inadequate care during pregnancy, management of improper complications during pregnancy and childbirth. The purpose of this study was to see the relationship between history of antenatal care (ANC) visits and neonatal death in Indonesia.

**Method:** This study used a case control design with female respondents aged 15-49 years. Multiple Logistic Regression is used to see the variables most related with the 95% Confident Interval. Data was analyzed using SPSS 24 for windows.

**Results:** The final model shows that there is a significant relationship between the history of ANC and neonatal death after controlled variables for labor complications. OR value = 2.449 (95% CI: 1.358-4.417).

**Conclusion:** The implementation of Antenatal Care (ANC) for pregnant women is a step to detect problems or complications that may arise during pregnancy. Problems or complications during pregnancy can affect the safety of the mother and baby. Implementing ANC in accordance with the standards recommended by the government is a solution in reducing maternal and newborn mortality.

**Keywords:** Neonatal Death, Antenatal Care, Indonesian Health Demographic Survey

## Introduction

Neonates are newborns up to the age of 28 days. During this time there is a huge change in life in the womb and organ maturation occurs in almost all systems. Infants aged less than one month are age groups who have the highest risk of health problems and various health problems can arise.<sup>(1)</sup>

In the current trend, more than 60 countries will lose the target of Sustainable Development Goals (SDG's) to

reduce neonatal deaths to the lowest 12 deaths per 1.000 live births by 2030. About half of them will not reach the target by 2050. This countries brings about 80% of the burden of neonatal death in 2016.<sup>(2)</sup>

In 2016 there were 5.6 million children died before their fifth birthday, of which around 2.6 million (46%) died in the first month of life of all under-five deaths have ben occured during this period. This means that there are 7.000 newborn deaths every day. The majority of neonatal deaths are concentrated in the first day and week, with around 1 million death on the first day and almost one million dying in the next six days.<sup>(2)</sup>

The results of the Indonesian Demographic and Health Survey (IDHS) in 2017 show an NMR of 15 per

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1,000 live births. This implies that 1 in 67 babies die in the first month of life. As many as 75% of all deaths in the first 5 years occur between birth and first birthday and 63% of infant deaths occur within one month after birth.<sup>(3)</sup> In infant mortality the results of the 2017 IDHS show lower rates compared to the results of the 2012 IDHS.<sup>(4)</sup> These figures are still low from the targets of the Sustainable Development Goals (SDG's), with the target that in the year 2030 NMR no more than 12 per 1,000 live births.<sup>(5)</sup>

Neonatal mortality comes from poor maternal health, inadequate care during pregnancy, management of improper complications during pregnancy and childbirth, poor hygiene during childbirth and the first critical hours after birth, and lack of care for newborns.<sup>(6)</sup> All of these risk factors can be minimized or prevented through Antenatal care (ANC) interventions.

Antenatal Care (ANC) is a pregnancy checkup to optimize the mental and physical health of pregnant women, so that they are able to face childbirth, puerperium, preparation for breast feeding and the normal return of reproductive health.<sup>(7)</sup> During pregnancy, ANC is very important for early detection of risks. High rates of pregnancy and childbirth can also reduce maternal mortality and monitor the condition of the fetus.<sup>(8)</sup>

Based on the 2017 IDHS report, mothers with a history of getting ANC at least 4 times were 77%. This percentage is slightly higher than the target of the Ministry of Health in 2015 of 72%. Based on these data, coverage of ANC at least 4 times nationally shows that there are still around 28% of mothers who have not received ANC at least 4 times.<sup>(3)</sup>

Research by Tufa Kolola found that mothers who received an ANC less than 4 times had a risk of 3.48 times for death in babies born.<sup>(9)</sup> Other studies by Monica PL in Ghana used data from the Demographic and Health Survey (DHS) in Ghana as well found a decrease in the risk of neonatal death in mothers who received ANC more than 4 times.<sup>(10)</sup> Research by Imelda (2019) found that there was a relationship between ANC and neonatal deaths in the Mentawai Islands.<sup>(11)</sup> Research conducted by Desy (2013) also found that there was a relationship between ANC and neonatal death.<sup>(12)</sup>

Research on the relationship between antenatal care (ANC) history and neonatal mortality using IDHS data is still rare. Antenatal care (ANC) can prevent various risk factors for neonatal death. Therefore researchers are interested in further analyzing how much influence

the risk of Antenatal care (ANC) on neonatal deaths in Indonesia.

## Research Method

**Study Design:** This study is an analytical study using a case control design to determine the relationship between the history of ANC as an independent variable and neonatal death as the dependent variable.

**Population and Samples:** The population in this study were all female individuals who participated in the 2017 IDHS survey interview, which amounted to 17,848 people who were willing to become respondents. The study population were mothers who gave birth to babies who died at the age of 0 to 28 days and the comparison population was mothers who gave birth to live babies. The inclusion criteria in this study were women who had live babies, infants died at less than 29 days of age and exclusion criteria were variables with incomplete data. The total eligible population is 8,349 respondents. There are 95 cases of neonatal deaths. The comparison of cases and controls used is 1: 4. Case samples are 95 and the controls chosen are 380.

**Variable:** The dependent variable is neonatal mortality, the independent variable is the history of ANC and the covariate variables are residence, maternal age, maternal education, parity, tetanus toxoid (TT) immunization, pregnancy complications, complications of labor, place of delivery, twin births, ANC (antenatal care). This study uses data from the 2017 Indonesian Health Demographic Survey.

**Data Collection:** The 2017 IDHS data contains comprehensive information about population and maternal and child health in Indonesia. The 2017 IDHS sample covers 1,970 census blocks covering urban and rural areas in all provinces in Indonesia, including women of childbearing age aged 15-49 years. The sample frame of the 2017 IDHS uses the Master Census Block Sample from the 2010 Population Census results.

**Data Analysis:** Univariate analysis to see the frequency distribution of respondents' characteristics. Bivariate analysis is used to see the relationship of the independent variable with the dependent variable is to use the Logistic Regression test. Multivariate analysis using the Multiple Logistic Regression test by entering all candidate variables with criteria  $p < 0.25$  to see the relationship between the ANC history of neonatal mortality after control of the covariate variable. Data analysis using SPSS.24 software.

## Result

**Table 1: Results of Bivariate Analysis**

Characteristics	Live Baby Status				P value	OR
	Case		Control			
	n = 95	%	n = 380	%		
<b>Place of Residence</b>						
Rural	46	48,4	180	57,4	0,854	1,043
Urban	49	51,6	200	52,6		
<b>Mother's Age</b>						
<20th & >35th	34	35,8	81	21,3	0,004	2,057
20th - 35th	61	64,2	299	78,7		
<b>Mother's Education</b>						
Middle down	82	86,3	322	21,3	0,700	1,136
Higher	134	13,7	58	78,7		
<b>Parity</b>						
>4	9	9,5	25	6,6	0,330	1,486
1-4	86	90,5	355	93,4		
<b>Tetanus Toxoid Immunization</b>						
< 2	57	60	219	57,6	0,676	1,103
>2	38	40	161	42,4		
<b>Pregnancy Complications</b>						
Yes	76	80	339	89,2	0,017	0,484
No	19	20	41	10,8		
<b>Labor Complications</b>						
Yes	71	74,7	260	68,4	0,232	1,365
No	24	25,3	120	31,6		
<b>Place of Delivery</b>						
Not - Health Facility	28	29,5	85	22,4	0,147	1,450
Health Facility	67	70,5	295	77,6		
<b>Twin Births</b>						
Twin	5	5,3	3	0,8	0,009	6,981
Single	90	94,7	377	99,2		
<b>Antenatal Care (ANC)</b>						
ANC < 4	22	23,2	47	12,4	0,009	2,135
ANC > 4	73	76,8	333	87,6		

**Table 2: Final Model of Multivariate Antenatalcare Relationship (ANC) with Neonatal Death in Indonesia**

Variabel	P value	OR	95% CI	
			Lower	Upper
ANC	0,003	2,449	1,358	4,417
Labor Complications	0,074	1,629	0,954	2,784

The proportion of infants dying in urban areas is higher (51.6%) compared to rural areas (48.4%). In the maternal age group, the proportion of infants who died in mothers aged <20 years and > 35 years was lower (35.8%) compared to mothers aged 20-35 years (64.2%). The proportion of infants who died in mothers with

secondary education was higher (86.3 %) compared to higher education mothers (13.7%). The proportion of babies who die in mothers with more than 4 children is smaller (9.5%) than mothers who have children less than 4 (90.5.1%). The proportion of infants dying was higher in mothers who did not get tetanus injections (60%) than mothers who received tetanus injections (40%). The proportion of infants who died in mothers with a history of pregnancy complications was higher (80%) than mothers who did not experience pregnancy complications (20%). The proportion of infants dying in mothers who experienced labor complications was higher (74.7%) than mothers who did not experience labor complications (25.3%). The proportion of infants who were born in non-health facilities was lower (29.5%) than babies born in health facilities (70.5%). The proportion of infants who died in twin births was lower (5.3%) compared to single-born babies (94.7%). In mothers with a history of ANC visits, the proportion of infants dying was higher in mothers with a history of ANC > 4 (76.8%) than mothers with ANC > 4 (23.2%).

Independent variables that meet candidate requirements for multivariate models (p value <0.25) are the age of the mother, complications of pregnancy, complications of labor, place of delivery, multiple births and ANC (antenatal care). The final model shows that there is a significant relationship between the history of ANC and neonatal death after controlled variables for labor complications.

## Discussion

The results of this study also showed that there is a relationship between ANC and neonatal deaths in Indonesia. Mothers who received ANC <4 times during pregnancy had a risk of 2,449 times to get neonatal death compared to mothers who received ANC > 4 times during pregnancy, after being controlled by variables of labor complications.

Research in Kenya using Kenya's Demographic and Health Survey (DHS) data found that mothers with a history of small ANC visits from 4 had a high chance of risk of death in babies born.<sup>(13)</sup> The study used basic survey data on maternal and newborn intervention in Eastern Uganda found that there was a reduction in the risk of neonatal death in women with a history of ANC visits more than 4 times.<sup>(14)</sup> Other studies by Monica PL in Ghana using the Demographic and Health Survey (DHS) in Ghana also found a reduced risk of neonatal

death in mothers who get ANC more than 4 times.<sup>(10)</sup> In many Sub-Saharan Africa (SSA) countries, many risk factors can be minimized or prevented through Antenatalcare interventions (ANC). Recommendations from WHO through effective ANC services are a minimum of four or more ANC visits.<sup>(13)</sup>

Ministerial Regulation number 97 of 2014 mandates that maternal health services during pregnancy be carried out through comprehensive and good quality antenatalcare services to prepare clean, safe and healthy deliveries. Health care for pregnant women is given to pregnant women by health workers in health care facilities. This process is carried out during the maternal gestational age range grouped according to gestational age into the first trimester, second trimester, and third trimester. The standard of service time is recommended to ensure the protection of pregnant women and or the fetus in the form of early detection of risk factors, prevention, and early treatment of pregnancy complications which if not handled properly can lead to death.<sup>(15)</sup>

## Conclusion

Antenatal care (ANC) is a step taken to detect problems or complications that may arise during pregnancy. Problems or complications during pregnancy can affect the safety of the mother and baby. One of the main indicators in reducing maternal and neonatal mortality is to implement ANC in accordance with the standards recommended by the government.

**Limitation of Study:** This study used secondary data analysis and not all variables can be included because there are variables whose data is missing. Potential information bias that can occur in this study is non-differential misclassification, including recall bias. At the time of data collection, respondents were asked to recall events in the past 5 (five) years regarding their health condition during pregnancy and childbirth. Information about the variables of neonatal death, TT immunization, the presence or absence of pregnancy complications and labor complications, the history of ANC and PNC were obtained based solely on the respondent's memory, not from medical records that could result in underestimated risk values.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

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# The Effect of Mind Fullness Therapy on Psych on Euro Immunology: A Systematic Review

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## Abstract

**Context:** Psych on euro immunology (PNI) is a link between psychological factors that affect the immune system and physical health through neural and endocrinological pathways. Mindfulness as an exercise is aware of the conditions experienced by the body, mind, feeling, current situation and conscious thinking to make a feeling or situation calm. The purpose of this study was to find the effect of mindfulness therapy on psychoneuroimmunology by using a systematic review based on the PRISMA guidelines. Database Scopus, ScienceDirect, Proquest, Pubmed, and Springerlink which have been published in the limits of January 2013-November 2018. Articles were identified using the keywords “Mindfulness” AND “Psychoneuroimmunology” OR “Psycho” OR “Neuro” OR “Immunology” . The article used is intervention research. Twenty eight of the 307 articles found were used in this systematic review. The article reviewed mentions that mindfulness therapy has positive benefits for psychoneuroimmunology. Mindfulness therapy can be used as a non farmacological intervention to overcome health problems related to psychoneuroimmunology.

**Keyword:** *Mindfullness, Psychology, Neurology, Immunology, Psychoneuroimmunology, PNI*

## Introduction

Psych on euro immunology (PNI) discusses about how psychological factors affect the immune system and physical health through neural and endocrinological pathways. This relationship is very relevant for immunological mediated health problems, including infectious diseases, cancer, autoimmunity, allergies, and wound healing. Psychosocial characteristics associated with changes in immune function indicate that psychological interventions such as, relaxation and hypnotherapy and mindfulness to improve mood, coping and social support in an effort to modulate immune function<sup>1</sup> and incidences of depression, fatigue, and anxiety are elevated. We examined effects of a mindfulness-based intervention (MBI).

In this systematic review, we will discuss the effectiveness of mindfulness on psychoneuro immunology. Mindfulness also refers to practices or techniques such as meditation practice, based on the contemplative Buddhist tradition<sup>2</sup> during and following the stressor. Results We found that PMAA reduced psycho-physiological dysregulation in response to an anxiogenic stressor, as well as moderated the anxiogenic effect of distress intolerance on psychological but not physiological responding to the stressor among smokers pre-disposed to experience distress via deprivation. Conclusions The present study findings have a number of theoretical and clinical implications for work on mindfulness mechanisms, distress tolerance, emotion regulation, and smoking cessation interventions.

2. There is a great deal of interest in research on mindfulness including Mindfulness-Based Cognitive Therapy (MBCT), Mindfulness-Based Cancer Recovery (MBCR) and Mindfulness-Based Stress Reduction (MBSR).

Mindfulness-Based Stress Reduction (MBSR) is a treatment program to relieve stress and overcome chronic

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diseases as an inflammatory biomarker<sup>345</sup> health status, coping capacity, mindfulness, posttraumatic growth, and immune status. This RTC assigned 166 women with breast cancer to one of three groups: MBSR (8 weekly group sessions of MBSR. Certified Mindfulness-Based Cognitive Therapy (MBCT) 8- The weekly skill-based skills training group program was originally designed to prevent recurrence of depression and recurrence formed as a basis for empirical research to test predictors of relapsing depression<sup>6,7,8</sup> most of the available studies suffer from important methodological shortcomings, including the lack of adequate control groups. The present study aims to compare MBCT with a psycho-educational control group designed to be structurally equivalent to the MBCT program but excluding the main putative "active ingredient" of MBCT (i.e., mindfulness meditation practice<sup>9,10</sup>. With Mindfulness-Based Cancer Recovery (MBCR) there is a greater decrease in mood disorders (especially fatigue, anxiety and confusion) and stress symptoms including tension, sympathetic stimulation and cognitive symptoms in cancer patients<sup>11</sup>.

The purpose of this study was to find the effect of mindfulness therapy on psychoneuroimmunology.

## Method

This Systematic review uses a guide based on the Preferred Reporting Item for Systematic Review and Meta-Analysis (PRISMA)<sup>12</sup>.

**Literature Search Strategy:** The literature used in this Systematic Review uses tracing through 5 electronic databases, namely: Scopus, ScienceDirect, Proquest, Pubmed, and Springerlink which have been published within the limits of January 2013-November 2018 with keywords "Mindfulness" AND "Psych on euro immunology" OR "Psycho" OR "Neuro" OR "Immunology".

### Criteria for Inclusion and Exclusion:

**Desain Studi:** The study design being the inclusion criteria in this Systematic Review is a Randomized Controlled Trial (RCT) design that is published using English

**Populasi:** The population in this systematic review is, All studies that describe patients who get Mindfulness Training interventions with or without a control group, Men and women > 17 years old and Seeing the effect of

Mindfulness on Psychoneuroimmunology on patients.

**Intervention:** Various types of mindfulness interventions that affect psychological, neurological and immunological effects on various types of diseases.

**Clinical Results:** The main outcome of this systematic review is to look at the influence of mindfulness interventions on psychological, neuro and immunology.

**Study Selection:** Standard protocol for selecting studies as suggested in the systematic review method guide, PRISMA. The steps taken are removal of duplication, examination independently for titles, abstracts and keywords and delete citations that are not relevant according to the inclusion criteria, if the title and abstract seem to meet the inclusion criteria and according to the purpose of the systematic review, the next step is the selection of journals with full text, the final step is the selection of articles using the RCT approach to reduce the risk of bias.

**Data Extraction:** Data is extracted from each study that meets the requirements. The extracted data includes the characteristics of the study, characteristics of mindfulness, characteristics of the results and summary of results.

**Analysis of Data:** Studies are grouped according to the effects of mindfulness on psychology, neurology and immunology. If possible, the research was then grouped based on the time of follow-up and the type of control group

## Result

**Literature search and study selection:** Search results and the selection of studies following the PRISMA guidelines<sup>12</sup>. The selection of journals based on the keywords used produces 307 articles. 256 articles found after duplication screening. 201 is eliminated due to irrelevant studies based on titles and abstracts. A total of 56 articles with full text were taken with 33 studies excluded. So that 23 studies were selected which will be carried out systematic reviews.

**Population:** The sample size of the 23 studies used is that the least systematic review is 23 people divided into two groups, namely the control and intervention groups, with the age range 18-51 years, and the characteristics of patients are female patients with Multiple Sclerosis, while the highest number of samples was 271 people,

divided into three (3) treatment groups as well as female patients with stage I, II and III Breast Cancer conditions with age > 18 years.

The conditions of patients sampled in this study included patients with conditions: Breast Cancer, Multiple Sclerosis, Cardiovascular Disease, Sleep Disorders, HIV Infection, Major Depression Disorder, Patients after undergoing Hematopoietic Stem Cell Transplantation (HSCT), patients with stressful conditions/have a high stressor, patients with lung injury/ lung problems, and smoker patients.

**Characteristics of Intervention:** There are several types of mindfulness interventions including Mindfulness-Based Cognitive Therapy (MBCT), Mindfulness-Based Cancer Recovery (MBCR), Mindfulness-based intervention (MBI), Mindfulness Meditation (MM). The intervention was carried out with different duration and frequency with the shortest time being 3 days with a duration of 25 minutes per day and the longest time was 8 weeks with a duration of 45 minutes per day.

**Size of Clinical Outcomes:** Research reports the outcome measures used to measure psychology, neurology and immunology. Outcome measures are used to measure the psychological symptoms of stress inventory (SOSI), the profile of mood states (POMS), the Beck Depression Inventory-2 (BDI-II), the Hamilton Rating Scale for Depression (HAM-D). Measurement of neurological results using salivary cortisol, neurological inflammation. Whereas to measure Immunology results using the Lymphocyte Proliferation Test (LTT), ELISA (Cytokine Assays), Flow Cytometric Analysis (FACS), CD4, c-reactive protein, IL-6, and d-dimer

**Intervention Efficacy Analysis:** For each RCT intervention it was explained they evaluated the effect of mindfulness on treatment separately. Some journals continue to follow up up to 12 months after the intervention so that they can assess the long-term influence of the intervention that has been done.

### Effect of mindfulness on psych on euro immunology

#### Psychological:

a. **Stress:** Kingston et al., reported that the Mindfulness-based cognitive therapy (MBCT) group experienced a significant increase in awareness and a decrease in anxiety levels. The most preferred program is

Mindfulness-Based Cancer Recovery (MBCR) (55%) compared to management stress<sup>13</sup>.

- b. **Depression:** Chiesa et al., most of the available studies suffer from important methodological shortcomings, including the lack of adequate control groups. The present study aims to compare MBCT with a psycho-educational control group designed to be structurally equivalent to the MBCT program but excluding the main putative "active ingredient" of MBCT (i.e., mindfulness meditation practice showed a decrease in the level of depression measured using the proven HAM-D and BDI scores over the long-term period in the MBCT group than in the psycho-education group. Kenne Sarenmalm et al., health status, coping capacity, mindfulness, posttraumatic growth, and immune status. This RTC assigned 166 women with breast cancer to one of three groups: MBSR (8 weekly group sessions of MBSR stated that the MBSR group experienced a significant increase in depression scores, with a pre-MBSR average using a HAD-score of 4.3 and a post-MBSR score of 3.3 (P = 0.001), and compared with non-MBSR (P = 0.015).
- c. **Fatigue:** Fatigue decreased significantly in the Ambulance Activity Feedback (AAF) therapy and Web-based mindfulness-based cognitive therapy (eMBCT) group compared to the psycho-education group<sup>14</sup>. Relevant clinical changes in fatigue severity were observed in 66% (41/62) of patients receiving AAF therapy, 49% (27/55) patients received eMBCT, and 12% (6/50) patients received psycho-education.

**Neurology:** Research shows that the increase in posterior cingulate cortex rsFC with left dlPFC (p = 0.05). Mindfulness meditation training statistically changes in IL-6 so mindfulness has been shown to increase the marker of risk of inflammatory diseases<sup>15</sup>.

**Immunology:** Research shows that MBSR therapy carried out for 45 minutes / day for 8 weeks causes a decrease in CRP and IL-6 levels<sup>16</sup>. Frederick et al, in their study found a decrease in CD4 + T-cells in the MBSR group of 49.6 cells / µl and the control group 54.2 cells / µl difference from 4.6 cells (p = 0.85)

### Discussion

There are several important findings regarding the effect or effectiveness of mindfulness that will now be discussed in detail.

## Psychology:

**Stress:** The program most favored by patients with stage I, II, III breast cancer is MBSR (55%) compared to management stress. The mindfulness group has been shown to improve mood disorders, stress, quality of life<sup>13</sup> and weight loss by relieving stress<sup>17</sup>, improving sleep quality<sup>18</sup>. There were no significant effects MM and general interventions because they were equally effective in reducing stress and related symptoms<sup>19</sup> therefore the need for stress-reducing method is great. This randomized controlled trial compared the efficacy of self-help physical activity (PA).

MBSR intervention showed that there were no significant improvements in physical symptoms and mental health ( $p > 0.05$ ). However, a significant increase was observed in patients' quality of life ( $p > 0.05$ ) in patients with Multiple sclerosis<sup>20</sup>.

**Depression:** Based on the MBCT intervention in patients diagnosed with dysthymia at least 2 years and experiencing depression during treatment experienced a significant increase in improving depression symptoms and mindfulness skills in patients compared to the control group<sup>7</sup>. Electro-cortical clinical work pathways with MBCT in multi-leveled depression are nonlinear and interdependent mechanisms, represented by dynamics of mediated EEG synchronization<sup>6</sup>.

Based on HAM-D and BDI scores, as well as quality of life scores and awareness, showed a higher increase, which was especially evident over the long-term period in the MBCT group than in the psycho-education group<sup>8</sup> most of the available studies suffer from important methodological shortcomings, including the lack of adequate control groups. The present study aims to compare MBCT with a psycho-educational control group designed to be structurally equivalent to the MBCT program but excluding the main putative "active ingredient" of MBCT (i.e., mindfulness meditation practice<sup>9</sup>). Patients with breast cancer who took MBSR for 8 weeks experienced a significant increase in depression scores, with an average pre-MBSR HAD score of 4.3 and post-MBSR scores of 3.3 ( $P = 0.001$ ), and compared with non-MBSR ( $P = 0.015$ )<sup>5</sup> health status, coping capacity, mindfulness, posttraumatic growth, and immune status. This RTC assigned 166 women with breast cancer to one of three groups: MBSR (8 weekly group sessions of MBSR. Multiple sclerosis patients with mindfulness interventions result in a greater reduction in the rate of

depression than psycho-educational interventions, up to 6 months of follow-up<sup>21,22</sup>.

**Fatigue:** Fatigue decreased significantly in the AAF and eMBCT groups compared to the psycho-education group. Relevant clinical changes in fatigue severity were observed in 66% (41/62) of patients receiving AAF therapy, 49% (27/55) patients received eMBCT, and 12% (6/50) patients received psycho-education<sup>14</sup>.

**Neurology:** Mindfulness carried out for 3 days with a duration of 2.5 hours / day can reduce salivary cortisol reactivity and reactivity to psychological stress after doing cognitive therapy. Mindfulness meditation training causes an increase in the posterior cingulate cortex rsFC with dlPFC ( $p = 0.05$ ) and statistically changes in IL-6.

**Immunology:** There was a significant effect on the MBSR group on mental health and quality of life compared to the control group and there was a significant increase of lymphocyte proliferation with phytohemagglutinin (PHA) and peripheral blood IL-17, but did not significantly affect lymphocyte (CD4 +, CD8 + and NK-cell)<sup>3</sup>.

HIV patients who take MBSR for 8 minutes with 1x meeting / week duration of 2.5 hours. Follow-up 12 months after MBSR and a decrease in the average number of CD4 T cells was 49.6 cells /  $\mu$ l compared to 54.2 cells /  $\mu$ l in the control group, a difference of 4.6 cells supporting the MBSR group (95% CI, -44.6, 53.7,  $p = 0.85$ ). Differences between groups in other immunological related outcomes (c reactive protein, IL-6, HIV-1 viral load, and d-dimer) were not statistically significant at each time point (3, 6 and 12 months after intervention)<sup>23</sup>.

There are several potential limitations associated with this systematic review, namely (1) the risk of publication bias, (2) the main outcome is not always the same as in other studies.

## Conclusion

There are several types of mindfulness and their effects on psychoneuroimmunology but this cannot determine the most effective type of mindfulness. Mindfulness as a whole has an influence on psychoneuroimmunology especially on the psychological. Further randomized research must be carried out by including more objective steps to explain the mechanism of mindfulness to psycho-

neuro and immunology simultaneously.

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# Long Term Outcome of Laparoscopic Assisted Anorectoplasty in Management of High Anorectal Malformations in Males

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## Abstract

**Aim of the Study:** The purpose of this study is to evaluate the long term outcome of laparoscopic-assisted anorectoplasty (LAARP) in management of male children with high-type anorectal malformation (ARM).

**Method:** Forty patients with high ARM were operated between January 2005 and January 2014 were reviewed. All of them underwent LAARP. Age at operation, type of fistula, associated anomalies, complications and degree of continence were evaluated. Bowel functions were assessed using the Cleveland Clinic Incontinence Score. Ethical procedures including obtaining informed consent were conducted in accordance with the ethical standards of the Committee on Human Experimentation of Cairo University.

**Main Results:** The mean follow up period was (6.4±2 years). The type of fistulae were recto-bladder neck and recto-vesical (45% and 55% respectively). Rectal mucosal prolapse occurred in 40% of patients. The rates of normal continence (score 0:4) (25%), mild incontinence (score 5:9) (30%), moderate incontinence (score 10:14) (30%) and severe incontinence (score 15:20) (15%). None of our patients included in the study suffered from constipation.

**Conclusion:** The long term functional outcomes after LAARP was satisfactory apart from rectal mucosal prolapse, however LAARP is a suitable method for management of ARM patients with higher type fistulae.

**Keywords:** LAARP, PSARP, male imperforate anus, high anorectal malformation.

## Introduction

Since laparoscopically assisted anorectoplasty (LAARP) was first described by Georgeson et al<sup>1</sup> as an alternative to posterior sagittal anorectoplasty (PSARP), it has gained popularity for the management of patients with high anorectal malformations (ARMs). Surgeons adopting this approach believe that it offers advantages in terms of a better cosmetic outcome, in addition to accurate placement of the pull-through rectum within

the muscle complex without division<sup>2-6</sup>. However, to the best of our knowledge, there is a paucity of articles comparing the functional outcomes of the two approaches<sup>2, 6-12</sup>. The aim of this study was to evaluate the long-term outcomes and complications of LAARP for high types of imperforate anus in males.

## Materials and Method

**Patient Demographics:** We reviewed the data of male patients of imperforate anus with high fistulae who underwent surgery in our institution from January 2005 to January 2014. Forty Five patients were operated on during this period and were asked to attend our paediatric colorectal clinic for assessment. All of them were managed by LAARP. Closure of colostomy was done for all patients after reaching the desired size of anal dilatation. Five patients were either lost to follow-up or refused to participate in our study. Patients with

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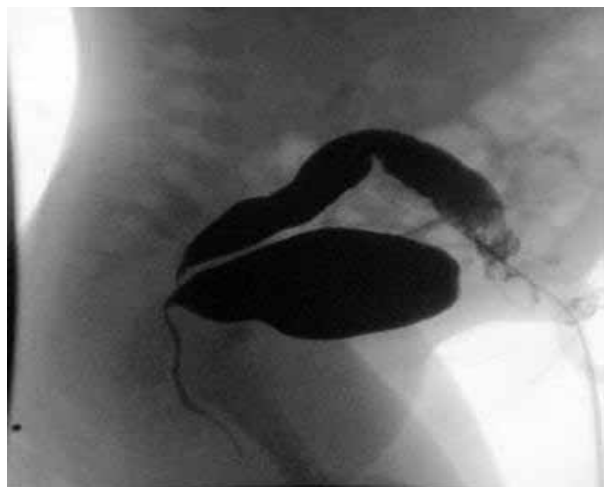
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sacral anomalies were excluded from the study.

The median ages of the patients at the time of assessment were 7.5 (range: 4-11) years. Operations were performed by a single surgeon. LAARP was performed as described by Georgeson et al<sup>1</sup>. Types of malformations were identified according to colostogram findings and were confirmed by operative findings (Fig. 1). 22 patients had recto-vesical fistulae, while 18 patients had recto-bladder neck fistulae.

Patients were reviewed retrospectively. The age at operation, associated anomalies and complications were compared.



**Fig 1: Distal colostogram showing Rectobladder neck fistula**

**Complications:** The postoperative complications were evaluated. We examined anal stenosis, rectal prolapse and malposition of the rectum. The colon position within the muscle complex was assessed by MRI for patients suffering from any degree of incontinence. Malposition was defined as misplacement of the rectum outside the muscle complex along any length of the tunnel<sup>10</sup>.

### Functional Results

Bowel control for patients older than 3 years was assessed. Functional assessment was performed using the Cleveland Clinic Incontinence (CCI) score<sup>13</sup>. In this scoring system, the frequency of incontinence, in addition to the extent to which a person's life is altered, is evaluated using 5 questions assessing the type of incontinence (solid, liquid, gas, wears pad, lifestyle alteration). The frequency with which each type of incontinence occurs is rated on a scale from 0 (never)

to 4 (always or 1/day). The frequencies are added to yield a total score, which can range from 0 to 20, with higher scores indicating higher levels of incontinence. A good outcome was considered when the patient was continent (score 0-4) or had mild incontinence (score 5-9). Poor outcome patients were those presenting with moderate (score 10-14) or severe (score 15-20) incontinence. Sphincter squeezing was assessed using Kelly's score<sup>14</sup>. Pena's criteria were used for assessment of constipation<sup>15</sup>.

**Statistical Analysis:** Data were analysed using SPSS version 23. Student's t test was used to compare the mean age at operation, type of fistula and associated anomalies. The chi-square test was applied to compare the postoperative complications and the functional outcome. A value of  $P < 0.05$  was considered statistically significant.

**Findings:** No statistically significant difference was observed for the age at the time of operation. Also no statistically significant difference was found between the types of fistulae included in our study, 22 patients had recto-vesical fistulae while 18 cases had recto-bladder neck fistula (55% vs 45% respectively).

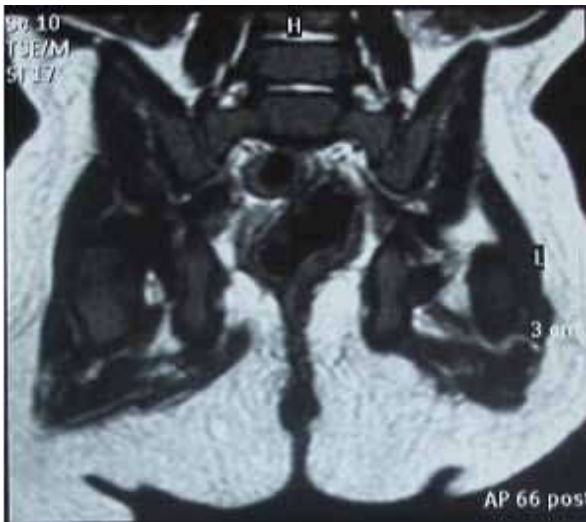
All patients were followed up for more than 3 years; the median follow-up period was  $6.4 \pm 2$  years. Regarding anal stenosis occurred only in 2 cases (5%) while rectal prolapse was significantly more in our patients (Fig. 2). It occurred in 16 cases by a rate of 40% which is a high percentage.

Malposition of the rectum was found only in 2 cases (5%) while centrally positioned rectum was found in 95% of patients (Fig. 3A, 3B). If MRI failed to show a centrally placed rectum within the muscle complex, we termed it malposition of the rectum. The rate of strong sphincter squeezing (score 2) was found in 25% patients (10 cases). However, patients with weak squeezing (score 1) were (10%) 4 cases. Significantly more patients had no squeezing (score 0) (65%) 26 cases. None of our patients experienced recurrent fistula or rectal retraction.

The rates of voluntary bowel control (score 0-4) was found in 25% of patients, mild incontinence (score 5-9) was found in 30% of patients, moderate incontinence (score 10-14) was found in 30% of patients and severe incontinence (score 15-20) was found in 15% of our patients. Furthermore, none of our patients complaining of constipation.



**Fig 2: Rectal mucosal prolapse post LAARP**



**Fig 3A : MRI coronal section with centrally positioned rectum**



**Fig 3B: MRI sagittal section with centrally positioned rectum**

## Conclusions

We concluded that LAARP has satisfactory long-term outcomes. LAARP might even offer an advantage for patients with high recto-urinary fistulae presenting as recto-bladder neck and recto-vesical fistulae. LAARP is associated with a higher incidence of rectal prolapse. We recommend modification of this technique by performing application of an anchoring stitch on the rectum to the presacral fascia. Nevertheless, performing a study with a larger sample size and longer follow-up period is recommended to obtain more reliable results.

**Level of Evidence:** Level III.

## Discussion

Although PSARP is the classic approach for cases of recto-prostatic and recto-bulbar fistulae<sup>16,17</sup>, LAARP has been gaining popularity for treating patients with recto-bladder neck and recto-vesical fistulae. Indeed, the advantages of LAARP outweigh those of PSARP in terms of limited pelvic dissection, precise centralization of the rectum within the muscle complex and puborectalis muscle without division, preservation of the levator ani and muscle complex, accurate assessment of the fistula site, and reduced pain and wound complications, in addition to improved cosmesis<sup>18</sup>. However, no consensus exists on either approach in terms of long-term bowel control<sup>19</sup>. To the best of our knowledge, only a limited number of research studies that assess the long-term results of both approaches have been performed.

Rectal prolapse occurred in 40% (16/40) of our patients after LAARP. The rate of rectal prolapse post-LAARP ranged between 8.8% and 46%<sup>3,20,21</sup>. Jung et al<sup>22</sup>, similar to our results, found rectal prolapse after LAARP in as many as 52% of patients. There are two possible explanations for this finding: the more rectal dissection associated with LAARP as well as a lack of rectal fixation within the muscle complex might contribute to this increased incidence. Therefore, some authors recommend the application of an anchoring stitch between the rectum and presacral fascia to avoid such complications during LAARP<sup>23</sup>. Bischoff et al reported a higher incidence in patients with recto-bladder neck and recto-vesical fistulae as a result of poor sacral and pelvic musculature<sup>21</sup>. Hence, securing the rectum to the presacral fascia, in addition to limiting rectal dissection, is essential to avoid such morbidity<sup>21</sup>.

MRI was used to assess the position of the rectum

within the muscle complex in all cases. Only two patients (5%) had their rectum pulled away from the midline, despite that all patients were operated on by experienced paediatric surgeon. Patients with deviation from the midline and suffering from faecal soiling underwent redo anorectoplasty through a posterior sagittal approach. These results were similar to Tong QS et al<sup>4</sup>, who reported a lower incidence of malposition of the rectum after LAARP. In contrast, Elbarbary MM et al<sup>24</sup> reported a higher incidence of malposition with LAARP. They assessed the centralization of the rectum at three transverse levels (levator ani, muscle complex and external anal sphincter); non centralized cases were either anterior in relation to the external anal sphincter or deviated to the right side of the muscle complex.

Anal stenosis occurred only in 5% (n=2) of patients. No patients experienced rectal retraction or recurrent fistula.

Regarding constipation, none of our patients suffered from constipation. A proposed explanation is that the preserved muscle complex in LAARP decreases the incidence of postoperative scarring, hence avoiding the associated decreased rectal sensation and subsequent recto-sigmoid dilatation with constipation and overflow soiling.

Concerning bowel function and soiling, LAARP appears to result in better long term outcomes. Kudou S et al<sup>3</sup> and Ming AX et al<sup>12</sup> found that LAARP and PSARP patients had similar bowel habits, despite that the age at the time of evaluation of faecal continence was younger in the LAARP group in both studies, suggesting that anorectal function in the LAARP group would improve over the long term. Additionally, in a Japanese multicentre study<sup>7</sup>, faecal continence was evaluated using two types of scoring systems: the Kelly score and a newly developed system, the Japanese Study Group of Anorectal Anomalies Follow-up Project (JASGAP), which compared PSARP and LAARP and found no statistically significant difference.

**Source of Funding:** Self funding

**Conflict of Interest:** Age of pull-through and time at which bowel continuity was restored were relatively greater than those of other studies. This is due to the lack of specialized paediatric colorectal centres in the country and a large case load in our institution, in addition to reluctance of some caregivers as a result of low educational standards. Also, we used only the Cleveland

Clinic scoring system to assess the functional outcome, which lacks objective parameters such as manometry. However, we believe that the history given by parents is the most important parameter to assess bowel control, rather than dependence on numerical values that may not reflect the patient's lifestyle

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# Regionalization Referral System of the Hospital National Health Insurance

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## Abstract

**Context:** A reference system in Indonesia is not running effectively and efficiently which cause cumulation of patient in advance health facility, with the result that there is utilization of skilled workers and advance equipment unwisely and quality deterioration of health. This matter is needed rationalization of health service more than devolution and decentralization of public services by the government of south Celebes include consolidation of take holder and local institution and also other services centralization. The purpose of this research is analyzing the rationalization of the referral system which integrated to national health assurance in South Celebes seen from several knowledge factors and social community value. This research used qualitative approach of phenomenology design, with analyzing method which used content analysis base on triangulation method, source triangulation and data triangulation. The result is gotten that there was information and communication bias among policy, provider, as a result from receiver variety in social community, made society not obey the rationalization of the referral system. This research can be concluded that understanding and awareness between policy and provider, social security administration is needed to give better health services. Affecting the sustain ability of health service negatively can cause lack of patient satisfaction. Furthermore, lacking of facility in family practice center can increase the high of reference.

**Keywords:** *Regionalization of The Referral System, Health Service, Health Social Value*

## Introduction

Socio-cultural development of society, life style, demands of the time and advance technology development which cannot be balanced with knowledge development, information access becomes one of factors or variables that influence in implementation of community social live policy very varied. The education failure to

policy and provider, caused community obedience to regionalization of the referral system policy<sup>(1)</sup>. Health social security provider, they have not fulfilled equity principle appropriate with constitution of national social health insurance required health equal service base on medical needs which is not bound by amount of participant contributions<sup>(2)</sup>. The benefit obtained before the era of social health insurance also vary based on the provider, for instance there are some nit guaranteed services, limitation to services, and there is an obligation in paying deviation bill and also difference in accessing payment claim in accordance with segmentation of providers of health insurance participation. This case shows that uncomprehensive membership, the service we get always have discrimination between one to another in health service<sup>(3,4)</sup>.

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Regionalization of the referral system is a form of health reference management in hospital of province/district/city which cannot be separated from health service system in South Celebes Province and this system becomes flagship program of the governance of South Celebes which implemented in giving quality referral health services, equal, and affordable, and also quality for all societies of South Celebes. One of main concerns is lack of standard procedures and protocol for reference patients among various service levels start from reference service in the first level until reference center, the prediction of patient referral waiting time from premier level to higher level and the quality of information which is reflected in reference form and reference system service have continuous positive effects<sup>(5)</sup>. this research intends to create a new system that integrated with National Health Insurance Referral System in South Celebes Province.

### Research Method

This research is done in Daya Hospital as the second level reference, Wahidin hospital as tertiary hospital or the last level of reference and health department of South Celebes as an originator, program executor, at a time as supervisor of implementation of regionalization of the referral system. For almost two years interview research to the hospital's directors and vice directors, health of medical nurse, head of reference system, head of emergency room and staffs, head of medical colleague, and ten patients from two hospitals and head of health department, head of medical service, the head of reference and also exp tiem 9 free health. The research with qualitative method of phenomenology approach which analysis used content analysis based on method triangulation, source triangulation, and data triangulation.

### Results and Discussion

**Society's Knowledge to Regionalization of Health Reference System:** Society as a main basic for government in making policy. It Is understandable that society in every district is not balance in various aspects of life. Not only financial, knowledge, social structure, in South Celebes one district is different with another, so as the health policy is appropriate with evidence based, a regional characteristic, the current policy cannot top down anymore. Such us information from R1, and other 12 informants which is almost same with assumed related to regionalization of the referral system about

social cultural understanding which still need handling comprehensively and continuously and also need deep understanding to be able to evaluate the extent to which the program runs, to foster, to educate society about implementation of health service in order to run in accordance with the realm of the BPJS, so that the same thing did not happen again which was expressed by the informant as follows:

“Kegagalan edukasi pada receiver, policy mengakibatkan tidak patuhnya masyarakat terhadap aturan regionalisasi sistem rujukan....”

*(R1, 59 Years Old)*

While according to informant R3 and other information, they confirmed about a riot of the regionalization of the referral system nowadays which is sometimes the society assume as strange and confusing policy. Especially the receiver and society who have done health service because the ill they suffered does not heal plus complicated BPJS rules. Sometimes make them give up. Like living in the stone age as expressed by informant R3 and other informants:

“Regionalisasi sistem rujukan waktu kesehatan gratis itu is the best tapi begitu berintegrasi ke JKN semua amburadul itu sebabkan karena bias informasi, kita semua tidak bekerja maksima.” *(R3,44 Years Old)*

While informant R2 argue no less interesting than the previous informant as authentic fact that is expressed as follows:

“Kegagalan edukasi pada dokter yang bekerja di rumah sakit daerah .....di rumah sakit swasta di kota hingga ada pasien yang mau dirujuk saat dikonfirmasi oleh dokter yang petugas .... ok langsung saja ke RS tempat saya kerja” *(R2, 45 Years Old)*

Government and profession must sit together, make policy about doctor's practice license related to domicile and the distance between work place and practice place and also notice a region to make health policy because in certain condition will happen the same case as was revealed by informant R2, an example expressed by the informant that Daya Region Hospital became an option of referral in that time. Same as informant R6, as vice director of Daya Hospital who has experiences when doing doctor's job in PKM that there was something wrong nowadays because need to know that 2 other informants said:

“Pada awalnya masyarakat patuh terhadap sistem rujukan berjenjang namun tidak lama, masyarakat enggan berobat di puskesmas karena selalu .... akhirnya masyarakat berpendapat buat apa ke PKM mending langsung aja ke rumah sakit” (R6, 40 Years Old)

Informant R10, and 6 are informants who stated that almost all receiver failed in education and there was unbalance in society in term of utilization of BPJS health service facilitation. Some certain patients misuse BPJS to get direct reference to the hospital whereas their ill can be cured in health center. But for the society, sometimes the health center just become a stepping stone to get reference letter of advance health facility. This matter will become a problem when there is society who really need hospital service, delay or even cannot be served because the hospital is full. We need strict rules, precise to give discipline in health service especially referral system, there must be a reward and punishment so that the society get the right health service base on indication. Failed education to the society, provider and receiver is a collaboration that need a special handling, in the future, should be form special team or own department to give clear and bright information so that the society can do health service well, effectively and efficiently. Information bias not happen again.

According to informant R15 (40 years old, emergency room team) (FGD UGD) ever misunderstood and confused because an extraordinary thing happened when the family of patient suddenly rampage with unknown cause. Whereas doctors and emergency team have tried maximally and also based on vision of WHO 2020 <sup>(5)</sup> the feasibility of transferring information and skills as well as the availability of resources that service in emergency unit is and emergency unit that is considered the most vital or is assumed to be a little more valuable than an infinite asset as the following statement:

“Idealnya seorang tenaga medis harus mampu mengedukasi pasien..... sehingga bisa dihindari seperti yang pernah terjadi di UGD Wahidin .... Telah ditindaki segera dengan baik berdasarkan SOP tapi entah apa yang terjadi tiba-tiba keluarga pasien ngamuk dan minta keluar paksa” (R15, 40 Years Old)

According to informant R14 that patient must understand about referral rule regarding to BPJS because if they do not understand so that misunderstanding happen and can make service process become complicated so maximum benchmark as the following statement:

“Seorang pasien harus paham alur rujukan dari Faskes mana berasal dan mau kemana, ini terkait dengan sistem informasi rujukan bila pasien misalnya dari rumah sakit Siloam dia akan mengikuti rujukan dapat diliat melalui memonitoring di UGD, dan dari mana mau kemana atau bahkan keluar paksa pak itu ... ada format khusus” (R14, 50 Years Old)

According to informant R17 is more strange and considered do not understand to the regionalization of the referral system of National Health Insurance (JKN) assumed that the society must obey to follow the government rules no matter you far or near that is your personal business. This is one of the saddest and heartbreaking evidences when he was interviewed and never imagined about his statement because he is a senior doctor, head department, the head of health center as the following expression:

“Saya tinggal di perbatasan desa A, dengan Desa B kabupaten lain, kalau .... berobat di desa A jaraknya jauh sekali, lalu ke desa B tapi sebagai pasien umum, ....maka pemerintah bilang ya apa mau na pemerintah pasti bilang janganko tinggal disitu, kasi pindah rumahmu” (R17, 44Years Old)

**Social Value View To The Regionalization Of The Referral System:** Kuswinarti (2016) said that social structure is placement of socio-cultural and organs of the society in position which is considered suitable with organism function as an entirety<sup>(6)</sup>. Social value which is meant is region teaching, ideology, principle, morality, and also politeness rules which have by society, while organs of the society is social groups, institute, social institution that efforts embodiment of certain value becomes real and use in fulfilling needs<sup>(7)</sup>. We believe that all society in the whole world without exception to Indonesia have a right of equal chance to enjoy health service with the best quality that can be achieved, patient as a core pushes us with not discriminative approach to health service policy which uphold health right for all<sup>(8)</sup>. The government has not able yet to make national health insurance (JKN) model which membership based on social value, ability to pay, differentiate the classification of national health insurance member base on society life level<sup>(9)</sup>. Furthermore, health service level to patient is differentiated and not given freedom to choose health facility that suitable with what he wants. Informant R2 stated that:

*“Sebagaimana prinsip orang jeneponto telah dibuktikan sesuai pernyataannya” bajikangngangi mate acceraka na mate ammokki mokki” (sikap semangat juang yang tinggi, usaha keras, tidak menyerah, janganakan harta nyawa sekalipun diberikan) rela membayar asalkan mendapatkan pelayanan yang bisa memberikan jaminan, keamanan dan kenyamanan terhadap keluarga atau si buah hatinya yang sakit”*

*(R26, 43 Years Old)*

A high spirit to sacrifice his family's health interest, commitment and principle, istiqomah as stated by informant R26 is one of patriotism attitude that worthy of imitation by all people, committed to work together in developing inclusion solution, innovative and continuously to increase integration between the regionalization of the referral system policy with holistic approach to access health service easy, safe, comfort because availability, adequacy, accessibility, suitability of health service needs:

*“Sebenarnya JKN sudah bagus namun banyak masalah di faskes seperti kasus yang terjadi disebuah paskes yaitu ada oknum hanya jerawat didiagnosa tumor, akhirnya dirujuk, bahkan kasus di kabupaten tertentu di rumah sakit bersalin normal oleh bidan dimalam hari. Besok dokternya visit disuruh kuret celakanya terjadi pendarahan akhirnya pasien meninggal”*

*(R2, 45 Years Old)*

The informant invoked astonishing facts, do beyond healthy reason, when a program is become as inhumane business field. Acne was diagnosed as tumor and patient of normal delivery was given another action that caused the patient dead become an example that tarnishing the good name of medical. Seeing this thing is very important to make a health program which is able to solve it as following statement of R22:

*“Data jaminan kesehatan di sulsel sudah 70% memiliki KIS, kalau 80% berarti zona hijau dan 4 kabupaten di Sulawesi Selatan Zona hijau dengan asumsi 20 % termaksud golongan yang mampu dan terdaftar di asuransi lain, pemerintah fokus pada masyarakat miskin dan tidak mampu, anehnya banyak masyarakat miskin yang tidak memiliki jaminan kesehatan”*

*(R22, 45 Years Old)*

Health insurance in South Celebes has increased from year to year, but the society has not able yet to place himself right suitable with economic ability or his live level. There are still many poor societies who do not

have KIS (Indonesia Healthy Card) whereas the level of affordability (registered) as member of BPJS and have KIS reached 90%, it is caused because the society is not all the poor. But many rich people who get and enjoy the facility of KIS which should only be for poor people if refer to the statement of informant R22, A statement from a doctor and BPJS staff as following stated:

*“Saya dokter melakukan riset bahwa kalau pasien bpjs rawat jalan hampir tidak ada puas tapi kalau betul-betul sakit, baru puas, dan berkata bayangkan saya dirawat 2 minggu tidak ada saya bayar sama sekali”*

*(R13, 45 Years Old)*

**Same as stated by Informant R11 that:**

*“Sebenarnya regulasinya sudah jalan misalnya dari RS tipe C ke RS Wahidin itu langsung di tolak, cuman dari puskesmas ke RS tipe B belum misalnya dari puskesmas ke RS Daya, belum pernah menolak pasien karena saya sudah arahkan ke RS Jala-ammari TNI AL sebagai RS tipe C tapi tidak mau banyak permintaannya juga paham rumahnya dekat sini”*

*(R11, 44 Years Old)*

About the responsibility, this doctor is always take unpopular policy, sometimes make informant take steps that contradict with higher policy made him got warning several times by his boss meant BPJS that life must have principle sometimes the rules are violated for the principle as following statement:

*“Pada dasarnya persoalan rujuk – merujuk tidak ada masalah, saya pernah ditegur kenapa dirujuk ... bisa ditangani, dengan alasan yang jelas, RS penuh ke berkompeten dan fasilitasnya lebih bagus”*

*(R14, 50 Years Old)*

**Conclusion**

The research result stated that health service especially the regionalization of the referral system has not running effectively and efficiently which caused by bias information to policy and provider, failed education by policy and provider that caused the society or receiver is not obey the regionalization of the referral system. the regionalization of the referral system nowadays needs to be revised or joint policy among regions, region must fit the needs of society with various perspective about health service access with the spirit of understanding each other. Regionalization must be updated so as achieve quality health service and stand for society so that society's social value become meaningful, be believed in team work, as the best tools to identify



challenge, to transfer knowledge, and avoid overlap in effort to overcome access gaps in Indonesia especially South Celebes.

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# Relationship of Knowledge and Experience with Perception of the Level of Emergency in Patient's Family at Emergency Room

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## Abstract

**Context:** Handling in Emergency Room (ER) is often considered late by the patient's family. Public perception in this case the patient's family about the condition of the emergency is based on knowledge about the clinical condition of the emergency and psychosocial and the experience of bringing patients to the ER. The goal of this study is to find the relationship between knowledge and experience with perceptions of the level of emergency of patient's family in ER. The research design is a cross sectional approach. The population covers the families of traffic accident patients in the ER with the total of 100 people using purposive sampling. The results showed that more than half (55%) of respondents had good knowledge (55%), more than half (66%) of respondents had experience delivering patients to ER, and almost all (94%) had a severe perception of the condition of patients on ER. The results of the research used Spearman Rank test to know the relationship between knowledge and experience with perceptions of the level of emergency of patients family in ER. The p value obtained was 0.043(significancy of 0.05) which means there is a relationship between knowledge with perceptions of the level of emergency and the p value obtained was 0.176(no significancy of 0.05) which means there is no relationship between experience with perceived level of emergency. It is expected that the next researcher will examine the factors that influence the patient's family knowledge about the level of emergency of patients in the ER.

**Keywords:** *knowledge, experience, perception, family of patients, level of emergency*

## Introduction

Handling in Emergency Room (ER) is often considered late by the patient's family. Internal and external factors that affect the delay in handling emergency cases include the character of the patient, staffing, availability of stretchers and health workers, time of arrival of patients, implementation of management and selected examination and treatment strategies.

The highest gap in the communication process occurs in the patient's priority scaling process, where ER users do not obtain information verbally about the priority scale and response time set in the ER of the Dr. Saiful Anwar Malang General Hospital<sup>1</sup>. Based on the observations of researchers at one of the Malang City Hospital ER found the complaints of families of patients who took patients to the emergency room about the slow handling of patients and the absence of information about the condition of the patient because the family was not allowed to enter the emergency room. The results of interviews of researchers with the patient's family stated that the reason for bringing traffic accident patients to the emergency room was falling pain, broken bones, torn wounds, bleeding, and getting treatment as soon as possible.

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The elements that form perceptions in general are the existence of objects that are a concern, stimulus, and influencing factors such as stereotypes, experiences, intelligence, circumstances, needs, and emotions <sup>2</sup>. In this study perceptions arise due to the stimulus of the object that is the concern of the patient's family, namely traffic accidents. Public perception in this case the patient's family about the condition of the emergency is based on knowledge about the clinical condition of the emergency and psychosocial and the experience of bringing the patient to the emergency room <sup>3,4</sup>. The knowledge of the patient's family about the level of emergency based on the reason for coming to the emergency room is due to pain, injury and trauma and the availability of skilled human resources and emergency facilities such as laboratory and x-ray examinations, health insurance status and barriers to primary health care providers <sup>5,6,7,8</sup>. Based on research as much as 58% - 82% of visits in the emergency department for pediatric cases are unfortunate conditions. The reason parents take patients to the emergency room is because the emergency department has skilled workers who will provide immediate treatment <sup>5</sup>.

Differences in perceptions of the level of emergency between nurses who deal with patients and the families of patients who deliver patients to the emergency room can trigger conflict between the two parties. Elder et al. in 2004 reported a significant gap in patient knowledge about perceptions of triage in the ER<sup>9</sup>. This is in accordance with the study of Ekwall et al. in 2008 who reported irregularities regarding the relationship between nurses' perceptions and patients about emergency <sup>10</sup>. In this study the nurse assessed the patient's problems as being less severe but not in accordance with the patient's perceptions causing psychological effects. Based on the above background, it is necessary to conduct research on the relationship of knowledge and experience with perceptions of the level of emergency in the family of patients in the emergency department.

## Materials and Method

This research was a correlation study with a cross sectional approach where data retrieval of independent and bound variables is measured at the same time and there is no follow-up <sup>11</sup>. At the time of the study, there were 100 people who are families of traffic accident patients in the ER at the Dr. Saiful Anwar Malang General Hospital using purposive sampling. The inclusion criteria of respondents in this study included being willing to

be respondents, male and female, in a state of calm and not experiencing severe anxiety (based on the Hamilton Anxiety Rating Scale (HARS) questionnaire, as well as parents, husbands, wives, or children of traffic accident patients who know the condition and take patients to the emergency room at Dr. Saiful Anwar Malang General Hospital.

The independent variable in this study is the patient's family knowledge compiled by the researcher based on a literature review consisting of 10 items that have been tested for its validity and reliability with results in the range 0.667–0.885 meaning the patient's family knowledge questionnaire is valid because the value is greater than 0.632 and obtained  $r$  value = 0.661 where  $r > r$  table value (0.632), then this instrument is said to be reliable with high classification. The parameters in the patient's family knowledge questionnaire can be seen in Table 1. While the instrument for measuring dependent variables uses an observation sheet to record the results of the patient's family perception of the level of emergency. Data was analyzed using the Spearman Rank test with the help of SPSS at the significance level obtained  $p$  value  $0.001 < (\alpha 0.05)$ . Research ethics by applying the respect for person principle (respecting human dignity), minimizing maleficence, maximizing beneficial results (beneficence), explaining research procedures and paying attention to honesty and accuracy. Ethical Clearance was obtained from The Ethical Committee Medical Research, Medicine Faculty, Brawijaya University where in collaboration in Dr. Saiful Anwar Malang General Hospital.

## Results and Discussion

Dr. Saiful Anwar Malang General Hospital is a Class A General Hospital owned by the Regional Government of East Java Province. RSUD dr. Saiful Anwar Malang is located in the middle of Malang city, precisely on Jalan Jaksa Agung Suprpto 2 Malang, which is a strategic location that is easily accessible to the community both by surrounding communities and from outside the city. The Emergency Room (ER) is located at the northern front door of RSUD dr. Saiful Anwar Malang. ER has a triage room, Resuscitation / Priority 1 room, Priority 2 general cases, Priority 2 cases of Neonates, Priority 2 cases of Obstetrics and Priority 3. In addition, ER also has a nurse room, doctor's room, operating room, Information and Education Room (KIE), Decontamination Room, Administration Room, pharmacy depot, X-Ray room, CT Scan and toilet.

Based on the results of the study, respondents' characteristics according to age, sex, education, and family relationships with patients who were sent to the emergency room can be seen in Table 2. Based on Table 2, it was obtained that respondents have an average age of 36 years (SD = 8.27) where age at this time is of productive age. More than half (59%) of respondents were female, almost half (45%) of respondents had junior secondary education where high enough education would be easier to receive information and more than a quarter (31%) of respondents had family relations as wives. Based on the results of the study found the characteristics of knowledge and experience on perceptions of the level of emergency of the respondents (Table 3). Based on Table 3, it is known that more than half of the respondents have severe perceptions (94%) and good knowledge (55%), and more than half of the respondents (66%) have experience delivering patients to the ER. Good knowledge will make it easier to perceive the patient's condition.

Based on the results of the study, it was found that more than half of the respondents had good knowledge and had the experience of delivering patients to the emergency room. Factors that affect knowledge include age, education, and experience. Nearly half (45%) of respondents have senior secondary education where a high level of education will be easier to receive information. In addition to the level of education, Vallejo et al. (2011) reported 70% of patients considered that their health problems were not serious, but they thought this situation must be resolved immediately, meaning the patient's family took the patient to the ER in the hope of getting immediate treatment even though airway conditions, breathing function (breathing) and circulation of patients is not severe<sup>12</sup>.

Based on Table 3, it was obtained that more than half of respondents had good knowledge (55%), almost all perceptions were severe (54%), who had sufficient knowledge (38%), most perceptions were severe (34%), who had less knowledge (5%) all perceptions are severe (5%), and those who have bad knowledge (2%) are perceived to be insecure and not critical at 1% each. At 95% confidence level using the Spearman Rank Test, p value  $0.043 < (\alpha 0.05)$  was obtained, meaning that  $H_0$  is rejected so that there is a relationship between knowledge and perceptions of the level of emergency. The results of this study are in accordance with the theory of Notoatmodjo that knowledge is very close to education

both obtained through formal and informal education<sup>11</sup>. In this study, respondents had ages between 18 and 67 with an average age of 36.34 years and almost half (45%) of respondents had senior secondary education (45%). A high level of education will be easier to receive information. The results of this study are in accordance with Notoatmodjo which states that with increasing age a person will experience changes in physical and psychological (mental) aspects, where the psychological aspect of a person's thinking level is more mature and mature<sup>11</sup>.

Based on Table 3, it was obtained that more than half (66%) of respondents had experience and had severe perceptions (64%). At 95% confidence level using the Spearman Rank Test, p value  $0.176 > (\alpha 0.05)$  was obtained, meaning that  $H_0$  is accepted so that there is no relationship between experience and perceptions of the level of emergency. The results of this study are not in accordance with the Fellows' statement which states that the experience of bringing patients to the emergency room beforehand causes patients and those who take it to feel that the patient's condition is severe but is better prepared to deal with a dense situation in the ER<sup>4</sup>. The family of patients who had previously taken patients to the emergency room assumed that the pain complaints felt by patients were one reason that patients were in a severe category and had to get treatment as soon as possible even though the airway, respiratory function, and circulation were adequate. The results of this study are in accordance with Rachmat, Krech and Crutchfield in Sobur (2003) who explained that one of the factors that influence perception is a personal factor consisting of experience, motivation and personality. Experience will help a person improve perceptual abilities<sup>13,14</sup>.

**Table 1: Patient Family Knowledge Questionnaire**

No.	Parameter
1	Definition of emergency level
2	Assessment of airway
3	Assessment of breathing
4	Assessment of bleeding
5	Assessment of fractures
6	Assessment of level of consciousness
7	Assessment of pain
8	Assessment of the occurents of complaints (onset)
9	Assessment of wound conditions
10	Assessment of fever conditions

**Table 2: General Characteristics of Respondents (n=100)**

Variables	Category	Gender (%)		Total (%)
		Male	Female	
Age 36±8.27	< 36 years old	14	34	48
	≥ 36 years old	27	25	52
Last education	Elementary school	5	8	13
	Junior high school	14	20	34
	High school	21	24	45
	College	1	7	8
Family relationship	Parents	14	11	25
	Husband	11	0	11
	Wife	0	31	31
	Son/Daughter	8	4	12
	Others family	8	13	21
<b>Total (%)</b>		<b>41</b>	<b>59</b>	<b>100</b>

**Table 3: Distribution of Knowledge and Experience to Emergency Level Perception (n=100)**

Variables	Category	Perception (%)		Total (%)	p value
		emergency	not emergency		
Knowledge	Good	54	1	55	0.043
	Enough	34	4	38	
	Less	5	0	5	
	Not good	1	1	2	
Experience	Ever	64	2	66	0.170
	Never	30	4	36	
<b>Total (%)</b>		<b>94</b>	<b>6</b>	<b>100</b>	

### Conclusion

In conclusion, the better the patient's family knowledge, the more likely it is to perceive the patient's condition in the direction of emergency in the ER of the Dr. Saiful Anwar Malang General Hospital. There is no relationship between experience with perceptions of the level of emergency in the family of patients in the ER at the Dr. Saiful Anwar Malang General Hospital ( $p = 0.176$ ). Suggestions for hospitals to increase the patient's family knowledge through Communication, Information and Education (KIE) to the patient's family about the level of emergency when the patient is on the ER both verbally and in writing. For the next researcher, it is expected to examine the factors that can improve the patient's family knowledge about the level of emergency.

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# Relationship Factor Enabling Giving Complementary Foods for Breast Milk with Baby Nutrition Status in Makassar City

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## Abstract

**Introduction:** Poor nutritional status is a major nutritional problem in infants and has an impact on growth disorders and is a problem that needs to be addressed seriously, age 6-18 months is a very important period as well as a critical period in the process of growth and development both physically and intellectually. Therefore, every baby at this time must obtain nutritional intake according to their needs. Aim; to prove the relationship between enabling factors and infant nutritional status.

**Method:** Type of research used analytical survey with a cross-sectional study approach. This research was carried out in Maccini Sawah Sub-District, Makassar Sub-District, Makassar City. The sample of this study was infants with exhaustive sampling with 62 samples.

**Results:** The study found that the age of starting complementary food for breast milk was related to the nutritional status of the baby with a p-value (0,000), the type of complementary foods for breast milk related to the nutritional status of the baby with a p-value (0,015), the frequency of complementary foods for breast milk related to nutritional status with p-value 0.004), and the variation of complementary foods for breast milk administration is related to nutritional status with p-value (0.001).

**Conclusion:** It was found that there was a strong relationship between age, starting, giving, type, frequency, and variation of complementary feeding with infant nutritional status.

**Keywords:** *Nutritional Status, Complementary Food, Breast Milk, Enabling Factors*

## Introduction

Nutritional status in children is very important for their lives, growing and developing into healthy, productive adults who benefit the community, this is an

international priority to improve children's nutritional status<sup>(1)</sup>. The World Child Association (UNICEF) and the World Health Organization (WHO) state that good nutrition practices in children include the initiation of early breastfeeding, exclusive breastfeeding ages 0-6 months, the addition of adequate, safe nutrition, and complementary foods according to the breastfeeding period for 1 year<sup>(2,3)</sup>. The prevalence of malnutrition in Indonesia is still high. One potential factor that contributes to the high prevalence of malnutrition is the inappropriate complementary diet and practice of breastfeeding<sup>(4)</sup>.

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Malnutrition during breastfeeding, especially the practice of exclusive breast milk for 6 months after birth is a risk factor for infant and child morbidity and mortality that can be corrected by providing complementary food (5). One intervention to prevent a more effective way to reduce 13-15% of child deaths is to apply exclusive breastfeeding supplemented with complementary foods that will prevent 19% of children’s deaths (6). The impact during the child learning process is inactivity, intellectual disruption, decreased productivity, and development of social behavior(5).

Improvement of maternal nutrition carried out before and during exclusive breastfeeding is one of the efforts to improve infant nutrition 0-6 months. This problem is very important and needs to be addressed seriously. The age of 6-18 months is a critical period due to malnutrition at the age of under two years, has an impact on decreasing brain development, physical growth, intellectual, and productivity, the impact of malnutrition is largely irreversible. Malnutrition in infants and children occur because of the food given is low in nutrition or energy. Additional food for babies in developing countries generally made of cereals or tubers tends to be powdery. At the age of one year, the proper administration of complementary foods for breast milk is expected to meet the nutritional needs of the baby, but it can also stimulate the baby’s eating behavior which is usually liquid and then adapt to the types of porridge and biscuits (7). Premature babies are at high risk and really need adequate nutrition to increase proper growth (8). The complimentary food program of breast milk is very important to give to babies in overcoming high nutrient deficiencies, based on the description above the authors

feel interested in conducting research on the relationship of enabling factors for complementary food for breast milk with the nutritional status of infants. Aim; to prove the relationship between enabling factors and infant nutritional status.

**Method**

This research was conducted in 2017 with samples in the study, namely infants aged 6-11 months, using exhaustive sampling techniques as many as 62 infants. The type of research used is an analytical survey with the approach cross sectional study. The source of complementary food data is derived from the results of interviews with mothers and caregivers using questionnaires, nutritional status data obtained from weighing the baby’s weight using Baby Scale the GEA brand with measurement accuracy of 0.05 Kg to 0.1 Kg followed by calculation of standard deviation using anthropometric method (WHO Anthro Plus) and referring to the NCHS table. Data analysis using univariate, bivariate and multivariate analysis.

**Results**

**Sample Characteristics:** Table 1 shows a description of the sex of the baby, the age of the baby, the level of education and the type of work the mother has on the case of infant nutritional status. The homogeneity test results between cases of abnormal nutritional status and normal nutritional status in the baby sex obtained a value of p = 0.77, the average age of the baby obtained a value of p = 0.87, the maternal education level obtained a value of p = 0.44 and work mother obtained p value = 0.73.

**Table 1: Analysis of Sample**

Characteristics	Infant Nutritional Status				Number of	P-values
	Normal		Normal			
	n	Percentage	n	Percentage of		
<b>Gender for infants</b>						
Male	11	31.4	24	68.6	35	0.77 *
Female	9	33.3	18	66.7	27	
<b>Age of Infants</b>						
6 - 7 Months	6	42.9	8	57.1	14	0.87 *
8 - 9 Months	6	35.3	11	64.7	17	
10 - 11 Months	8	25.8	23	74.2	31	



Characteristics	Infant Nutritional Status				Number of	P-values
	Normal		Normal			
	n	Percentage	n	Percentage of		
<b>Mother's Education</b>						
Elementary	5	35.7	9	64.3	14	0.44 *
Junior High School	3	25.0	9	75.0	12	
Senior High School	8	29.6	19	70.4	27	
Bachelor	4	44.4	5	55.6	9	
<b>Mother's Work</b>						
not work	15	32,6	31	67,4	46	0,73 *
contract	1	33,3	2	66,7	3	
employees	2	22,2	7	77,8	9	
government employees	2	50,0	2	50,0	4	

n: Number of Samples, \* Homogeneity Test

**Factors Enabling Complementary Foods:** relationship between enabling factors and infant nutritional status is presented in Table 2. Based on table 2, age suitability in supplementary feeding does not have a significant relationship with infant nutritional status, age suitability in the process of providing complementary food for breast milk in cases of abnormal nutritional status is more  $37.5 \pm 22.7$  compared with age suitability in the case of normal nutritional status  $62.5 \pm 77.3$ . Chi-square test between the two variables obtained p value = 0.23. There is a significant relationship between the consistency of the type of complementary food

given with the nutritional status of the baby, where the consistency in the case of abnormal nutritional status is more  $55.6 \pm 14.3$  compared to the consistency of food types in the case of normal nutritional status  $44.3 \pm 85.7$ . The chi-square test between the two variables obtained p = 0.001. there is a significant relationship between the frequency of complementary feeding and the nutritional status of infants, where the frequency in cases of abnormal nutritional status is more  $45.2 \pm 19.4$  compared to the frequency in cases of normal nutritional status  $54.8 \pm 80.6$ . The chi-square test between the two variables obtained a value of p = 0.03.

**Table 2: Correlation Factors Enabling Food Complementary foods for breast milk with Infant Nutritional Status**

Enabling complementary foods for breast milk	Infant Nutritional Status				Total	p-Value
	Not Normal		Normal			
	n	Percentage	n	Percentage		
Age Suitability						
Unsuitable	15	37.5	25	62,5	40	0,234 *
Suitable	5	22.7	17	77,3	22	0,000 **
Type Consistency						
Inconsistent	15	55.6	12	44,4	27	0,001 *
Consistent	5	14,3	30	85,7	35	0.090 **
Frequency						
Less	14	45,2	17	54.8	31	0.030 *
Sufficient	4	19,4	25	80.6	31	0.021 **

\* Chi-Square \*\*Paired Test

**Multivariate Analysis:** Requirements fulfilled in multivariate analysis, namely all variables related to p value <0.05 entered which are then analyzed include variable consistency the type of complementary food,

the frequency of supplementary feeding, using the statistical ratio method to see the riskier and most related variables. It is indicated that the consistency of food types and frequency can improve nutritional status (Table 3).

**Table 3: Multiple Logistic Regression**

Variable	B	Sig (p-value)	Exp (B)	OR	95% CI
* Consistency type	2.186	0.001	8.903	7.500	2.384 to 33.054
Frequency	1.477	0.027	4.380	3.431	1.183 to 16.219

B: Beta, Sig: Significant, Exp: Expected, OR: Ods Ratio, CI: Conbidential Interval. \* Variables that are most related to the nutritional status of the baby.

### Discussion

**Giving Age Suitability:** Provision of complementary foods for breast milk should be started at the age of 6 months because the digestive system of the body has started to be perfect and ready to receive food other than breast milk. When babies enter the age of 6 months and above, some nutritional elements such as protein, carbohydrates and some vitamins and minerals contained in breast milk are no longer sufficient. Based on the results of this study that the suitability of the age of the first time giving is not related to nutritional status. Important findings in this study, supplementary feeding was first given in the first 6 months, but more were given formula milk at the age of under 6 months. Similarly, Lakshman’s research is more focused and specific in the provision of bottled milk and obesogenic foods<sup>(9)</sup>.

The results of this study are in contrast to Alzaheb’s research in Saudi Arabia (2015) stating that the practice of giving is very useful as a complement to infant malnutrition obtained from breast milk<sup>(10)</sup>. The introduction of earlier complementary foods before a six-month-old baby has a negative effect as a substitute for breast milk and can stop breastfeeding practices at an early stage<sup>(11,12)</sup>. Baby’s nutritional needs increase along with increasing age and reduced breast milk production and duration of breastfeeding<sup>(10)</sup>. In the first year of life, the method of feeding babies on time is one way of intervention carried out in the community to support optimal baby growth and development<sup>(13)</sup>.

**Consistency of Food Types:** important finding in this research is that the type of complementary food has an influence on the nutritional status of infants and children. Research found and explained more specifically

the age conformity with the type of quality food consumed has an influence on the absorption of nutrients that have an impact on nutritional status. Various kinds of complementary foods for breast milk are given to each day according to age development. Complementary foods cannot match breast milk in its nutritional content, enzymes, hormones, and immunological substances and antibodies. Modified food ingredients or mixtures of various types of food ingredients that are specially made as complementary foods for breast milk so that these foods contain complete nutrients needed by babies because this period includes the period of growth.

This study is not in line with stating that the average food supplement studied cannot meet the needs of calcium, iron and zinc every day as a nutritional source of complementary foods for infants in developing countries<sup>(14)</sup>. This study is in line with that conducted in Tanzania in the 6-23 month age group (2010) which states that the main determinant that can affect a baby’s health, development and growth is the proper consumption of complementary foods<sup>(15)</sup>. Giving baby food is a modification factor that can reduce mortality and disability caused by preterm birth<sup>(16)</sup>. The growth and development of premature babies is in accordance with types of food such as breast milk or fortified formula<sup>(17)</sup>.

**Giving Frequency:** Quantity of complementary food is very important for brain growth and intelligence development. The fulfillment of infant and family nutrition is closely related to the frequency of food provided. The frequency of breastfeeding must be adjusted to the age and ability to produce breast milk. Increasing age needs are also increasing and the ability

to produce breast milk decreases so that the frequency of supplementary food supply is increasing and added some types of snack foods.

The frequency of eating children is also influenced by several factors such as the family's socio-economic status and the number of family members. According to the theory, the proportion of adults more than children in the family can result in less food availability for children. Low-income communities increase the attention and focus on breastfeeding and supplementary food for babies<sup>(1)</sup>. The results of this study are similar to research conducted in Krakow and Silesia (2014) stating that regular feeding is very important, adequate daily nutrient intake is useful for physical development and and it is necessary to introduce healthy eating patterns for health during the growth period<sup>(18)</sup>. Perceptions about breast milk and feeding given complementary breast milk can be improved by health education<sup>(13)</sup>.

### Conclusion

Provision of complementary breast milk food is related to the nutritional status of the baby. The consistency of food types has a greater relationship with nutritional status compared to frequency. The age match for starting complementary foods performed by mothers starts at 6 months of age. The practice of giving complementary foods for breast milk is influenced by the mother's knowledge which has an impact on the mother's skills in serving complementary foods.

**Significant Statement:** Results of this study found that babies need complementary food as they age to cover malnutrition from the intake of breast milk for growth and development. The practice of providing good complementary foods can be seen from the suitability and consistency in providing complementary foods caused by knowledge of maternal nutrition.

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**Ethical Clearance:** Ethical approval has been obtained from Ethical Commission of Health Research, Faculty of Public Health, with protocol number UH910183006.

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# Urinary Tract Stones Cases Profile at a B-type General Hospital, Gresik, East Java in March: May 2018

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## Abstract

**Introduction & objectives:** Urinary tract stones are associated with various risk factors, both endogenous and exogenous risk factors. The aim of this study is to investigate the demographic data of the outpatient clinic in Ibnu Sina General Hospital, a B-type hospital located in Gresik, East Java, Indonesia.

**Patients and Method:** This research was a descriptive study from medical records and questionnaires. A total of 118 patients was admitted to this research during March - May 2018. The variables used in this study were age group, sex, family history, water intake, and location of stones.

**Results:** The research show obtained result that the age group with the highest number of urinary tract stone cases is the age group of 45-64 years old (63,6%). Most of the patients were male (58,5%). The majority of the patients denied to having familial history of urinary tract stones (79,7%). The largest part of the patients didn't take >2,5L per-day (82,2%). Most of the stones were found in Upper Urinary Tract (81,4%).

**Conclusion:** From the results of the research the highest number of cases in each group was found to be in the age group of 45-64 years, male group, patients without any family history of urinary tract stone group, patients with water intake < 2.5L/day group, and patients whose stone located in the upper urinary tract group.

**Keywords:** *Urolithiasis, urinary tract stones, epidemiology, risk factor, east java, indonesia*

## Introduction

Urinary tract stones are a pathological condition because of the presence of hard masses such as stones that form along the urethra and can cause pain, bleeding, or infections of the urinary tract. If not treated properly, this obstruction can cause malfunction and permanent kidney structure damage, such as obstructive nephropathy, and if you have a urinary tract infection can cause urosepsis.<sup>1</sup>

Urinary tract stones are associated with various risk factors that must be recognized by everyone, both endogenous or exogenous risk factors. Usually there is a combination of endogenous and exogenous factors that lead to stone formation. Endogenous risk factors include age, sex, and family history. While exogenous risk factors include climatic conditions, nutrition, obesity, fluid intake, work, and medication.<sup>2</sup>

In Indonesia, the prevalence of urinary tract stone disease increases with age. The prevalence of urinary tract stones is 0.6%. The highest was in the age group of 55-64 years (1.3%) and it was higher in male (0.8%) compared to female (0.4%).<sup>3</sup>

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## Materials and Method

This is a descriptive research. Retrieval of patient

data was obtained from medical record and questionnaire filled by patients with urinary tract stones at the Outpatient Clinic of Ibnu Sina General Hospital during March - May 2018. All patients who fit the inclusion criteria were included in this study, the variables of this study were age, sex, history of stones in the family, amount of fluid intake, and location of the stone. From the inclusion criteria, 118 cases of patients with urinary tract stones were obtained.

### Results

This study is a retrospective study of patients with urinary tract stones in the Outpatient Installation of Ibnu Sina Gresik Hospital during March-May 2018. The patient’s diagnosis is based on medical records.

The results showed that the age group with the

highest number of cases of urinary tract stones was the age group of 45-64 years, as many as 76 patients (63.6%) and the group with the least number was the age group 1-4 years and 5-14 years with 1 patient (0.8%) in each group. Based on the sex group (69 male patients and 49 female patients), the ratio of male compared to female was 1.4: 1 (58.5%: 41.5%). Patients who had family history of urinary tract stones were reported as many as 24 patients (20.3%), while 94 patients (79.7%) denied for having it. The group of patients with fluid intake > 2.5L per day was 21 patients (17.8%) and the remaining 97 patients consumed < 2.5L water per day. A total of 96 patients (81.4%) had urinary tract stones located in the upper urinary tract, 20 patients (16.9%) in the lower urinary tract, and 2 patients (1.7%) had stones both in the upper and lower urinary tract. The data is presented in Table 1.

**Table 1: Characteristic of Research Subject**

Criteria		Amount	Percentage (%)
Age (Year)	< 1	0	0
	1 – 4	1	0,8
	5 – 14	1	0,8
	15-24	2	1,7
	25-44	23	19,5
	45-64	76	63,6
	≥65	16	13,6
Sex	Male	69	58,5
	Female	49	41,5
History of Urinary Tract Stone within Family	Yes	24	20,3
	No	94	79,7
Fluid Intake ≥2,5 L/day	Yes	21	17,8
	No	97	82,2
Stone Location	Upper	96	81,4
	Both	2	1,7
	Lower	20	16,9

### Discussion

Based on age group, the most cases were found in the 45-64 year age group as many as 76 patients (63.6%). the age group with the highest number of urinary tract stone cases in this study accordance with the study that was published in 2017 which states that the majority of cases of urinary tract stones are in the age group 40 years to 60 years and the number of cases which is rare in children.<sup>4</sup>

As in adults, the factors involved in the metabolic syndrome such as obesity also pose a risk of urinary tract stone formation in children.<sup>5</sup>

Changes in stone composition have also been reported, this may occur as a result of lifestyle changes according to age development. The choice of lifestyle and food involved in the metabolic syndrome complex is an important factor that contributes to this development.<sup>6</sup>

In terms of sex, the majority of cases were found in male as many as 69 patients (58.5%). This is consistent with many studies in developed and developing countries.<sup>7</sup>

It has been observed that women show a bimodal distribution of stone disease, demonstrating a second peak in the sixth decade of life corresponding to the onset of menopause and a fall in estrogen level. This finding and the lower incidence of stone disease in woman compared with men have been attributed to the protective effect of estrogen against stone formation in premenopause women, owing to enhanced renal calcium absorption and reduced bone resorption.<sup>8</sup>

Lower urinary saturation of calcium oxalate and brushite was identified in women compared with men. Moreover, urinary calcium was lower in women than in men until beyond age 50, when it reached equivalence in the two groups.<sup>9</sup>

Patients who had family history of urinary kidney stone as many as 24 patient (20,3%). Urolithiasis was significantly associated with a positive family history of urinary tract stones.<sup>10</sup> Another study found that first-degree relatives of those with stones have twice as high a chance of stone disease.<sup>11</sup> Defects in urine acidification can be inherited and polygenic factors, as well as household diet and environmental factors, can play a role.<sup>12</sup>

Although the data above supports that there is a significant relationship between urinary tract stone patients and the history of this in the family, there is a discrepancy in the results of this study. This may be due to a recall bias by the patient, where the patient may be wrong in mentioning the presence or absence of a family history due to limited knowledge and memory of the patient.

Based on the amount of fluid intake, patients with fluid intake > 2,5L per day in cases of urinary tract stones were 21 patients (17,8%). The cut off figure 2,5L was adapted from EAU 11th edition as a measure of prevention of urinary tract stones in general. In another study of the 21.000 patients who were expected to be obedient to drink 2L / day of fluid, 11572 patients were found to be able to avoid first incidence of urinary tract stones.<sup>13</sup>

Dehydration is not only caused by fluid intake, but a balance between intake and output. Eventhough

the patient has been drinking enough fluid according to the recommended limits, the needs of each patient are different, varies according to individual's activity, exposure of sunlight, infection, diet, medication consumption, etc.<sup>14</sup>

Dehydration is a very important thing because higher temperatures are positively associated with stone prevalence.<sup>10</sup> Because the concentration of the amount of the crystallized solute is the most important matter which finally forms stone, thus the reduction in urine volume will strengthen the saturation of all solutes and increase the risk of all stone formation. In addition, oliguria also increases urinary stasis.<sup>15</sup>

Viewed from the location, urinary tract stones appeared to be located in upper, lower or both. The majority of stones' location were found at the upper urinary tract as many as 96 patients (81.4%). The results of this study are in accordance with the study that was published in 2015, with the results of the study that the upper urinary tract stones as the location of the most stones with 286 patients (82.4%) of a total of 347 patients. On the other hand, the location of the stone changes with age where the proportion of bladder stones increases, while the proportion of kidney stones decreases.<sup>16</sup>

Supersaturation which plays an important role in calcium oxalate stones, is deposition of stone material in a renal papillary calcium phosphate nidus. The calcium phosphate precipitate on the base of the thin membrane loop of Henle, erodes into the interstitium, and then accumulates in the subepithelial space of the renal papilla. A deposit from a subepithelial known as Randall's plaques eventually erodes through papillary urothelium. Calcium phosphate and calcium oxalate gradually deposit on the substrate to create a urinary tract stones.<sup>17</sup>

Benign prostate hyperplasia in the elderly causes a tendency towards obstruction. This might be a possible explanation for the high incidence of stones in the bladder in older people. Another thing that makes women at risk for lower urinary tract stones is the presence of other risk factors, such as changes in bladder function associated with relaxation of smooth muscle tone in the elderly, with reduced bladder emptying efficiency that supports urinary stagnation and stone.<sup>18</sup>

## Conclusions

From the results of the research the highest number

of cases in each group was found to be in the age group of 45-64 years, male group, patients without any family history of urinary tract stone group, patients with water intake < 2.5L/day group, and patients whose stone located in the upper urinary tract group.

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# Performance of Immunization Program Managers Based on Malcolm Baldrige Criteria for Performance Excellence (MBCFPE) in Puskesmas Tangerang District in 2019

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## Abstract

**Background:** Coverage of basic immunization to infants In Tangerang Regency, the last three years of 2014-2016 rose 2% - 7% every year, it always increases every year and immunization coverage nationally exceeds the national target of 90% 93.83%. This is different from the incidence of diphtheria in Tangerang Regency. The implementation of an immunization program provides an important role in the outbreak of vaccines by health workers who can preserve people's perceptions regarding unwanted reactions due to vaccination, causing re-emergence of diseases in the form (KLB). This event can also occur because a damaged vaccine cannot be repaired and cannot cause immunity. As a result, outbreaks of immunization-preventable diseases will continue to occur so that this study will know the description and relationship of program management performance based on Malcolm Baldrige.

**Method:** it used is quantitative and qualitative method using questionnaires and in-depth interviews.

**Results:** The results of the performance of immunization managers based on *Malcolm Baldrige* were obtained that strategic planning had the highest yield of 85.02. The lowest variable is to focus on the team with a value of 78.02. Multivariate showed that the correlation results of performance has a strong correlation with the variable Leadership Strategic Planning, Customer Focus, Measurement, Analysis and Knowledge Management, Focus on Team and Focus on Process Rated determinant coefficient ( $R^2 = 0.793$ ) where the variable most The high effect on the results with (B) = 0.429 or 42.9% while the focus variable on the team is the smallest variable which has an effect on the performance results with (B) = 0.003 or 0.3%.

**Conclusion:** So that better measurement, analysis and knowledge management, strategic planning, customer focus, leadership, focus on the process and focus on the team will improve the performance results.

**Keywords:** *Malcolm Baldrige, Performance, Program Managers, immunization*

## Introduction

Routine Immunization Coverage in infants in Tangerang District in the last three years of 2014-2016

always increases every year and immunization coverage nationally exceeds the national target of 90% to 93.83%<sup>(1)</sup> This is different from the Extraordinary Events (KLB) Diphtheria Tangerang Regency 73 cases reported up to January 2018 covering eight sub-districts<sup>(2)</sup>

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Puskesmas as the frontline in public health services have a very large role. The quality and quantity of human resources it must be improved so that the quality of health services can be felt by all communities. The use of damaged vaccines will give false recipients of the

vaccine recipients and this can also affect the program’s credibility to be negative. As a result, epidemics that can be prevented by immunization will continue to occur. (3), (4).

Determinants of complete basic immunization status in infants are the support of health workers after family support, access to health services and knowledge of mothers (5). The important role of puskesmas as the spearhead of government health services that provide health services to the wider community has various challenges as an organization to maintain electability as a public servant compared to similar organizations(6) because the success of a program is determined by the quality of health care on improving the quality of life of the community

Malcolm Baldrige criteria is a collection that is integrated with the instructions for excellence and continuity of performance in the health center immunization program in Tangerang Regency. (7). This research is expected to portray the implementation of immunization programs with the Malcolm Baldrige approach in health centers in Tangerang Regency

**Research and Method**

**Design Study:** The research method is *Mix method*, which is a quantitative method using questionnaires and qualitative using in-depth interviews and observations.

**Population Study:** Population is the entire person in charge of managing immunization organizer programs in Tangerang District Puskesmas, amounting to 43 officers. The sample used was the whole population (*Total Sampling*) with  $\alpha = 5\%$

**Data Collection:** obtained from primary sources from questionnaires with 56 statements, in-depth interviews with 15 questions and observations with 13 documents that referred to the criteria *Malcolm Baldrige*. Data collection of respondents using questionnaires that have been tested for validity and reliability in Depok City. Analysis of data used in quantitative analysis using multiple linear regression method with a scale of 100 on the SPSS 16.

**Research Results**

**Table 1. Description of Dependent Variables**

Size (Scala 100)	Value
	Variable Results
Minimum	40
Maximum	100
Mean	83,25
SD	11,40

Average values of 83.25 with standard deviation 11.40 on a scale of 100 Table.

**Table 2: Description of Independent Variables**

Size (Scala 100)	Value					
	Leadership	Strategic planning	Focus patients	Measurement, analysis, Knowledge Management	Focus teams	, Focus Process
Minimum	55	40	50	42,22	55	50
Maximum	100	100	97,5	100	100	100
Mean	82,05	85,02	79,65	83,00	78,02	80,31
SD	9,72	10,48	8,25	9,04	8,69	9,19

Strategic planning variable has the highest yield of 85.02 with a standard deviation of 10.48. The lowest variable is the focus of the team with a value of 78.02 with a standard deviation of 8.69.

**Table 3: Multivariate correlation of independent variables with Results**

Variabel	r	R <sup>2</sup>	p-value
Leadership, Strategic planning, Focus patients, Measurement, analysis and knowledge management, Focus teams, Focus process	0.759	0,793	0,001

Multivariate analysis of the dependent variable and independent r value = 0.759 which shows that the two variables have a strong and positive pattern. This means that the better the independent variable, the better the performance results. R<sup>2</sup> = 0.793 indicates that 79.32% of the variation of performance results can be explained by the independent variable.

Multivariate analysis of independent with dependent variables shows that the measurement variables, analysis and knowledge management are the highest variables that influence the results with the value (B) = 0.429 or 42.9% while the focus variable on the team is the smallest variable that influences the performance results with a value (B) = 0.003 or 0.3%.

**Table 4: Contributions influence of independent variables on the results**

Variabel	Standardized Coefficients (B)
Leadership	0,053
Strategic planning	0,199
Focus patients	0,190
Measurement, analysis and knowledge management	0,429
Focus teams	0,003
Focus process	0,158

**Table 5: Items of priority variabel**

Items of improved priority variabel	Items of Maintainable priority variabel
<b>Leadership</b>	
Efforts in program manager regeneration	Intense communication with all officers
<b>Strategic planning</b>	
Involvement of officers determining strategic plans	Preparation of activity plans
<b>Focus patients</b>	
Acceptance complaints in the implementation of customer	patient-oriented services
<b>Measurement, analysis and knowledge management</b>	
Ability to analyze performance in efforts to improve	Reporting and recording systems are used for IEC
<b>Team focus</b>	
Award or punishment for program managers	Training in conducting immunization
<b>Focus process</b>	
Development of new procedures according to needs	Implement tasks in accordance with work guidelines
<b>Results</b>	
Evaluate the implementation of immunizations with instruments carried out regularly is carried out	Logistics storageit is well implemented which includes maintained vaccine quality

**Discussion**

**Results:** Puskesmas carries out tasks in accordance with annual planning, the existence of health promotion activities prior to service. The documentation of the implementation of the report on the implementation of activities has been made and the implementation has been in accordance with the established Standard Operating Procedure which is a prerequisite in the accreditation of puskesmas. This is in accordance with previous research. Service can be achieved in good categories if there is commitment of human resources, which is good and right, in accordance with standard

operating procedures <sup>(8)</sup>.

Independent variables have a correlation and are positively patterned towards the dependent variable. This means that the better the independent variable will improve results. The highest value (R) is measurement, analysis and knowledge management (R<sup>2</sup>= 0.753) illustrating that these variables have the most influence on performance. The focus variable on the team (R<sup>2</sup>= 0.292) is the smallest variable. due to involving all employees in the puskesmas without seeing their competencies and developing the competency of the officers, they have not been *updated*.

**Leadership:** Efforts to prepare the regeneration of program managers are still low. Because of the lack of resources and workload, communication is intense with officers and basic socialization of policies to officers is the highest thing, because the health center is able to conduct two-way communication by involving all parties. This is in line with research that good and effective communication between all parts is a strength for organizational sustainability<sup>(9),(10)</sup>

The results of bivariate leadership variables with the results of performance obtained the value of  $r = 0.621$  which shows that both variables have strong and positive patterns of relationships. Value ( $R^2 = 0.386$ ) shows that 38.6% variation in performance results can be explained by leadership variables.  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between leadership and performance results. While the multivariate results of the *Standardized Coefficients* ( $B$ ) = 0.053 showed that 5.3% of the leadership variables contributed to the performance results simultaneously with other variables. The better the leadership, the better the performance results of the puskesmas, this is in line with previous studies<sup>(11)</sup>.

**Strategic Planning:** Strategic planning involves specific plans, strategic determination, strategic program policies needed to achieve organizational goals. This can arise because of input in the form of requests, support, and the environment, from the outside to the policy owner<sup>(12)</sup>.

Bivariate strategic planning variables with results obtained by the value of  $r = 0.801$  which shows both variables have a strong and positive pattern of relationships. Value ( $R^2 = 0.641$ ) showed that 64.1% of the variation of performance results can be explained by the strategic planning. The statistical test results obtained  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between strategic planning and performance results.

The better the strategic planning will improve results, according to the research that strategic planning, customer focus and measurement will not affect leadership<sup>(11)</sup>.

**Focus Customers:** Satisfaction is a fulfillment response that is considered satisfactory in the form of an overall attitude directed at consumers of goods or services after they obtain and use it<sup>(13)</sup>. Expectations are directly proportional to the patient's desire to enjoy

service satisfactorily. If the services provided are as expected, the quality is interpreted well and satisfactorily as well as it should.<sup>(14)</sup>

Customer satisfaction and loyalty will increase if puskesmas is able to handle complaints effectively at the first contact, customer information can be obtained through regular customer satisfaction surveys by placing voice boxes, centers complaints conducting immunization. in line with the research that service quality contributes of patient satisfaction for puskesmas services<sup>(15)</sup>

The results of the variable bivariate focus patients with results obtained a value of  $r = 0.718$  which shows both of these variables have a strong and positive pattern. ( $R^2 = 0.516$ ) shows that 51.6% variation in results can be explained by variable focus patients.  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between focus patients and results.

The better focus patients will improve puskesmas performance. Reception and search for complaints is still not optimal. Puskesmas use social media as a means of complaint (suggestion box, *call center*, telephone, sms, or whatsapp) in obtaining complaints. This shows that the organization has involved puskesmas with an effective, systematic and responsive approach even though there are still parts that need to be systematically evaluated<sup>(16)</sup>

**Knowledge Measurement, Analysis and Management:** This variable explains how the puskesmas collects, selects, analyzes, manages and improves data, information and knowledge assets and how the health center uses the findings of the review results to improve its performance.<sup>(17)</sup> Organizations must use data or information in decision making, this is very necessary in identifying patient needs and patient expectations.<sup>(18)</sup>

The results of variable bivariate analysis focusing on the team with performance results obtained a value of  $r = 0.54$  which shows the two variables has a strong and positive relationship. The value ( $R^2 = 0.292$ ) shows that 29.2% variation in performance results can be explained by the focus variable on the team.  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between the focus on the team and the performance results.

**Focus Team:** Organizational culture, work stress and staff job satisfaction have a positive effect on employee performance<sup>(19)</sup>. Job stress causes employees to feel the need to mobilize all their abilities to achieve

high performance and to complete tasks well.

Bivariate analysis of variables focus teams with performance results obtained value  $r = 0.54$  which shows that both variables have a strong and positive pattern. Value ( $R^2 = 0.292$ ) shows 29.2% variation in performance results can be explained by variable focus on the team.  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between the focus on the team and the results of the performance

The better the focus team will improve performance. Reward or punishment in assignments on the focus variable on the team gets the lowest score. Rewards is one of the controlling tools used to motivate personnel, while *punishment* is something that produces a deterrent effect. If *reward and punishment* is carried out appropriately and wisely, the puskesmas will have more qualified staff who can improve performance. <sup>(20)</sup>

**Focus process:** Management is the process of planning, organizing, leaders, controlling the efforts of members of the organization and the process of using all, organizational resources to achieve established organizational goals while the process is a systematic way to carry out a job <sup>(21)</sup>

Results of variable bivariate focus process with the results of performance obtained a value of  $r = 0.568$  which shows both variables have a strong and positive pattern relationship. The value ( $R^2 = 0.322$ ) shows that 32.2% of the variation in performance results can be explained by the variable focus on the process.  $p$  value 0.001 ( $<0.05$ ), meaning that there is a relationship between the focus on the process and the performance results. The better the management process will improve results of its performance.

### Conclusion

Strategic planning variables have the highest value while the variable focuses on the lowest team. All variables have a strong and positive pattern. Measurement variables, analysis and knowledge management are the variables that have the strongest relationship. The better independent variabel will improve performance results of program management in Tangerang Regency

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# The Impact of Primary Dysmenorrhea on the Level of Physical Activity among College age Students

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## Abstract

**Background:** Dysmenorrhea is one of the most prevalent adolescent health problems. Aim . This study aimed to evaluate the impact of primary dysmenorrhea on the level of physical activity among female students at the College of Applied Medical Sciences, Jouf University.

**Method:** A cross-sectional study was conducted in this study. Purposive sampling technique was used to enroll seventy-nine female students who reported moderate to severe pain and recruited from Physiotherapy and Health Rehabilitation Department from the middle of April to the end of August. A self-administered questionnaire, was designed to collect required data in this research.

**Results:** from the present study showed that there was a significant impact of pain on the absenteeism, low concentration, poor academic performance, and reduced physical activity. All those effects were accompanied by higher pain rating scale ( $p$ -value 0.0001, 0, 0001, 0.011 and 0.023 respectively).

**Conclusion:** Most of the female students had experienced a variety of dysmenorrhea degrees that may have an adverse effect on the number of physical activity limitations and other variables such as absenteeism, low concentration, and poor academic performance.

**Keywords:** *dysmenorrhea, physical exercise, young adult .*

## Introduction

Primary dysmenorrhea (PD) is defined as the menstrual cycle's painful discomfort. It is very common among adolescent females. It is usually accompanied by abdominal and pelvic pain, nausea, diarrhea, vomiting, headaches, dizziness, lower limb, and lower back pain [1]. Dysmenorrhea is classified into two discrete types. The

primary type is the menstrual pain with the absence of any underlying pathological cause. While the secondary one is usually associated with a well-defined pelvic disease [2]. The predominance of PD was measured in many countries of the world and was confirmed that it differs from one place to another according to the geographical location. Predominance of PD in Arab countries such as Iraq, Lebanon, Egypt and Saudi Arabia, the was 89.4%, 74.3%, 84.01%, and 60.9%, respectively [3-5].

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In a study conducted by Ismaile, 2016 [6] concluded that the rate of dysmenorrhea prevalence was ranging from 50% to 90% in adult girls. Persistent PD pain has a direct impact on the everyday activities and performance of adult females. For instance, previous study by Abu Helwa., 2018 [7] stated that menstrual pain is the major

leading factor forcing female students out of school and college for the short-term, which negatively affects their academic activities. The academic performance of females who experienced dysmenorrhea varies during their menstrual cycle. [8]. Therefore this research was aimed to evaluate the impact of dysmenorrhea on the physical activity and academic performance of female students.

**Subject and Method:**

**Study Design:** This study was a descriptive, cross-sectional study using.

**Setting:** This study conducted in the faculty of Applied Medical Sciences, Jouf University. From the middle of April to the end of August 2018.

**Sample:** A purposive sample of seventy-nine female students from all academic years who reported moderate to severe pain, All students were recruited according to the following criteria:

**Inclusion Criteria:** Female students ages ranged between 18-22 years, All participants were single and belonged to the same homogeneous group.

**Exclusion Criteria:** Female students with diagnosed secondary dysmenorrhea, any other systemic diseases or endocrinal disorders or who undergo major abdominal surgery. Furthermore, students with pre-existing gynecological conditions, students who were taken oral pills for contraception due to any hormonal problem or other reasons.

**Tool of the Study:** A structured self-administrative questionnaire prepared based on prior researches in the literature, it was composed of three distinct parts. Part one explored the demographic data related to the personal characteristics of the study participants Moreover, part two asked about the effects and symptoms related to dysmenorrhea such as measuring pain intensity through a numerical rating pain scale starting from 0 to 10 (No pain to worst pain), McCaffery M., and Beeb A., (1999) [9] and supported by a smiley face illustration. In this part, premenstrual symptoms such as abdominal pain, leg cramps, nausea and vomiting, were also included in addition to absenteeism, low concentration, poor academic performance, and reduced physical activity included.

Part three was derived from the international physical activity questionnaire (IPAQ) (Craig et al.,

2003) [10] that was designed to investigate both type and level of physical activities practiced daily.

**Data Collection and Procedure:**

- Once the questionnaire was distributed to college students, they were told as, to how and when (during menstruation) the questionnaires to be filled. All questionnaire items were explained to each participant. The questionnaire was allowed to be taken at home to be accomplished and returned on the next day then they were handed the questionnaire to be filled which most probably after the first day of their menses by one week.
- All participants received consent form and information sheet before filling the questionnaire, also allowed to withdraw freely. Hence, no cases have been reported.

**Data Analysis:** For descriptive statistics, for qualitative variables, quantitative variables For analytical statistics, t-test, Pearson correlation and ANOVA test was used to study the relation between levels of pain rating scale and duration of physical activities.

**Results**

Table 1: the mean age 22.4 (1.1) years old while their menarche age was 12.2 (1.8) years old and they had normal BMI 23.4 (5.5) Kg/m2. Fifty-two (65.8%) subjects had regular menstruation with a mean duration of menstruation 5.7 (1.2) days.

**Table 1: Characteristics of The Study Sample (n=79)**

Variable		M ± SD
Age(years)		22.40 ± 1.14
Weight(kg)		60.51 ± 12.00
Height(cm.)		158.21 ± 4.71
BMI		23.48 ± 5.57
Age at menarche(years)		12.22 ± 1.87
Duration of menstruation(days)		5.74 ± 1.25
Variable	Values	n. (%)
Regularity	Yes	52 (65.8)
	No	27 (34.2)
Family history	Yes	63 (79.7)
	No	16 (19.3)
Marital status	Married	20 (25.3)
	Single	59 (74.7)



**Table 2:** demonstrated that 41.8% of the students complained from moderate pain and 49.4% complained from severe pain according to pain rating scale (4-6 & 7-10) during menstruation respectively while only 8.9% reported a mild level of pain (0-3) with mean value 6.3 ±2.2.

**Table 2: Pain Rating Scale of The Sample (n=79)**

Variable	Values	n (%)
Pain scale	0-3	7 (8.9)
	4-6	33 (41.8)
	7-10	39 (49.4)
	Mean ± SD 6.37 ± 2.21	

Note. n = number; % = percent; SD = Standard deviation.

According to the impact of dysmenorrhea on participated students, the most common types of associated symptoms were abdominal pain followed by fatigue and leg cramps representing (91.1%, 72.2% and 40.5%) respectively. Additionally, the academic performance was affected by menstruation in different ways, nearly half of students reported a high percentage of absenteeism 46.8% during menstruation and the majority of them complained from low concentration 78.5% and poor academic performance 77.2% while 87.3% demonstrated reduced in their physical activity. Furthermore, the results showed a significant impact of pain intensity on absenteeism, low concentration, poor academic performance, and reduced physical activity in which all accompanied by higher pain rating scale as

(p-value 0.0001, 0.0001, 0.011 and 0.023 respectively). Moreover regarding to physical activities that done by students during menstruation, present study showed that the mean value of duration of vigorous activities was 1.2±2.1 days and 25.2±5.9 minutes (mins), while for moderate activities was 3.2±2 days and 116.9±106.6 mins meanwhile the mean value of duration of mild activities in the form of walking was 3.9±1.8 hours, 78.8±58 mins, while for sitting were 6.1±3mins.

As regards to the relation between levels of pain rating scale and duration of physical activities study revealed that there was a significant relation between levels of the pain rating scale and days of mild activities in form of a walk. The days mean number for pain scale 0-3 was 1.9 days while the mean number of days for pain scale 4-6 was 4.3 days and for pain scale 7-10 was 4 days which means that a higher pain scale was associated with longer days of mild activities in the form of walking. Moreover, reported that there was a positive direct relation between duration of menstruation and time of walk.(p-value 0.01). Also, there is a positive direct relation between a number of symptoms and days and time of vigorous activities only (0.42 & 0.37 respectively).

Table 3. Showed a significant direct impact of duration of menstruation on time of walking. Duration of menstruation was a significant predictor of walking duration.

**Table 3: Regression Analysis For Impact Of Duration Of Menstruation On Duration Of Physical Activities**

Variable	Duration of menstruation			
	β	SE	t-value	p-value
Days of vigorous activities	.02	.19	.01	.991
Time of vigorous activities(min.)	2.34	5.01	.46	.640
Days of moderate activities	.11	.18	.54	.583
Time of moderate activities(min.)	16.40	9.40	1.73	.080
Days of mild activities in form of walk	.18	.17	1.05	.290
Time of mild activities in the form of walking (min.)	12.34	5.08	2.42	.010*
Time of sitting(hours)	0.03	0.27	0.01	0.991

\*p< .001 Note.SE= standard error; min= minutes.

### Discussion

A high prevalence of the PD (91.2%) among college-aged females in the North Province of KSA was

reported in the results of the current study. Other studies reported different PD prevalence in different regions of KSA such as 60.9% in Jeddah, 56% in Eastern Province, 61.7% in Hail, and 77.0% in Taif [1- 4].

Moreover, a study by Alaettin et al. [11] stated in their study that 72.7% of dysmenorrhea reported among female students; this estimate is congruent with the percentages observed in the prior study between 28% and 89.5% Unsal et al [12] and Wong [13].

From our opinion explanation for this variance in these figures can be due to the use of selected groups of women and the lack of a universally accepted criterion for identifying dysmenorrhea, which was likely as highly responsible for the difference as data collection method, the research meanings of dysmenorrhea and pain, and the sample populations themselves.

The current study demonstrated that academic performance was affected by menstruation in different ways, nearly half of students reported a high percentage of absenteeism 46.8% during menstruation and the majority of them complained from low concentration 78.5% and poor of academic performance 77.2% also 87.3% demonstrated reduced in their physical activity. This comes in agreement with study done by Dalia et al. [4] who stated that the intensity of the pain experienced by students coincided to their lack of concentration and recent also to their class.

Recently Orhan et al [14] concluded that the results of the present study present that primary dysmenorrhea affects adversely on academic performance and sharing in sports and social activities. In addition, we found that dysmenorrhea participants are 3.2 times more likely to lose concentration in the workplace compared to girls who never experienced loss of concentration in their menstrual cycle. Dysmenorrhea has been shown to have a noticeable effect on daily activities, thus affects on QoL, contributing to absenteeism, diminished physical activity, concentration, and social relations as stated by Joshi et al. [15] while he studied the Primary dysmenorrhea and its effect on quality of life in young girls

Also our study results demonstrated that nearly more than one third of studied students (41.8% & 49.4%) reported that they complained from moderate to severe pain according to pain rating scale (4-6 & 7-10) during menstruation as well as the study by Esimai [14] reported that the levels of menstrual pain are classified as 3-4 as mild 5-6 and 7-10 as severe. In this report, the highest score between nursing students had menstrual pain listed from 5 to 6 as a score of menstrual pain with an average of 27%. These variations in pain intensity may be related to cultural differences in pain perception

and pain tolerance variability.

Our study showed that a higher pain scale was associated with longer days of mild activities in the form of walking. This may be attributed to the sedation effect of activities like walking that forming an alternative movement of lower limbs in reducing pain-related dysmenorrhea.

In the line with this findings study by Joshi et al [15] documented that dysmenorrhea was significantly affect on day-to-day activities, as decreased physical activity, loss of concentration and poor social relationships. Various studies also have been shown that the more physically active female students are shown to have less signs of dysmenorrhea relative to their sedentary peers. Physical activity plays a crucial role in the homeostasis of the body, including hormonal regulation and menstrual cycle control [16].

In a study performed by Joshi [15] revealed that there was no clear correlation between physical activity and dysmenorrhea and the most common type of activities was walking in (76.1%) of the participated females. Another study also revealed the same results. Nonetheless, some epidemiological studies have identified a decrease in the prevalence of dysmenorrhea [17].

Current data indicate that most exercise treatments have fewer side effects and were favored for pain reduction over pharmacological or herbal therapies [18].

Lastly, concerning the physical activity, our study revealed that medical students who represented our study sample and have primary dysmenorrhea are commonly affected by adverse effects of dysmenorrhea due to their prolonged duration of practical requirements during their attending a variety of their studies inside their college.

## Conclusion

The findings of this study concluded that most of the female students have experienced dysmenorrhea that may be having number of physical activity limitations. So that further studies will be needed in multicenter and specialties with a larger and more varied sample population. Moreover, collaborative efforts may be needed from health care providers.

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# Factors Associated with Safety Compliance among Workers at Feed Poultry Industry

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## Abstract

**Context:** The direct causes of accidents often involved human error, organizational and management factors in all industries incidents. The old paradigm of domino theory which emphasizes that accidents were always rooted in management errors began to slowly changed. Human factors such as behavior, motivation, psychology began to be considered, as enabling factor to improve safety compliance; reduce the potential for accidents in the workplace.

This study was to determine the factors associated to safety compliance at feed poultry industry workers in Sidoarjo. This research is a quantitative study with a cross sectional approach. Method used to measure safety compliance was the questionnaire filling. The population in this study were 150 people and the samples obtained using a simple random sampling technique were 108 workers. The results showed that there was no relationship with age (0.563), experience (1.000), level of education (1.000), and training (1.000). There was a relationship between safety concern (0.008), and appreciation (0.012). To improve safety compliance, a leader who focused on fulfilling work safety aspects both at the supervisors and managers level as well as giving appreciation to workers who worked safely is needed.

**Keywords:** *Appreciation, Safety Concern, Safety Compliance*

## Introduction

Safety performance was one of the company's achievement in safety management systems and occupational health implementation. A good safety performance showed that a company was committed to prevent accidents, occupational diseases, and increase productivity. A terrible implementation of safety

management system and occupational health was one of the causes of accidents. According to working accident report launched by<sup>5</sup>, in every 15 seconds, there were 153 workers suffered occupational accidents and 317 million accidents annually. The accident resulted 6,300 workers died, increased the rate of absenteeism, loss of working hours, and expenses 4% of the *Gross Domestic Product* each year.

The causes of accidents happen due to human factor and occupational factor. It took a precaution to ensure a safe working environment, so that workers could work safely. The role of a leader was expected to be able to minimize the occurrence of accidents and to improve the safety performance of personal and company.

Feed Poultry Industry at Sidoarjo, ran business activities as producing animal feed. According to

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observations of potential hazards of organic dust, addictive materials, working climate, noise of workplace, the hazards of unnatural working attitude, Forklift vehicle passing road, there found a worker who worked with unsafe work like working at high place without a safety equipment, working without any protective equipment, and ignorance of the danger in the workplace. Therefore, it is a need to raise leadership skill which enable to change employee unsafety behavior become employee with awareness of safety environment. Through this awareness, employee is expected to improve their safety performance personally and globally in the company.

<sup>2</sup>explained that safety leadership was a social interaction with members or employees. In this interaction, a growing mutual trust and the exchange of attention of the leaders for occupational safety and health were existed. The interaction process would encourage leaders to pay attention towards occupational health and safety aspects. Safety leadership could be defined as the process of interaction between leaders and followers. Leaders could use their influence to achieve safety goals of an organization under the state organization and individual factors.<sup>15</sup>

The factors that determined the safety leadership role with *motivation safety*, *safety policy*, and *safety concerns* approach would be able to improve the implementation of management system of occupational safety and health performance.<sup>7</sup>

*Safety concerns* referred to the extent to which leaders emphasize the importance of safety equipment and their interest in behaving based on the safety rules, emphasizing the increased security, and having a coordination with other departments to solve the safety problem of employee.<sup>9</sup>

According to,<sup>4</sup> internally, motivation was everything that lied in a work and profession. If things in a work built a level of motivation that could produce optimal adherence, then one indicator is recognition. Recognition was a form of appreciation and attention. Differences might occur between the situations where the tangible rewards that have been granted by the recognition were compared with the absence of any recognition.

<sup>3</sup>saw the safety performance aspects of job performance and safety performance of the model proposed by the theory of job performance.<sup>1</sup>They identified two components of the safety performance,

namely 1) the safety compliance; and 2) the safety participation. Safety compliance refers to the core safety activities that must be performed by employees to maintain safety in the workplace, such as following the rules and safety procedures, and the use of personal protective equipment (PPE) correctly.<sup>3</sup> Fulfillment of the safety covers employee behavior that improves their health and personal safety. This could be considered as part of the employee's role.

Contextual performance could be understood as the efforts made by individuals who were indirectly related to the main job, but it played an important role in shaping the organization, social environment, and the psychology of employees.<sup>8</sup>The following was an explanation of the safety performance dimensions:

- a. **Safety Compliance:** Safety compliance referred to the performance task components used to describe the core safety activities implemented by the individual to maintain safety in the workplace. Behavioral safety compliance included compliance with existing safety regulations, the use of personal protective equipment (PPE), and the efforts of individuals behave safely at work.<sup>3</sup>

## Materials and Method

This research was conducted in January 2019 in Feed Poultry Industry at Sidoarjo. This research was observational research with the cross-sectional approach. The population of this study were 150 workers who later became 108 workers as sample using random sampling technique. The independent variables in this study were safety concern and recognition. Besides, the surveyed respondents' characteristics involved age, length of work, safety training, and education level. The dependent variable used was safety compliance.

This method was carried out using a questionnaire to determine the age, length of work, education, training, safety concern, recognition, and safety compliance. To fill the questionnaire, the researchers read out the questionnaire to the respondents, and filled the questionnaire for the respondents.

According to,<sup>6</sup> a questionnaire was a tool for data collection that contained written questions. The questionnaire in this study was based on a Likert scale developed by Renis Likert in 1932. In this study, the questionnaires consisted of:

- a. **Safety Compliance:** Safety compliance was

measured using a questionnaire measuring instrument that was made under safety compliance with safety regulations set by the company itself.<sup>3</sup>In this study, the questionnaire consisted of five items that used a Likert scale with some options as “Always”, “Often”, “Sometimes” and “Never”.

**b. Safety Concern:** Safety concern was measured using a questionnaire to measure instruments and to collect information related to the role of supervisor on the implementation of safety at work based on the perception of workers.<sup>7</sup> This questionnaire was developed by the researchers, and consisted of six items that used a Likert scale with some options as “Strongly Agree,” “Agree”, “Disagree” and “Strongly Disagree”.

**c. Recognition:** Recognition was measured using

a questionnaire to dig and overview the role of supervisors in his appreciation to workers who adhered the safety rules set by the company. In this study, the questionnaire consisted of five items that used a Likert scale with some options as “Always”, “often”, “Sometimes” and “Never”.

The data obtained were presented descriptively, and was expected to provide an overview of the characteristics of respondents, safety concerns and safety compliance. The analysis of the variables was used to determine the presence or absence of relationship between the variables. The bivariate analysis of this study’s variables used Chi-Square test with SPSS version 17.<sup>11</sup>

**Finding:** 1. The Analysis of Factors that Correlated with Safety Compliance

**Table 1: Distribution of Statistical Analysis Result**

Variable	Safety Compliance				P (Value)	PR
	Low		High			
	N	%	n	%		
<b>Age</b>						
< 38 years	30	55.5	26	48.2	0.563	1.161
≥ 38 years	24	44.5	28	51.8		
Total	54	100	54	100		
<b>Length of Work</b>						
< 6 years	8	14.8	9	16.7	1.000	0.931
≥ 6 years	46	85.2	45	83.3		
Total	54	100	54	100		
<b>SHE Training</b>						
Has not participated in K3 training	10	18.5	11	20.4	1.000	0.942
Has participated in K3 training	44	81.5	43	79.6		
Total	54	100	54	100		
<b>Education Level</b>						
Vocational High School	51	94.4	50	92.6	1.000	1.178
College/University	3	5.6	4	7.4		
Total	54	100	54	100		
<b>Safety Concern</b>						
Low	43	79.6	29	53.7	0.008	1.955
High	11	20.4	25	46.3		
Total	54	100	54	100		
<b>Recognition</b>						
Low	35	64.8	21	38.9	0.012	1.711
High	19	35.2	33	61.1		
Total	54	100	54	100		

Table 2 explained that the category of  $\geq 38$  years have safety compliance with the high category of 51.8%, while the category of  $<38$  years have safety compliance with the lower category of 55.5%. The result of  $X^2$  test showed that the relationship between age and safety compliance were not significant. It was indicated by p-value as 0.563. These results differed from a research<sup>12</sup> that showed the older workers were more likely vulnerable to injury, but they had good safety performance. The younger workers were not vulnerable to injury, but their safety performance was not optimal. The age and experience of the workers ran hand-in-hand in determining the condition and safety status. Therefore, companies must be careful in managing its human resources.

Based on the theory of Gibson,<sup>10</sup> one of the factors that affected person's performance was age, the more increased the person's age and the longer he worked; the more adept he was at his job. At that age, a person tended to start to master the work, selected the job he liked, and being critical of his work.

Based on the results of this study, 83.3% of workers who had tenure  $\geq 6$  years had high safety compliance. The sufficient working experience made the workers understand the hazards in the workplace, and was able to raise their awareness in the workplace. The result of  $X^2$  test against years of service and safety compliance, showed no significant with p-value magnitude of 1,000.

According to,<sup>13</sup> the classification of work period was divided into two, namely 1) the new working period ( $<6$  years); and 2) a longer working period ( $\geq 6$  years). The dominating working period was  $\geq 6$  years. It could be ascertained that there was no additional employees that supported the jobs, and they were classified as workers with long working lives. In another sense, the work period was the length of the workers worked in the workplace. The period of work could affect workers' performance (positive and negative).

The Safety and Health Environment (SHE) training delivery has not been able to improve safety compliance. The  $X^2$  test showed no significant results with a p-value of 1.000. The results of interview with K3L worker training program section has been presented, and it included basic health and safety, first aid (P3K), fire management, housekeeping (5R), and ISO.

Morrison,<sup>3</sup> have called safety knowledge as an influence on safety performance by increasing employee

participation in activities such as training. The training that was held by the company would provide knowledge and skills of the employees to be able to work effectively and efficiently and to motivate employees to behave safely in executing their job.

The results of interview on K3L worker, training programs that have been provided included basic safety, first aid (P3K), fire management, housekeeping (5R), and quality standards. Based on the interview, the trainings were less supportive to improve worker safety compliance. Safety compliance (in this study) emphasized on compliance with safety regulations in the workplace and on how to identify and control workplace hazards that has been set by the company.

Most of the educational levels of Livestock Feed Industry workers at Sidoarjo were vocational high school (SMK). The total respondents with vocational education level were 101 respondents as the following classifications: 1) 45 respondents have a low safety performance; and 2) 56 respondents have a high safety performance. Fisher's test results showed the relationship between the levels of education with safety performance was not significant as the magnitude of the significant value was 0.697 (more than 0.05).

Furthermore, the relationship between safety concerns and safety compliance was significant. It was proven by 0008  $X^2$  test with the prevalence ratio (PR) 1.735. It meant that the role of supervisors on working safety unit could improve worker safety compliance in the animal feed industry at Sidoarjo.

This results was consistent with a study,<sup>7</sup> which explained that leaders would set a priority occupational safety workplace behavior according to the rules of the company, so it would make employees change their mindset and behavior in their work gradually. Thus, the awareness on safety performance would become the culture of the company. As an illustration, person would have difficulty in working without any safety gear that has been set by the company.<sup>15</sup>

On the other hand, the significant relationship between the recognition and safety compliance was proven by the test result of  $X^2$  0.012 with prevalence ratio (PR) 1.831. It has the intention that the urge to give recognition and appreciation towards workers who applied the rules of working safety was factually able to increase fodder workers' safety compliance at Sidoarjo.



According to,<sup>14</sup> there were two things to improve motivation as: 1) the individual inputs; and 2) the context of the work. The context of work could influence working motivation. In this case, a worker would be motivated when their performance was appreciated verbally or non-verbally. With the appreciation given, the worker could improve safety compliance safety that has been set by the company.

### Conclusion

The factors that were associated with the increased safety compliance were safety concern and shape recognition/appreciation. Supervisor who gave appreciation and attention to safety at work would focus on the dangers that arose in the workplace. The supervisor also provided safety equipment and being responsive towards the issue of workers' safety. This action would make its members imitate the behavior of supervisors. Besides, the compliance of workers against safety compliance would increase.

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# Public Perceptions About Immunization in Indonesia: National Online Survey

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## Abstract

**Background:** Immunization is one of the ways to build an immunity to a child by injecting vaccines to prevent certain disease. Nationally, immunization coverage continued to increase but the coverage gap in some areas in Indonesia due to the negative perceptions of immunization that affect to the arising outbreaks of certain diseases.

**Objective:** The study is aimed to identify and to analyze the perceptions of Indonesian society (aged  $\geq 18$  years) about the importance of immunization and the sources of information about vaccines using Likert scale.

**Method:** The method is a descriptive-analytic, applying cross-sectional survey using online questionnaire instruments.

**Results:** The results of the study from 2050 respondents showed that 1184 respondents (57.8%) received information sources on vaccines from health workers, overall respondents believed (86.4%) of immunization and the factors which are related significantly to vaccination perception were age, gender, education, income, and job with p value  $< 0.05$ .

**Conclusion:** Vaccination is an important activity for early childhood. Factors that significantly affect public perception of vaccination in general are age, gender, education level, income, number of children, and occupation

**Keyword:** Perception, Immunization, Vaccination, Childhood, Indonesia.

## Introduction

More than 1.4 million children in the world die annually from diseases that can be prevented by immunization. Immunization is also proven to be the most cost-effective solution to public health problems caused by infectious diseases<sup>1</sup>. Some of the infectious diseases that belong to immunized-preventable diseases

(PD3I) include: Diphtheria, Tetanus, Hepatitis B, meningitis, pneumonia -post, pertussis, and polio<sup>2</sup>.

In Indonesia, the coverage of national immunization increases continuously. Evaluation of Immunization Programs for 2015-2016 reported to the Office of the Presidential Secretariat that the coverage of complete primary immunization in infants reached 86.9% in 2015 with the target of 91% that year and 91.6% in 2016 with the target of 91.5% coverage. According to WHO/UNICEF in 2015, almost one million Indonesian children are not immunized or completely immunized<sup>3</sup>.

Vaccine concerns are a global issue in many countries, especially in developing countries included

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Indonesia<sup>4</sup>. Many misconceptions about immunization are rumored in the community such as that immunization causes fever and even danger children that can cause illness moreover death<sup>5</sup>.

Based on the facts, low immunization coverage causes the trend of its morbidity and mortality in infants and toddlers increases. To increase the coverage of this immunization, the knowledge about community perception related to immunization is necessary. Therefore, a study is needed to identify how the perception of Indonesian society aged  $\geq 18$  years about the importance of immunization and source of information about vaccine.

### Method

This study is a national online survey conducted in January-March 2018 with the method of cross-sectional among Indonesian population aged  $\geq 18$  years. This study used questionnaires which are developed from national and international standard surveys of New South Wales Child Health Survey, New South Wales Health Adult Health Survey, Queensland Health Survey, US National Immunization Healthcare and UK Wave Survey<sup>6-8</sup>.

The questionnaire that was distributed to all Indonesian people was represented by 2050 samples through online google form. Then the basic demographics of all respondents, sources of information about vaccination, and public perception of vaccination are identified.

All respondents who responded the questionnaire according to the criteria participated in the study without being excluded by any criteria. All respondents received an indirect explanation of the research at the time of filling out the questionnaire and given the voluntary consent directly. Assessment of respondent perceptions uses Likert Scale in the form of statement Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The data was processed using IBM SPSS 22 and analyzed descriptively and analytically by Pearson chi-square test.

### Results

This study is an online cross-sectional survey conducted from January 27 to March 18, 2018. Among 2050 respondents, 984 of them have children while the rest do not have yet. The respondents was 29 years old as average, with the oldest age of 69 years and the youngest

age of 17 years. Based on the survey, most respondents got information about the vaccine from health workers as much as 1184 respondents (57.8%), while 506 respondents (24.7%) from internet/social media and 287 respondents (14.0%) from their families.

The distribution of respondents shows the most frequent characteristic of them which was aged 25-34 years as many as 837 (40.8%) with the gender of women which reached 1291 respondents (63%). Most of respondents' latest educations was bachelor degree (S1) as much as 1331 respondents (64.9%). Islam was the most frequent religion as many as 1884 respondents (91.9%). The number of respondents who did not have children was estimated 984 respondents (48%), private worker as many as 732 (35.7%), and the income category <PMW (Provincial Minimum Wage) as many as 862 respondents (42%) as the highest class of each category.

The majority of respondents assumed that the purpose of vaccination is to protect their children (90.4%). Most respondents believe that vaccination is safe (86.4%) and be able to protect the community (77.9%). However, a small percentage reported perceiving that vaccine could not prevent the disease (20.7%), could cause autism (12.0%) and even religiously forbidden to do (7.2%).

Based on Pearson chi-square analysis in table 1, the general community concerns towards vaccination was correlated ( $p < 0.05$ ) with respondents' demographics of age, gender, education level, number of children, and occupation. In this study, religion view becomes a factor which does not have a significant relationship with the general community concerns towards vaccination with the various p-values ( $p > 0.05$ ). Religion has a significant relationship only to a concern statement about the forbidden law of vaccine in Islam ( $p = 0.000$ ). Based on Pearson chi-square analysis shown, demographic characteristics other than religion including age, gender, education level, income, number of children and occupation, have a correlation with the positive community perceptions about vaccination. This represents that religion has no significant relationship to some statements leading to a positive perception of vaccination. In general, the highest community groups which signifies strong positive support for vaccination were the class of age 45-54 years (26.9%), female gender (24.0%), education level of doctorate (52.9%), had income <PMW 24.0%, having no children (30.30%), and students (35.6%).

Represents the group of age, gender, education, income, number of children and occupations, have a negative public perception of vaccination. This suggests that religion has no significant relationship to some of the statements leading to a negative perception of vaccination. In general, most community agreeing on the counter-vaccination statements are group of 35-44 years old (23%), male gender (17.7%), junior high school as the education level (65.4%), have the equivalent to UMP income (23.9%), has 2 children or more (25%), and working as civil servants (20.4%). The following is a bivariate analysis of the demographic characteristics of each of the statements describing the perception of vaccination in Indonesia.

**Table 1: Community concerns towards vaccination.**

<b>n = 2050</b>	<b>Strongly Agree or Agree (%)</b>
I vaccinate my child to protect him/her	90,4
I believe that vaccinations are safe for children in general	86,4
I am confident in information provided by healthcare professional	83,6
I vaccinate my child to help protect the wide community	77,9
I am satisfied with amount of information provided by healthcare professional	74,9
Behavior of not vaccinating children causes harm	61,7
I am concerned that vaccines are not tested enough for safety	36,9
I am concerned about the increasing number of vaccines recommended for children	32,3
I am concerned about the distress to children of the injection itself	32,0
I am concerned that children get too many vaccines during the first two years of life	28,5
I am concerned that a child's immunity system could be weakened by vaccinations	22,9
I prefer children to get natural immunity from the diseases rather than immunity from the vaccines	21,3
I am concerned that vaccines are given to children to prevent diseases that they are not likely to get	21,0
I am concerned that vaccines are given to children to prevent diseases that are not serious	20,7
Vaccination is not needed because others have vaccinated their children and diseases have been controlled	15,8
I am concerned that vaccines can cause autism in healthy children	12,0
I hesitate to get my child vaccinated because it is forbidden in my religion	7,2

## Discussion

This study was conducted to determine about the public perceptions about vaccination for children. An individual's confidence about the vaccine will affect health behaviors to vaccinate as an attempt to prevent some diseases. In a study of six European countries, the role of physicians, pharmacists and nearby hospitals were regarded as the most reliable source of information about medicine and as the reminders about health hazards<sup>9</sup>. This is positively aligned with the results of this study in which information provided by health workers is trusted by most communities<sup>10</sup>. The health literacy on vaccination is not limited to discover some evidences that the vaccine is safe, people who have good health literacy also should be able to understand the dangers if vaccines are not given and do not hesitate for getting vaccinated without the odd rationalization related to the community that has been fully immunized and the disease had disappeared<sup>11</sup>.

In Indonesia, it is allowed the circulation of vaccines with thimerosal levels of 0.005-0.01% because it is still under its threshold according to WHO<sup>12,13</sup>. In this study, for the age group  $\geq 55$  years, none believes the vaccine can cause autism in healthy children. They often highlight the rare occasions in which a child suffers from the unexpected side effects of the vaccine<sup>14</sup>.

Although religion factor does not relate significantly with the positive and negative perceptions of vaccines in general, the Muslim group still affects specific views of the vaccine law<sup>15</sup>. The education from health workers are also necessary to improve vaccine perceptions related to the false long-term effects of the vaccine, one of them is that the child's immune system is assumed being weakened by vaccination<sup>16</sup>. Respondents concerns that the vaccine is given to children can not prevent the disease illustrates public concerns about vaccination-related attitudes<sup>17</sup>.

In this study, young-aged group is the most often strongly disagree about this concern. The strongest predictor of one's health is health literacy<sup>18</sup>. Where the value of health literacy in young people is higher than older people. This is because young people, especially in this case adolescents, they can more easily access health information when compared to older people<sup>19</sup>. In one study showing the total number of pediatric patients had admitted with a febrile seizure event, none of the children who had febrile seizures caused from vaccination<sup>20</sup>. Remember that perception is the cognitive

aspect of attitudes, then measuring perceptions can be used as the instruments of disclosure of attitude<sup>21,22</sup>. Economic factors affect a person's ability to obtain education and health services, thereby affecting the level of ability to access, understand, assess and apply health information<sup>23</sup>.

Most of the respondents were satisfied with the information provided by health personnel<sup>24</sup>. Studies show that lack of information and knowledge about disease causes they don't to vaccinate their children so that it is necessary to optimize health promotion media to increase parental participation in vaccinating their children<sup>25</sup>. According to Becker, the concept of healthy behavior is the development of the concept of behavior developed by Bloom<sup>26</sup>. In the five most important reasons for vaccinations promoted by the CDC, immunization can save a child's life in the first place<sup>27</sup>.

In this study, the group that agreed on the perception of vaccination as protection against their children increased by age. Ages affect a person shown by the higher level of knowledge and the stronger consistency of an individual, this will build the more mature in thinking and receiving information<sup>28</sup>.

In this study, the public's belief of that the prevention of disease for the wide community is important is strongly influenced by the latest education level compared to the age, gender, income, number of children, or occupational age. A research showed that promoting vaccination activities conducted by health workers with the good communication can help the community in revising negative issues about vaccination<sup>29</sup>. Therefore, promotional programs on vaccination should be held more frequent in purpose that the community knowledge about vaccination is improved. This hopefully change their perceptions towards vaccination and willingness to vaccinate<sup>30</sup>.

### Conclusion

Vaccination aims to prepare a person's immune response to be active to encounter the disease. Vaccination is an important activity for early childhood. Factors that significantly affect public perception of vaccination in general are age, gender, education level, income, number of children, and occupation.

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# The Effect of Metal Nanoparticle on LH, FSH and Testosterone in Male Rats

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## Abstract

**Context:** In our study, metal nanoparticles Ag, Cu, ZnO, CdO, and Sn NPs were prepared by pulse laser ablation in liquid and characterized for investigation of reproductive toxicity in adult male rats. Thirty six healthy rats, two month age old and the rats weighing from 250-300 g, divided into six groups of six animals each (GAg, GCu, GZnO, GCdO and Sn) group which receive oral 0.3 ml dose of metal nanoparticles for 30 day. Blood samples were collected via cardiac puncture for serum collection. The formation Ag NPs, Cu NPs, ZnO NPs, CdO NPs, Sn NPs were shown through the x-ray diffraction pattern. AFM indicate to formation metal nanoparticles with diameter 61.36, 70.44, 66.82, 74.87 and 67.34 nm of Ag, Cu, ZnO, CdO, and Sn NPs respectively. The results showed significant ( $P < 0.05$ ) elevation of luteinizing hormone (LH) for each metal nanoparticles except AgNPs non-significant. Each metal nanoparticle significant ( $P < 0.05$  and  $** p \leq 0.01$ ) of follicle-stimulating hormone (FSH), whereas in testosterone only Cu and Sn NPs significant ( $P < 0.05$ ).

**Keywords:** Metal nanoparticles, pulse laser ablation, testosterone, LH, FSH.

## Introduction:

The application of nanomedicine is wide-ranging. One of nano-medicine's most significant problems is to comprehend its environmental efficacy and also to determine the possible toxicity of nano-scale materials. [1] The metallic nanoparticles (NPs) show distinct characteristics than they found at larger bulk size. These characteristics are accredited according to their smaller size and bigger area by volume ratio. [2] Nanoparticles of metal and metal oxide such as silver, zinc, gold, or titanium dioxide have been used as antimicrobial agents for over a century. The conduct of nanometals against pathogenic organisms at nanometric dimensions is currently being studied. [3]

The particle size is a significant nanomaterial characteristic that plays a main part in the characteristics of unique nanoparticles. The particle size may represent its physicochemical characteristics and enhance the ability to sorb and interact with biological tissues. [4,5] In reality, more research has been done on the size of nanoparticles than on other nano-scale properties. [6] Up to now, results have shown that the use of nanomaterials increases biological activity as their size decreases. Today, multi-industry uses this science [7].

Nanoparticles and other cellular reactions toxicity relies on the nature of the material and doses were used. This showed that liver parenchyma cells play a significant part in eliminating nanoparticles from the blood. [8] Theoretically, nanoparticles may have some adverse effects on human health and the environment and their obvious effects on male reproductive function have not yet been clarified.

There are currently many techniques for generating suspended nanoparticles in aqueous solutions. Chemical

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techniques are the most frequently used because they are comparatively economical and the particle size can be easily controlled. Nevertheless, laser ablation in liquids has lately been shown to be a promising new method for obtaining metal colloids.<sup>[9-11]</sup>The aim of present study was to investigate the effects of metal nanoparticles toxicity on luteinizing hormone (LH), follicle-stimulating hormone (FSH) and testosterone.

### Experimental Part:

**1. Preparation of Metal Nanoparticles:** Metal nanoparticles (Ag, Cu, Sn, ZnO and CdO) were produced by laser ablation of (Ag, Cu, Zn and Cd) targets (diameter = 1.5 mm, thickness = 0.6 mm, 99.99% immersed in a vessel filled with 3 mL of deionized water (DI) with power 500mJ and .The target irradiated vertically by a Q-switched Nd-YAG laser (DIAMOND-288 pattern EPLS), with wavelength ( $\lambda = 1064$  nm) duration time at 6 Hz. The laser beam was focused by a focal length 10cm), subsequently, we placed the pure metal solution and the pulsed Nd-YAG laser re-irradiates, the concentrated laser beam spot diameter was 4 mm.

**2. Experimental Model:** Suspensions of metal nanoparticles were administered to rats with 0.3 ml doses via oral gavage. Thirty six healthy rats and two months of age and rats weighing 250-300 g are all permitted to acclimatize in animal house conditions for one week ( $25 \pm 3^\circ\text{C}$ , 50-55 percent relative humidity, and 12 hours light/dark cycle). The rats were divided into 6 groups in 6-rat capability cages made of plastic and sprinkled ground with sawdust, replaced every three days. The rats were fed a normal nutritionally balanced diet.

**3. Experimental Design:** Wistar male rats were divided into six groups of six individual animals.

1. Control - Animals got (deionized water) only
2. Ag- Animals got 0.3 ml/ day of oral Ag NPs for 30 day.
3. Cu- Animals got 0.3 ml/ day of oral Cu NPs for 30 day.
4. Sn- Animals got 0.3 ml/ day of oral Sn NPs for 30 day.

5. ZnO- Animals got 0.3 ml/ day of oral ZnO NPs for 30 day.

6. CdO- Animals got 0.3 ml/ day of oral CdO NPs for 30 day.

**4. Blood Collection and Serum Separation:** At the end of the experimental period, blood collection 3ml per group was collected by heart puncture, Blood was gathered from each rat in the eppendorf tube. At  $30^\circ\text{C}$  and 3000 rpm for 15 min, eppendorf pipes were centrifuged. The blood sample was divided into two layers, the upper serum layer and the lower rejected layer, and then Pasteur pipette pulled it. Till blood measurements, the serum layer from each rat was placed in freezing condition.

**5. Statistical Analysis:** Data is shown as the mean  $\pm$  SD. With Graphpad Prism 6.0 software, statistical analyzes were carried out using ANOVA one way. Means were used to compare untreated rats with distinct treated groups ( $*P \leq 0.05$ ,  $**P \leq 0.01$ ,  $***P \leq 0.001$ ,  $****P \leq 0.0001$ ).

## Result & Discussion

### 1- Structural and Topography of Nanoparticles:

Metal and oxide nanoparticle (Ag NPs, Cu NPs, ZnO NPs, CdO NPs) are formed by examining the x-ray, this is mentioned in my other paper.<sup>[12]</sup>

AFM imaging of metal nanoparticles was conducted on a smooth glass slide substrates by drop casting at heat  $60^\circ\text{C}$ . Film surface morphology was explored using AFM pictures, which at very elevated magnification generates topological surface pictures. AFM pictures as commonly recognized provide a helpful tool for unambiguously characterizing the order of magnitude and nanoparticle size distribution.

Figure (1) shows the morphology of dried colloids for Ag, Cu, Sn, ZnO and CdO NPs, 500 mJ / pulse and 500 pulses prepared by PLAL in DI. The images indicate that the MNPs have semi-sphere forms and we can see from graphic (2D) that the number and particle distribution of MNPs, note that the lowest size is Ag NPs and the bigger size is CdO NPs. Table (1) shows the average roughness value in DI at 500 laser energy and 500 pulses.



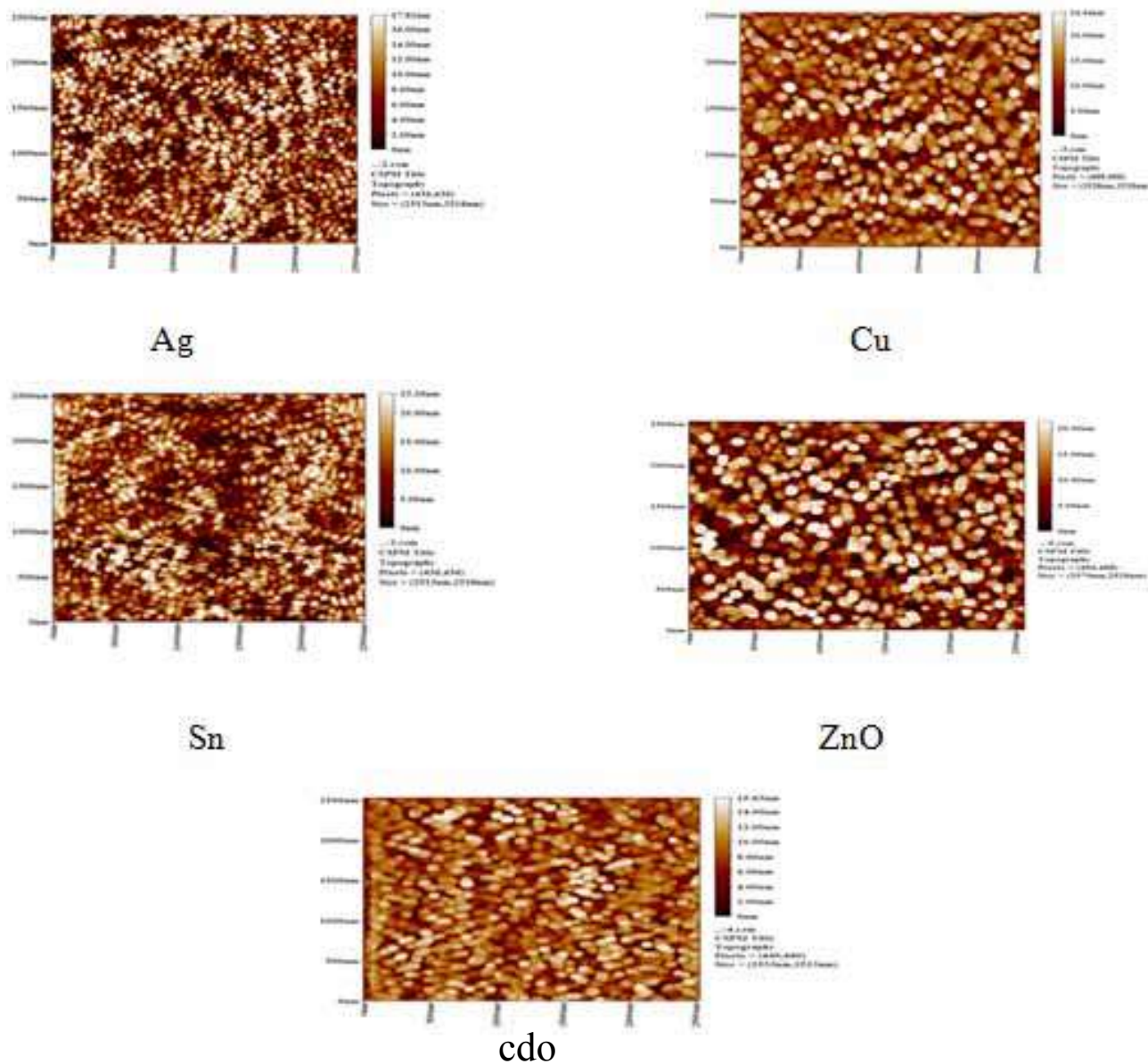


Figure 1: Typical 2DAFM image of Ag, Cu, Sn, ZnO and CdO nanoparticles prepared by PLAL by ablation of Sn target immersed in DI at 500 pulses constant, at 500mJ/pulse.

Table 1: shows the values of roughness average and average diameter for MNPs in DI.

MNPs	Roughness Average (nm)	Average Diameter (nm)
Ag	4.23	61.36
Cu	4.44	70.44
ZnO	5.09	66.82
CdO	2.24	74.87
Sn	5.2	67.34

2. Atomic Absorption Spectrometer Analysis (AAS): The concentration of Ag, Cu, ZnO, CdO

and Sn respectively, as in the table (2), prepared in PLAL has been determined by atomic absorption spectrometry.

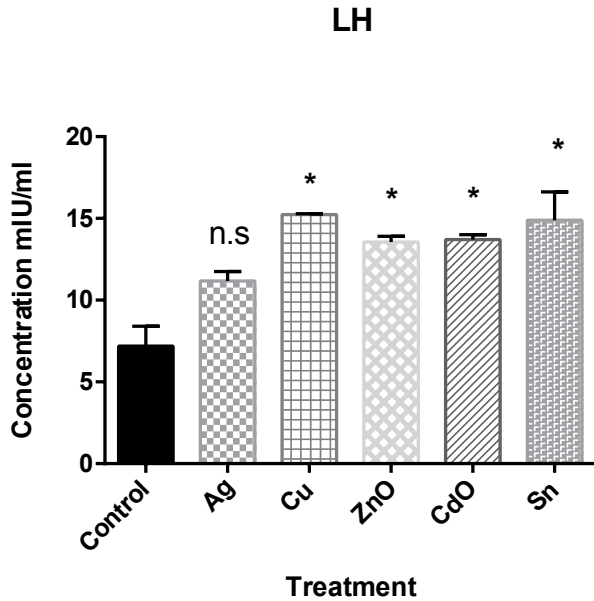
Table 2: Shows the concentration of MNPs with 500 mJ and 500 pulses.

Metal Nanoparticles	Concentration (ppm)
Ag	40.4081
Cu	10.3758
ZnO	24.0768
CdO	0.027
Sn	53.45

**3. Effect Metal Nanoparticles on Sexual Hormones:**

Figure (2) indicate that the level of serum leutinizing hormone(LH) in male rats dosed with MNPs showed a significant rise ( $p \leq 0.05$ ) over control. High LH shows an original testis failure and may happen as a result of chromosomal disorders. With the exception of group Ag NPs, the non-significant note ( $p > 0.05$ ) in the LH corresponds to<sup>[13]</sup>.

**Figure 2: The effect of MNPs on blood serum LH in male rats.**

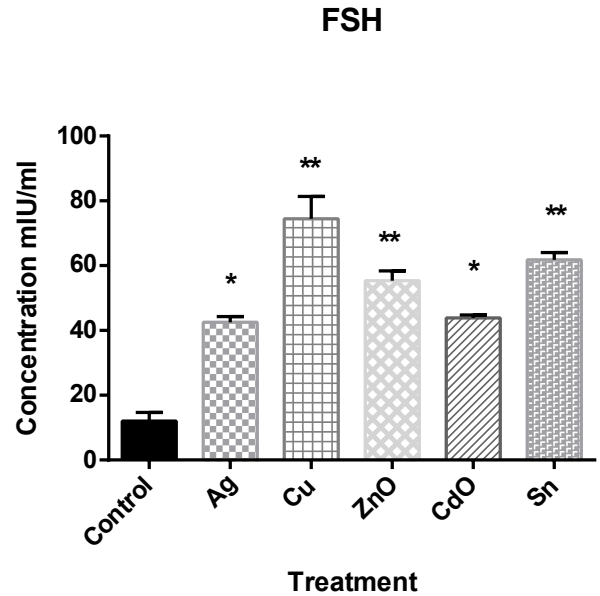


\* $p \leq 0.05$  and non-significant n.s

Figure (3) indicate that the concentration of the Serum follicular stimulating hormone (FSH) showed a significant rise (\* $p \leq 0.05$  and \*\* $p \leq 0.01$ ) in masculine rats dosed with MNPs compared to control, corresponding to.<sup>[14]</sup> This implies pituitary gland dysfunction, which can trigger reproduction of weaknesses.

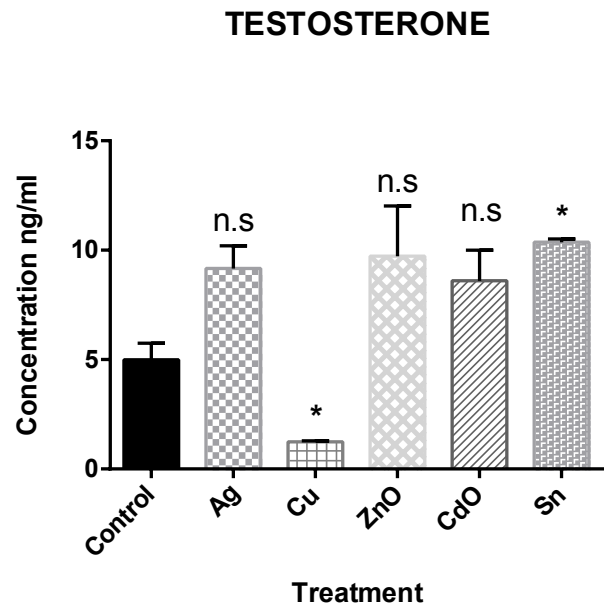
Figure (4) indicate that the level of serum testosterone hormone in male rats dosed with Ag, ZnO and CdO is non-significant ( $p > 0.05$ ) This outcome corresponds to.<sup>[14,15]</sup>for male rats dosed with Ag, ZnO and CdO as opposed to control at this dose. In Cu NPs this outcome corresponds to<sup>[16]</sup>, low testosterone concentration suggests a hypothalamic issue, adrenal disease, pituitary disease, or liver disease, indicating that copper nanoparticles can be regarded a reproductive toxicant. Sn NPs demonstrate a significant rise in the concentration of serum testosterone hormone ( $p \leq 0.05$ ) elevated testosterone concentrations may indicate enlarged testis or adrenal glands.

**Figure 3: The effect of MNPs on blood serum FSH in male rats.**



(\* $p \leq 0.05$  and \*\* $p \leq 0.01$ )

**Figure 4: The effect of MNPs on blood serum testosterone in male rats.**



\* $p \leq 0.05$  and non-significant n.s

**Conclusions**

In summary, oral administration of Ag, Cu, ZnO, CdO, and Sn NPs prepared by PLAL in 500 mJ and 500 pulses, Zn and Cd metals transformation to ZnO and CdO nanoparticles prepared by PLAL. Indicate some of

this metal (especially Cu and Sn NPs) have reproductive toxicity on male rats.

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# Association of Exclusive Breast Feeding Practice and Physical Activities in Reducing of Postpartum Maternal Weight

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## Abstract

**Context:** Weight gain experienced by pregnant women needs to be monitored to ensure the ideal body weight nutrition. It can be reduced by monitoring body weight during pregnancy and encouraging mothers to provide exclusive breast feeding and physical training after 6 weeks of postpartum care. The study was conducted in the Keputih Health Center catchment in Surabaya because coverage of high exclusive breast feeding practice. The study aimed to prove whether exclusive breast feeding is a dominant factor in naturally decreasing postpartum maternal weight. The were all mothers who had babies aged 6-7 months. That a sample of 25 mothers is obtained. Data analysis using descriptive analysis, chi-square analysis and using logistic regression analysis. The results showed that 84.6% of postpartum mothers had a weight loss of 0.5-12 kg and 11.5% had increased. There is a significant relationship between exclusive breast feeding with the decreasing of in maternal postpartum weight with a value of  $C = 0.432$  and OR 1.0, which means that mothers who give exclusive breast feeding have the opportunity to experience weight loss from mothers who give breast feeding un exclusively. And there is a weak relationship between variables of physical activity with a decrease in maternal postpartum weight with a value of  $C = 0.275$ . So the variable that has a significant relationship in postpartum maternal weight loss is exclusive breast feeding, so the importance of the postpartum mother to give exclusive breast feeding during the first 6 months is supported by high physical activity.

**Keyword:** *Weight loss, postpartum mothers, exclusive breastfeeding, physical activity, Keputih health center.*

## Introduction

Pregnancy is the reproductive stage where a pregnant woman will gain weight naturally and quickly<sup>1</sup>. According to IOM, the range of weight gain during pregnancy is 12.5-18 kg for women with a BMI <18.5 kg / m<sup>2</sup> (underweight) with an average weight gain of 0.51 kg / week, women with a BMI of 18, 5-24.9 kg / m<sup>2</sup> (normal) is 11.5-16 kg with an average weight gain of 0.42 kg / week, women with a BMI of 25-29.9 kg / m<sup>2</sup>(overweight) gain weight recommended is 7-11.5 kg

range of weight gain 5-9 kg with an average weight gain of 0.28 kg / week, for women with a BMI of  $\geq 30$  kg / m<sup>2</sup> (obese) with an average weight gain of 0, 22 kg / week. The average weight gain during pregnancy occurs in the second and third trimesters<sup>2</sup>.

Weight gain caused by the weight of the fetus reached 3 kg placenta 0.5 kg, amniotic fluid 1 kg. The normal uterine weight is 30 gr, which increases to 1 kg, besides accumulating fat such as the buttocks, breasts and others reaches 1.5 kg, the accumulation of 2 kg egg white and 1.5 kg water retention. Excessive body weight during pregnancy is a risk factor for a number of chronic diseases, such as type 2 diabetes, dyslipidemia, and cardiovascular disease and increases morbidity and mortality.

This can be a determining factor for obesity<sup>3</sup>Rio Grande do Sul, Brazil, aged 19 to 45 years, between

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weeks 38 and 42 of pregnancy. The patients were evaluated at one month, three months, and six months after delivery. Student's t-test or one-way analysis of variance (ANOVA. Research conducted by Zahabi revealed that normal weight during pregnancy can reduce the number of infant deaths, and babies born with an average body weight<sup>4</sup> each for 6 weeks and a washout period for 20 days. Subjects in the soy bread diet were asked to replace 120 grams of their daily usual bread intake with equal amount of soy bread. No significant effects of soy bread on serum lipid, systolic blood pressure and anthropometric indices were observed compared to the regular diet ( $p > 0.05$ ). The identification of this study included an increase in gestational weight, and body weight before delivery, which explained 34.5% experienced a decrease in postpartum weight by recognizing various determinants so as to reduce overweight and the emergence of diseases associated with excess weight. According to research conducted by Olson, et al, the results show that postpartum maternal weight retention is one of the causes of obesity<sup>5</sup>. This can be reduced by monitoring body weight during pregnancy and encouraging mothers to give exclusive breastfeeding and physical exercise after 6 weeks of postpartum visits.

In addition, according to a study conducted by Shobeiri et al, in Hamadan Health Centers, between physical exercise variables, pre-pregnancy weight, and exclusive breastfeeding, the most influential factor in postpartum weight loss was exclusive breastfeeding<sup>6</sup>. Decreasing postpartum maternal weight can reach 2.95 kg to 6.24 kg. Exclusive breastfeeding can reduce postpartum maternal weight because the energy released to produce breast milk is around 500-650 kcal / day. In a day of 850 cc ASI requires 750 kcal of energy while the intake of food consumed can contribute energy of 500 kcal / day so that 250 kcal is deficient. Weakness will be taken from fat reserves so that it can lose weight.

Another way to maintain energy balance is to increase energy expenditure. In theory, increasing energy expenditure in physical exercise can result in rapid weight loss. Lovelady, states that heavy exercise can increase total energy expenditure in nursing mothers<sup>7</sup>. This research was conducted in the work area of Keputih Health Center, Surabaya due to the high coverage of exclusive breastfeeding which reached 69.70% or a number of 169. This study aims to prove whether exclusive breastfeeding is a dominant factor in naturally decreasing maternal weight for 6 months postpartum or there are other factors.

## Material and Method

The type of research used is descriptive research. Descriptive research method was carried out with cross sectional approach. The study was conducted in the working area of Keputih Health Center in Sukolilo District, Surabaya City. The population in this study were all mothers who had babies aged 6-7 months and were recorded in the work area to the Keputih Health Center in Sukolilo District, Surabaya City. This study has obtained the approval and feasibility of the research from the Ethics Committee of the Faculty of Public Health, Airlangga University on April 19, 2017 No: 135-KEPK

The sampling technique in this study was total sampling. The samples taken in this study were 25 mothers. Dependent variable is a decrease in postpartum maternal weight and independent variables, namely exclusive breastfeeding, and physical activity. In addition, the data taken in this study is the general data of respondents.

The decrease in maternal weight 6 months postpartum was measured by calculating the difference in BB before giving birth minus 5 kg with maternal weight when infants aged 6/7 months<sup>8</sup>. Exclusive breastfeeding by interview with the help of exclusively categorized questionnaires, breastfeeding predominance, or not exclusive. Physical activity with interviews using the Gopal Physical Activity Questionnaire (GPAQ) Form and classified based on the MET developed by WHO consists of 16 simple questions about activities everyday which is then categorized into 3 categories: high activity, moderate activity, light activity. Identity data of respondents was conducted by interview with the help of a questionnaire. Data analysis consisted of Descriptive Analysis, Chi-Square Analysis and Logistic Regression Analysis

### Findings:

**Characteristics of Postpartum Mothers in the Work Area of Keputih Health Center:** Respondents who experienced weight loss of more than kg5kg were 10 (76.9%) of people aged 20-29 years. Respondents who gave the most exclusive breastfeeding, namely in the age range of 20-29 years, amounted to 6 respondents, while respondents with the age range of 30-40 years amounted to 5 respondents. Based on the chi-square test obtained (value  $p > 0.502 > \alpha$  value of 0.05). This means that there is no significant relationship between age and exclusive breastfeeding at Keputih Health Center.

This is in line with the research conducted by Qatrunnada, Soraya due to the influence of other factors, one of which is maternal health conditions such as nipple blisters or engorgement<sup>9</sup>. Even though the mother's age is more than 35 years and has good breastfeeding experience if the mother is breastfeeding, both exclusive breastfeeding and non-exclusive breastfeeding will continue to affect the behavior of the mother to continue giving exclusive breastfeeding or not. However this research is not in line with the research conducted by Puswati which states that there is a significant relationship between age and exclusive breastfeeding<sup>10</sup>. The findings of this study support the theory that age greatly determines maternal health related to the condition of pregnancy, childbirth, childbirth and how to care for and breastfeed her baby. Mothers less than 20 years old are still immature and not physically ready both during pregnancy and childbirth<sup>11</sup>. Different from mothers aged 20-30 years and over who have an increasingly mature mindset certainly has a variety of experiences both from themselves and from others<sup>9</sup>.

Educational level variables from 25 respondents as many as 12 high school graduating mothers, graduated from junior high school and D1 / D3 / S1 each from 4 mothers, and graduated from elementary school as many as 5 mothers. Of the 12 mothers who graduated from high school, 5 mothers gave exclusive breastfeeding, and 3 D1 / D3 / S1 graduates included exclusive breastfeeding.

Based on the chi-square test obtained (p value  $0.523 > \alpha$  value of 0.05). This means that there is no significant relationship between the level of education and exclusive breastfeeding in the work area of Keputih Health Center. The results of the study are in line with the Qatrunnada, Soraya study, this is due to the misunderstanding of breastfeeding and breastfeeding in mothers who give non-exclusive breastfeeding, even though they have gone through the level of education to college<sup>9</sup>. Informants who are less precise and accurate can be the trigger. However, this study is not in line with the research of Hikmawati which states that there is a significant relationship between the education status of mothers and exclusive breastfeeding<sup>12</sup>. Formal education plays an important role but the lack of true support and information can be an inhibiting factor for exclusive breastfeeding even though the mother has high formal education<sup>13</sup>.

Working status variables, respondents who gave the most exclusive breastfeeding were respondents

who did not work as many as 7 respondents, more than respondents who worked, only 5 respondents. Based on the chi-square test obtained (p value = 0.181 greater than the value of  $\alpha = 0.05$ ) means that there is no significant relationship between mothers who work with exclusive breastfeeding status in the work area of Keputih Health Center. This is because some mothers in the Keputih Health Center work area as housewives. The type of work a mother has is related to the daily activities of the mother. Housewives have more time to give exclusive breastfeeding to children.

**Table 1: Characteristics of Respondents**

Variable	N	%
<b>Age (years)</b>		
<20	3	12
20-29	13	52
30-39	8	32
≥40	1	4
<b>Education</b>		
Graduated from elementary school	5	20
Graduated from junior high school	4	16
Finish high school / vocational school	12	48
D1 / D3 / S1 graduate	4	16
<b>Working status</b>		
Work	11	44
Don't work	14	56
<b>Changes in postpartum weight (kg)</b>		
<b>Increase</b>		
≥ 5	0	0
<5	3	12
<b>Downhill</b>		
≥ 5	10	40
<5	12	48
<b>Giving Breast Milk</b>		
Exclusive	12	48
Predominant Breastfeeding	3	12
Not Exclusive	10	40
<b>Physical Activity</b>		
High	4	16
Is being	13	52
Low	8	32

**Relationship between Giving Breast Milk and Postpartum Maternal Weight Loss:** The results of the analysis of the relationship of breastfeeding with a decrease in maternal postpartum weight in the work area of Keputih Health Center showed a contingency coefficient value of 0.432 and the results of the OR

logistic regression showed a value of 1.0 which meant that postpartum mothers who gave exclusive breastfeeding had a risk of 1.0 times weight loss. The results of this study are in line with the research of Mahera, rifki et al., in the work area of the Tenayan Raya Pekanbaru Health Center<sup>14</sup>. After giving birth the mother will experience weight loss during pregnancy around 5-6 kg due to the expenditure of the baby, placenta, amniotic fluid and blood<sup>14</sup>. But there are some mothers who still experience weight around 1.4-2 kg. Mothers will also experience changes or weight loss between 5-11 kg due to the birth process and exclusive breastfeeding<sup>15</sup>. Mothers who give exclusive breastfeeding experience rapid weight loss due to breastfeeding mothers need a large amount of energy, which is around 250 kcal / day which will

be taken from the mother’s calorie reserves, namely fat stores during pregnancy. If for 4 months the mother is breastfeeding exclusive breastfeeding, she will lose 250 kcal x 3 x 4 = 45,000 kcal which is equivalent to 5 kg of fat<sup>14</sup>.

However, this study is not in line with findings published by “The International Breastfeeding Journal” which said, during the first 4 weeks after giving birth mothers who during breastfeeding combine breast milk with formula milk had a greater weight loss compared to mothers who gave exclusive breastfeeding<sup>16</sup>. This study shows that not all postpartum mothers who give exclusive breastfeeding experience weight loss.

**Table 2: Relationship Between Breastfeeding and Postpartum Maternal Weight Loss**

Giving Breast Milk	Weight Loss				Weight Gain		Total		Contingency Coefficient (C)	OR
	< 5 kg		≥ 5 kg		< 5 kg					
	n	%	n	%	n	%	n	%		
a. Exclusive	3	25	7	58,3	2	16,7	12	100	0,432	1,0000
b. Predominant Breastfeeding	0	0	2	67	1	33	3	100		
c. Not exclusive breastfeeding	7	70	3	30	0	0	10	100		

**Relation of Physical Activity to Postpartum Maternal Weight Loss:** The results of the analysis of the relationship between physical activity and decreased maternal weight in the work area of the Keputih

Community Health Center indicate that the correlation coefficient is 0.275 means that there is a weak relationship between physical activity and a decrease in postpartum maternal weight in the Keputih Health Center work area.

**Table 3: Relation of Physical Activity to Postpartum Maternal Weight Loss**

Physical Activity	Weight Loss				Weight Gain		Total		Contingency Coefficient (C)
	< 5 kg		≥ 5 kg		< 5 kg				
	n	%	n	%	n	%	N	%	
a. Low	3	37,5	4	50	1	12,5	8	100	0,275
b. Is Being	4	30,7	7	53,8	2	15,5	13	100	
c. High	3	75	1	35	0	0	4	100	

The results of this study are in line with the research conducted by Kinnuen, et all., (2009) if postpartum mothers engage in moderate physical activity for 30 minutes over a period of 5 days and harder physical activity for 3 times a week postpartum. In research that carried out high physical activity only amounted to 4 people according to the research conducted by Ramadhani (2012), showing that the higher the physical

activity carried out, the higher the weight loss of postpartum mothers

**Conclusion**

The characteristics of the respondents mostly had an age range of 20-29 years totaling 13 (52%), graduating from high school / vocational school amounting to 12 (48%) and 14 (56%) mothers who did not work

or housewives (IRT). There was no relationship at all between the variables of mothers breastfeeding exclusive breastfeeding with maternal age ( $p$  value  $0.502 > \alpha$  value  $0.05$ ), maternal education level ( $p$  value  $0.523 > \alpha$  value  $0.05$ ) and maternal employment status ( $p$  value  $0.181 > \alpha$  value of  $0.05$ ) in the working area of Keputih Health Center. There is a sufficient relationship between exclusive breastfeeding and a decrease in postpartum maternal weight in the work area of Keputih Health Center. Postpartum mothers who give exclusive breastfeeding are at a risk of 1.0 times losing weight from mothers who give breastfeeding non-exclusively. The variable physical activity did not have a relationship with a decrease in postpartum maternal weight in the work area of Keputih Health Center.

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# Short-term Survival of Stroke Patients According to Hemorrhagic and Ischemic Stroke Type in National Brain Center Hospital Jakarta

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## Abstract

**Background & Objectives:** Stroke is the second leading cause of death in the world. The aim of this study was to identify a short-term (30 days) survival of stroke patients according to hemorrhagic (HS) and ischemic (IS) stroke type in National Brain Center Hospital Jakarta.

**Method:** A cohort retrospective study. Acute first-ever stroke inpatients were included in this study. The sample consists of 134 HS and 134 IS and recorded in medical record from January 1 to November 30, 2018. All study patients were followed-up from diagnosis time to event (death). The Kaplan-Meier method was used to estimate the survival probability and Cox Regression to investigate the effect of variables.

**Results:** Survival at 30 days was higher for IS (91,8%) than HS (78,3%) of the first-ever stroke ( $p < 0,05$ ). Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ( $p < 0,05$ ).

**Conclusions:** Survival probability IS was higher than HS within 30 days of the first-ever stroke ( $p < 0,05$ ).

**Keywords:** *Survival, Stroke, Hemorrhagic, Ischemic.*

## Introduction

Stroke is the second leading cause of death in the world.<sup>(1)</sup> According to American Heart Association (AHA) estimates, 795.000 strokes occur in The United State and 610.000 of these are first attacks. Stroke kill nearly 130,000 people a year and on average, every 4 minutes someone dies of a stroke,<sup>(2)</sup> while in United Kingdom there are more than 100,000 strokes each year, that is around one stroke every five minutes.<sup>(3)</sup> In Asia, the highest mortality rates are observed in

Mongolia 222,6/100.000 person-years and Indonesia 193,3/100.000 person-years by the age-and sex-standardized.<sup>(4)</sup>

World Health Organization definition (WHO) of stroke: rapidly developing signs of focal (or global) disturbance of cerebral function with symptoms lasting over 24 h or leading to death with no apparent cause other than vascular.<sup>(5)</sup> Stroke can be divided into two main types; hemorrhagic (HS) and ischemic (IS). Hemorrhagic stroke occurs when a weakened blood vessel ruptures.<sup>(6)</sup> It's caused by a weakened vessel that ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surrounding brain tissue.<sup>(7)</sup> Ischemic stroke occurs when an artery to the brain is blocked. This is most often caused by atherosclerosis, or gradual cholesterol deposition. If the arteries become too narrow, blood cells may collect and form blood clots. These blood clots can block the artery

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where they are formed (thrombosis), or can dislodge and become trapped in arteries closer to the brain (embolism).<sup>(8,9)</sup>

Globally, stroke incidence according to stroke type is 15% - 30% for HS and 70% - 85% for IS. In Asia, 30% for HS and 70% for IS. HS cases are lower than IS, but HS cause death more often than IS.<sup>(9)</sup> In earlier study, found that stroke type was a dominant factor for stroke survival in 1 year. Survival probability for IS (63,7%) was higher than HS (22,9%). The risk of HS was 3 times greater than the risk of IS.<sup>(10)</sup>

National Brain Center Hospital Jakarta is a vertical hospital owned by the Ministry of Health which is one of the centers for handling stroke. Stroke incidence has increased in the last 3 years in this hospital. This study was to identify a short-term (30 days) survival of stroke patients according to hemorrhagic (HS) and ischemic (IS) stroke type in National Brain Center Hospital Jakarta. Estimate stroke survival according to stroke type is essential to understanding stroke treatment in order to achieve optimal health outcome. The intervention in

secondary prevention may improve patient’s condition to decrease mortality rate of stroke.

**Method**

This is a cohort retrospective study. All study patients were followed-up for 30 days from diagnosis time to event (death). The sample consists of 134 HS and 134 IS. Simple random sampling technique was used to select the sample. The inclusion criteria; inpatients with acute first-ever stroke that recorded in medical record from January 1 to November 30,2018. The exclusion criteria; medical records were not available or not stored in the medical records department during the study. The Kaplan-Meier method was used to estimate the survival probability and Cox Regression to investigate the effect of variables.

**Results**

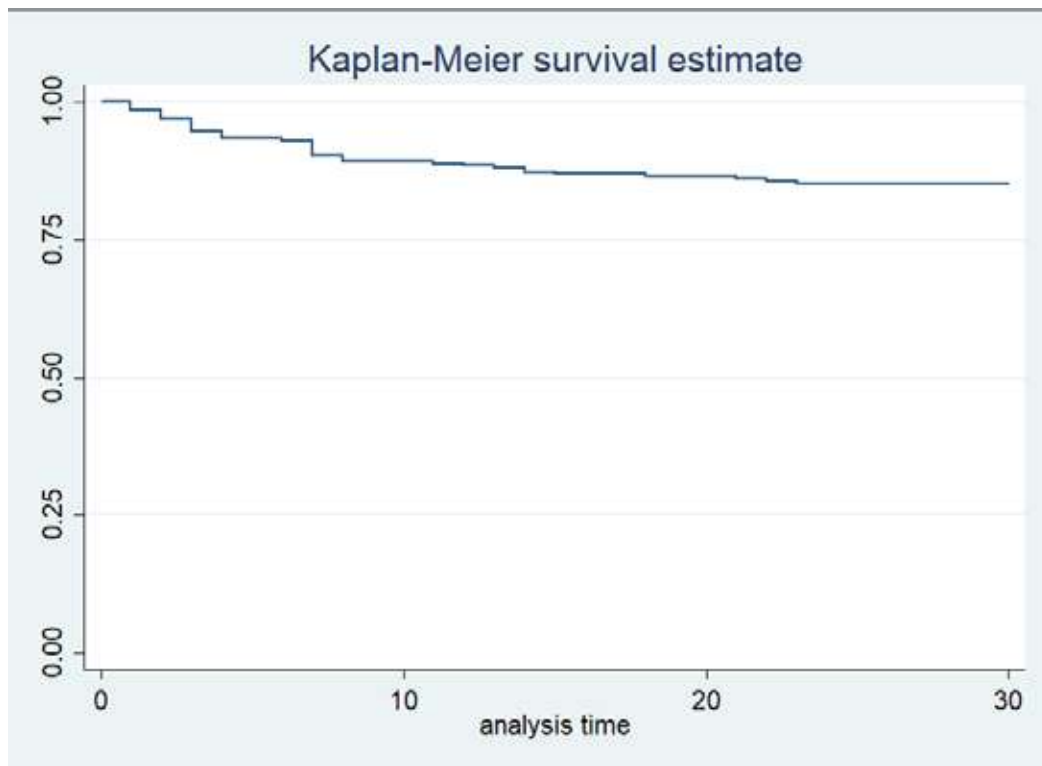
There were 268 patients included in this study. Of them, 134 were HS and 134 were IS. Table 1 shows characteristic of stroke patients;status, age, and gender.

**Table 1: Characteristics of Stroke Patients**

Variables	Total	HS	IS
No. of patients (%)	268 (100,0)	134 (50,0)	134 (50,0)
<b>Stroke patients status</b>			
Censor	229 (85,4)	106 (39,5)	123 (45,9)
Event (death)	39 (14,6)	28 (10,5)	11 (4,1)
<b>Age (years)</b>			
< 60	143 (53,4)	85 (31,7)	58 (21,7)
≥ 60	125 (46,6)	49 (18,3)	76 (28,3)
<b>Gender</b>			
Female	104 (38,8)	47 (17,5)	57 (21,3)
Male	164 (61,2)	87 (32,5)	77 (28,7)

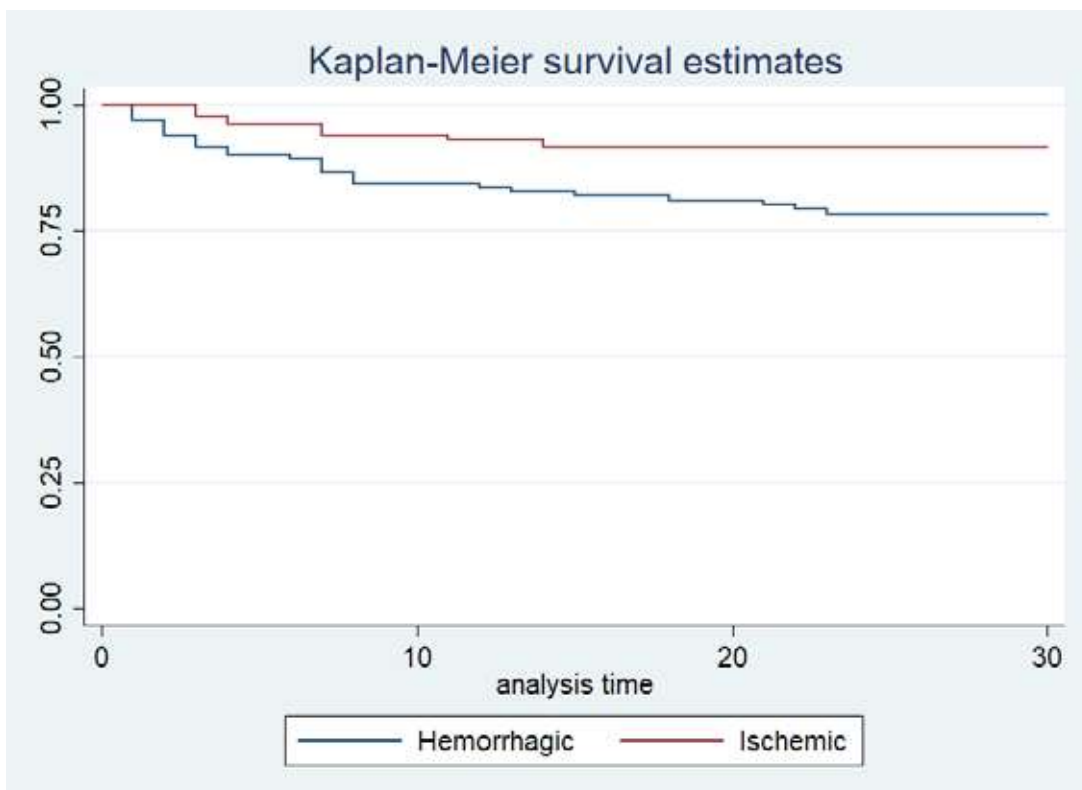
Among 268 patients, 14,6% were died for 30 days. Event (death) of HS (10,5%) was higher than IS (4,1%). The mean age of patients was 37 years old for HS and 57 years old for IS. The age of HS patients were higher

at < 60 years old, while IS patients were higher at ≥ 60 years old. Male (61,2%) was higher than female (38,8%) in this study.



**Figure 1: Cumulative Survival Probability**

The Kaplan-Meier method was used to estimate the survival probability within 30 days of the first-ever stroke. (Figure 1.) shows cumulative survival probability curve of stroke patients. Among 268 patients, 98,5% survived for 1 day, 90,3% survived for 1 week, and 85,1% survived for 1 month.



**Figure 2: Survival Probability according to HS and IS**

Survival at 30 days was higher for IS than HS of the first-ever stroke ( $p < 0,05$ ). (Figure 2.) shows survival probability curve according to HS and IS. Among 134 HS patients, 97,0% survived for 1 day, 86,6% survived for 1 week, and 78,3% survived for 1 month. While, among 134 IS patients, 100,0% survived for 1 day, 94,0% survived for 1 week, and 91,8% survived for 1 month.

Overall mean survival time of patients stroke were 25 days. Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ( $p < 0,05$ ).

## Discussion

We identified 268 inpatients with acute first-ever stroke from January 1 to November 30, 2018. Of those, 134 were HS and 134 were IS. The mean age of patients was 37 years old for HS and 57 years old for IS. The age of HS patients were higher at  $< 60$  years old, while IS patients were higher at  $\geq 60$  years old. This suggests that HS may occur more often among younger people as reported in other studies.<sup>(11,16,17)</sup> Male (61,2%) was higher than female (38,8%) in this study.

In our study, 39 patients (14,6%) died in 30 days. The Kaplan-Meier estimates the cumulative survival probability within 30 days were 98,5% survived for 1 day, 90,3% survived for 1 week, and 85,1% survived for 1 month. Event (death) of HS (10,5%) was higher than IS (4,1%). In previous studies, Butsing et al. found that 26% of stroke patients died within 30 days<sup>(11)</sup> and also study in Australia, found about 24% patients died in 28 days after stroke.<sup>(10,14)</sup>

The number of HS cases are lower than IS, but HS cause death more often than IS.<sup>(9)</sup> In earlier study, found that stroke type was a dominant factor for stroke survival.<sup>(10)</sup> Our findings on Kaplan Meier analysis showed, the short-term survival probability was higher among IS than HS patients. All IS patients survived for 1 day, while HS patients had decreased survival (97,0%). For 1 month, 91,8% survived for IS, while 78,3% for HS. Consistent with other studies, Butsing et al. revealed the short-term survival probability for HS was shorter than for IS within 30 days of the first stroke.<sup>(11)</sup> Study by Lee et al. found that survival among patients admitted to hospital for HS was lower than among patients hospitalised for IS and TIA in the first 28 days after the index stroke.<sup>(12)</sup>

The Perth Community Stroke Study similarly observed higher 30-day case fatalities for HS than for IS.<sup>(12,13)</sup> Study in Japan, showed the 30-day case fatality rate was substantially greater in patients with cerebral hemorrhage (63.3%) or subarachnoid hemorrhage (58.6%) than in patients with cerebral infarction (9.0%).<sup>(15)</sup>

Those who suffer IS have a much better chance for survival than those who experience HS, as HS not only damages brain cells but also may lead to increased pressure on the brain or spasms in the blood vessels.<sup>(18,19)</sup> We found that overall survival time of patients stroke were 25 days. Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ( $p < 0,05$ ). Similar to another study by Mulyani et al. the risk HS was 3 times greater than the risk of IS.<sup>(10)</sup>

There are limitations to our study. First, we have not identified risk factors for death. Second, we couldn't do long-term follow-up because the patient's identity is confidential, so we couldn't call patients by phone to find out their status after discharged from the hospital.

## Conclusions

Survival at 30 days was higher for IS than HS of the first-ever stroke ( $p < 0,05$ ). Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS is (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ( $p < 0,05$ ).

**Ethical Considerations:** This study was approved by the National Brain Center Hospital Jakarta Ethics Committee (No: UM.01.05/12/004/2019) and Faculty of Public Health Universitas Indonesia Ethics Committee (No.443/UN2.F.10/PPM.00.02/2019).

**Competing Interests:** The authors declared that no competing interests exist.

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# Factors Affecting Nurse Performance in Medical Ward

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## Abstract

**Context:** Nurses are the world's fastest-growing professions. The number of registered nurses increases every year. Nurse performance becomes the determinant of a hospital's accountability. Factors affecting performance were divided based on their perspectives: individual differences, situational, and regulation. This research was analytic descriptive study with cross-sectional approach. The study was conducted in dr. H. Andi Abdurrahman Noor General Hospital, Indonesia from September to October 2017. The sample consisted of 24 nurses in the medical ward. An open-ended structured questionnaire was used as an instrument of data collection. Design the questionnaire based on observations of the literature that has been presented. Data were analyzed using a cumulative percentage system and presented in tables. Some respondents were dissatisfied with his personal appearance. This was influenced by eleven factors, with the most important factors were overwork, lack of facilities, and inability to control stress. From a situational perspective, some factors affecting nurse performance were workload (83.3%), facilities (66.7%), cooperation (29.1%), and work environment (12.5%). Supervision (45.8), salaries (37.5%), service fee (45.8%), and rewards (12.5%) were grouped according to the regulation perspective. While the ability (54.1%), skills (12.5%), and motivation (8.3%) had an individual impact.

**Keywords:** Factor, hospital management, nurse, performance.

## Introduction

Nurses are the world's fastest-growing professions. The number of registered nurses increases every year. In 2003, there were 2,449,000s and became 2,888,000s in 2014 (18 percent increase).<sup>1</sup> In Indonesia, nurses are the largest health professions (compared to general practitioners, specialists, midwives, pharmacists and dentists) with 296,876 members (49%) in 2016. The national nurses ratio is 113.40 per 100,000 population

in the same year, which is far from the target of 180 per 100,000 population in 2009.<sup>2</sup> In these circumstances, the nurses - who is the first line in health care - is required to always do the best. So the assumption that the nurses are an important factor in determining the accountability of the hospital is not wrong.

Nurse performance in patient care is influenced by various factors. Study by Adatara et al (2016) found that optimal nursing performance was influenced by ability, mutualism, motivation, professionalism, clear assignment and target, availability of equipment, and functional feedback systems.<sup>3</sup> While based on Yaghoubi et al study (2013) was found that the nurse performance correlated significantly with work environment, legality of work, continuous work evaluation, incentives, assistance from management to achieve work goals, clarity of main tasks and functions, and individual capability.<sup>4</sup>

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Previous study was conducted by Kamati et al (2014) at a national referral hospital in Namibia. The study was conducted on 48 nurses from a 284 total population, using a questionnaire. The results showed that there was negative correlation between the nurses performance with short working mad, bad feedback, low remuneration, poor work environment, and poor training. Limitations in this study were the absence of control that elements and the results were done in one hospital due to lack of resources.<sup>5</sup>

The large number of factors that affecting nurse performance as employees makes Sonnentag and Frese divide them into three parts according to their perspectives: individual differences, situational, and regulation.<sup>6</sup>

**Individual Differences Perspective:** Many studies illustrate how individual differences perspective affects to their performance. To get a well-performing of nurses, the hospital must select individuals based on their abilities, work experience, and motivation and personality.<sup>3,5,6</sup>

**Situational Perspective:** This perspective refers to environmental factors that could support the improvement of nurse performance. The most basic question in this perspective: *“In what situations could the individual perform the best performance?”* Some factors in this perspective are job characteristics, capabilities/circumstances that allow for stress control, and forced situations.<sup>4,5,6</sup>

**Regulation Perspective:** This perspective focuses on performance processes and concepts as a result of work. The most important question in this perspective: *“How is performance generated?”* And *“What happens when a person works?”* This regulation could be either financial or non-financial (feedback, social reward) interventions.<sup>3,4,5,6</sup>

Despite the numerous studies conducted, in its development, nurse performance remains an important point in hospital marketing. Therefore, strengthening the theory about the factors that affecting nurse performance should continue to be done, as an effort to improve service to patients and build a good hospital image.

**Material and Method**

This research was analytical descriptive study with cross-sectional approach. The place this study was dr.

H. Andi Abdurrahman Noor General Hospital, located in Tanah Bumbu District, South Borneo Province, Indonesia. Data is collected between September and October 2017. The population of this study was all nurses who numbered 165 people. Form total population, there were 24 samples of nurses who served in medical ward.

An open-ended structured questionnaire was used as an instrument of data collection. Design the questionnaire based on observations of the literature that has been presented. Open-ended questions allow respondents to be spontaneous in conveying and focusing opinions in their own words. Respondents were asked questions about the factors that according to their perspectives had the highest effect on nurse performance in the first order, to the last sequence they thought had the least influence.

Data were analyzed using a cumulative percentage system. Demographic characteristics, performance satisfaction levels, and factors that impact the nurses performance were analyzed with descriptive statistics and presented in tables.

**Results**

Respondents consisted of 54.2% of female, with 16 respondents aged between 21-30 years, one respondent aged between 41-50 years, and the rest in middle age. More than half of the respondents had a diploma in nursing. More than 70% of respondents are non-permanent employees/contracts with varying work experiences, dominantly respondents worked less than four years as a nurse in this hospital.

Based on personal assessment of respondents, 66.7% were satisfied with his personal appearance. Most respondents felt that they had made the best effort to serve patients even though the equipment available at the hospital was not yet complete. While the rest felt not able to perform maximum service to patients (see Table 1).

**Table 1: Level of satisfaction with personal performance**

Level of Satisfaction	Frequency	Percent
Not Satisfied	8	33.3
Satisfied	16	66.7

Factors affecting nurse performance were ranked from the most-mentioned to the least. The most frequently mentioned factor in this case was the excessive workload (83.3% of the total respondents). This was influenced by

the ratio between the nurses and the bed in medical ward (only about 1:12) and the documentation on the medical record which time-consuming for the nurses. Lack of facilities became the second largest factor (66.7%). The facilities include medical and non-medical equipment, such as diagnostic equipment, emergency equipment and personal protective equipment. The inability to control stress in the workplace is the third largest factor (54.2%). This stress was mainly due to pressure from supervisors and leaders (see **Table 2**).

**Table 2: Factors that result in poor of nurse performance**

Factors	Frequency	Rank
Excessive workload	20	1 <sup>st</sup>
Lack of facilities	16	2 <sup>nd</sup>
Inability to control stress	13	3 <sup>rd</sup>
Lack of supervision	11	4 <sup>th</sup>
Non-compliance of service fee with workload	11	5 <sup>th</sup>
Salary incompatibility with minimum wage	9	6 <sup>th</sup>
Poor cooperation between different profession of employees	7	7 <sup>th</sup>
Lack of non-financial rewards	3	8 <sup>th</sup>
Inconvenience work environment	3	9 <sup>th</sup>
Unavailability of continuing education	3	10 <sup>th</sup>
Status as a non-permanent employee/ contract	2	11 <sup>th</sup>

### Discussion

One that affects the workload of the nurses was the ratio between the patient and the nurses. According to the California Nurse Association (CNA), the number of patients supervised by the nurses varies according to the work unit, but does not exceed six patients.<sup>7</sup> While, at the hospital where the research was conducted, the fact was still far from the ideal situation, where the average ratio was only 1:12. Document overload also results in excessive workload of nurses. When viewed from the Hospital Accreditation Standard of Indonesia 2012, there were still many overlapping forms on the medical record so that the time to complete the document becomes longer.<sup>8</sup> This will impact on shorter nursing services and lead to limited nurse-patient interactions. In 2015, Muhammadi et al studied the factors that affecting nurse performance who work in intensive care unit (ICU). There were many things that cause poor of the nurse performance, including difficulty sitting down to work on documentation, unfriendly workplaces, poor

workplace settings and inventory space, poor equipment conditions, drug delays, unpredictable situations, and poor cooperation.<sup>9</sup>

Inadequate facilities were the second most mentioned factor. This was in accordance with study conducted by Adatara et al (2016) who found that the availability of equipment affects the poor performance of 28% of respondents.<sup>4</sup> While stress and ability to control it is the third largest factor affecting the nurses performance. Simanjorang et al (2015) found a significant relationship between job stress and the nurses performance.<sup>10</sup> It was also found in this study, in which the ability to control stress has been mentioned by more than half the number of respondents.

Other studies had also shown that organizational factors, interpersonal cooperation, nurses cooperation with other professions, and relationships with leaders or supervision had an impact on the nurses performance. Good relationships and regular supervisory supervision with various parties in the workplace will improve nurses ability and motivation to perform their duties better.<sup>11,12,13</sup> Despite other influencing factors such as motivation, salary in accordance with regional minimum wages, and non-financial rewards. This was in accordance with James et al (2015) study, in which financial and non-financial rewards had a positive impact on the performance of health workers. Non-financial rewards can be promoted or candidates for specialized training.<sup>14</sup>

The work environment was also an important factor, although it was ranked ninth from eleven factors that affecting nurse performance.<sup>15</sup> While, the least-mentioned factor was the employment status. There was no evidence-base showing the relationship between employment status and nurse performance, but it was assumed that the status of government employees has higher income than contract workers, with the same workload. This clearly impacts financially for the nurses.

### Conclusion

From this research, there were eleven factors that influence nurse performance. If grouped according to Sonnentag and Frese theories, then the situational perspective had a great impact on nurse performance, followed by individual differences and regulation perspectives. Factors of the situational perspective in this study were the workload (83.3%), facilities (66.7%), cooperation (29.1%), and work environment (12.5%).



Supervision (45.8), salaries (37.5%), service fee (45.8%), and rewards (12.5%) were grouped according to the regulation perspective. While the ability (54.1%), skills (12.5%), and motivation (8.3%) have an individual impact. It was important to know by the hospital management, because if they improve the nurses performance means simultaneously they also improve the image of the hospital in a community perspective.

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**Ethical Clearance:** In this study we followed the guidelines from the Committee of Ethics, Indonesian School of Economics, Banjarmasin. The informed consent included the research title, purpose, participants's right, confidentiality and signature.

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# Maternal Death Model Decreases the Expression of BDNF in *Rattus Norvegicus* Newborns' Cerebrum and Cerebellum

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## Abstract

**Context:** Maternal death occurred in pregnancy period up to 42 days after giving birth. Maternal death could cause early life stress in newborns which activated HPA axis and glucocorticoid secretion as stress hormone marker. The developing brain was very sensitive to the initial exposure to stressors that would affect the Brain Derived Neurotrophic Factor (BDNF) expression, which was one of the most important endogenous mediators of stress responses in the brain. This study aimed to analyze BDNF expression in the cerebrum and cerebellum of *Rattus norvegicus* newborn with maternal death model. The control group (K1) consisted of newborns *Rattus norvegicus* which were not separated from the mother until 3 days old and the treatment group (K2) is maternal death model consisted of newborns *Rattus norvegicus* which were separated immediately from the mother after birth until 3 days old and fed with animal milk as a substitute nutrient. After 3 days treatments, 3 newborns with heaviest, medium, and lowest weights were taken from each mother to sacrifice. The BDNF expression examination was carried out on cerebrum and cerebellum by immunohistochemical method. The results showed that the mean BDNF expression in the cerebrum and cerebellum of 3 days old *Rattus norvegicus* with maternal death model which separated from the mother were lower than the mean BDNF expression of control group though there were no significant difference based on statistical analysis.

**Keywords:** *BDNF expression, separation from mother, maternal death model*

## Introduction

Maternal death is the death of a woman during pregnancy, childbirth, or within 42 days after the end of pregnancy. Maternal death did not depend on the length and location of the pregnancy. This death could be caused by anything related to pregnancy, childbirth, or medical handling. Maternal and infant death rates were a benchmark in assessing the health status of a country.<sup>17,27</sup>

Maternal death could affect the children's survival, especially in the first 1,000 days of life for children. The main impact of maternal death was the direct loss of the relationship between the mother and the newborn baby, causing by the absence of bonding and attachment between mother and baby and the immediate cessation of breast milk intake. Mothers also played an important role in giving and responding to communicative signals from babies after birth. The absence of bonding and attachment was one of the causes of neonatal stress. Neonatal stress is an early life stress occurred in neonatal period (birth to 1 month).<sup>1,10</sup>

In early life, babies were prone to experiencing pain and stress. When a baby faced a particular stressor, the hypothalamic-pituitary-adrenal axis would

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be activated and the paraventricular hypothalamus secretes Corticotropin-releasing hormone (CRH) which then stimulated the secretion of Adrenocorticotropic hormone (ACTH) by the pituitary gland. This hormone would induce the adrenal gland cortex to secrete glucocorticoids (GC), namely cortisol, which was considered a stress indicator hormone. Neonatal stress in newborns was associated with cortisol hormone responses and baby behavior. Neonatal stress caused glucocorticoid increasing which could had an impact on the baby's brain development. In addition, the socio-emotional stress reactivity during the early period of neonatal life would affected the brain development.<sup>10,11</sup>

The part of the brain that had cognitive function was the cerebral cortex, but recent research showed that the cerebellum contained more neurons than the cerebral cortex that allowed it to be involved in cognitive function.<sup>2</sup> The cerebrum and cerebellum were interconnected through polysynaptics and form a system associated with cognitive function and interference neuropsychiatry.<sup>7</sup>

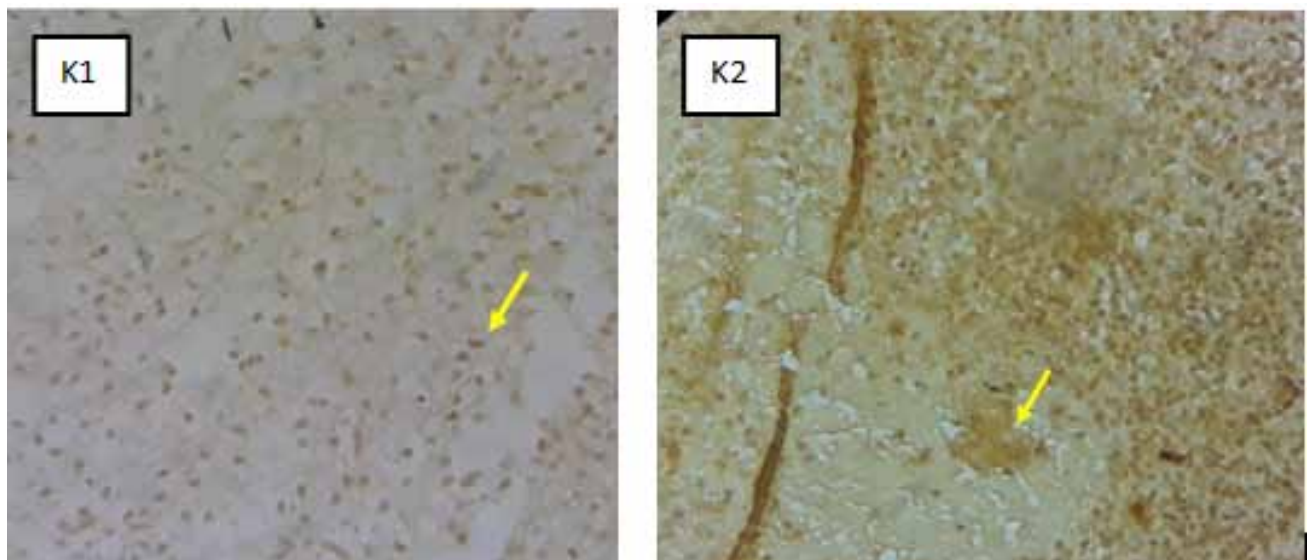
Brain Derived Neurotrophic Factor (BDNF) is a neurotrophic factor that played an important role in brain development because of its ability to protect brain cells from various pathological conditions. BDNF also

functioned to maintain neuron survival and regulate synaptic plasticity by increasing the number of dendritic spines and synapse formation. This molecular mechanism underlies cognitive function and brain development which was influenced by BDNF regulation.<sup>14</sup> BDNF was also one of the most important endogenous mediators of stress response in the brain. The developing brain was very sensitive to the initial exposure to stressors which would also affected BDNF expression.<sup>9</sup> Based on this background, this study was conducted to analyze the differences in BDNF expression in the cerebrum and cerebellum of 3 days old *Rattus norvegicus* newborns with maternal death model.

## Material and Method

This research was true laboratory experimental with randomized post-test only control group design. The 3-day-old *Rattus norvegicus* as sample unit. Female rats were pregnant through the superovulation technique by giving a 10 IU injection of the hormone Pregnant mare serum gonadotropin (PMSG). After 48 hours, they were given 10 IU injection of HCG hormone and later continued to monomating. Pregnant rat diagnosis was seen at 17 hours after mating with the presence of a vaginal plug.<sup>26</sup> The pregnant rats were cared until aterm and gave birth naturally.

### Findings:



**Figure 1. BDNF expression in the 3 days old *Rattus norvegicus* cerebrum between control group and treatment group. BDNF expression represented by brown color chromogen. Yellow arrow indicated the area was the maximum expression. (Immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera)**

Experimental animal samples were divided randomly into 2 groups, namely the control group (K1) consisting of newborn rats which were not separated from the mother until 3 days old and the treatment group (K2) is maternal death model consisting of newborn rats which were separated from the mother immediately after birth until 3 days old and fed with animal milk as a substitute nutrient. After 3 days treatments, 3 newborns with the heaviest, medium, and lowest weights were taken from each mother to be sacrificed and the head decapitation was performed. The head part was separated and then put into 10% formalin. Imonohistochemical examination of BDNF expression was carried out on histochemical cerebrum and cerebellum preparations.

**Table 1: Mean and standard deviation of BDNF expression cerebrum**

Group	n	BDNF Expression (IRS)
		Mean ± Standard Deviation
K1	18	2.96 ± 1.36
K2	18	2.34 ± 1.02

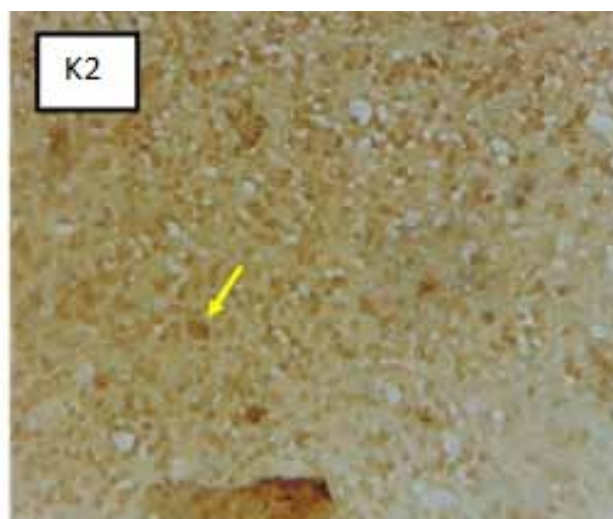
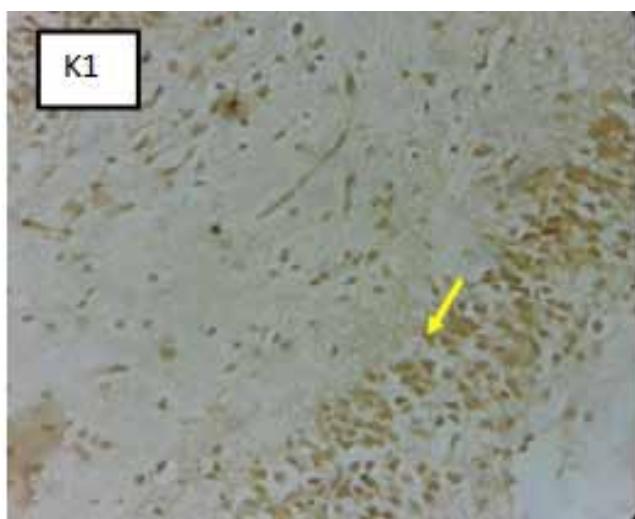
**Table 2: Analysis of BDNF expression cerebrum**

Group		p Value	Differences test Analysis
K1	K2	0.348*	Mann Whitney

**Information:** K1= Newborns **not separated** from the mother until 3 days (control group)

K2 = Newborns **separated** from the mother until 3 days (treatment group)

\*Significantly different p <0.05



**Figure 2. BDNF expression in the 3 days old Rattus norvegicus cerebellum between control group and treatment group. BDNF expression represented by brown color chromogen. Yellow arrow indicated the maximum expression area (immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera)**

**Table 3: Mean and standard deviation of BDNF expression cerebellum**

Group	n	BDNF Expression (IRS)
		Mean ± Standard Deviation
K1	18	3.06 ± 1.48
K2	18	2.39 ± 1.01

**Table 4: Analysis of BDNF expression cerebellum**

Group		p Value	Differences Test Analysis
K1	K2	0.392*	Mann Whitney

The results showed that BDNF expression mean in cerebrum of treatment group was lower than control group (Table 1) and by Mann Whitney test result showed

that not significant differences in the BDNF expression in cerebrum between control group and treatment group with a p value = 0.348 (significantly different need p value <0.05) (Table 2) which mean that the decrease of BDNF expression were not happened drastically based on statistical analysis. Similar results also showed in cerebellum that the BDNF expression mean of treatment group was lower than control group (Table 3) with no significant different (p value = 0.392) (Table 4).

## Discussion

In this research, the maternal death model was carried out by separation of newborns from the mother from day 0 to day 3. The full separation immediately after birth and examination of BDNF cerebrum and cerebellum expression of 3 days old newborn had never been done before. The separation treatment from day 0 to day 3 early in newborn rats would be the same as the human baby separation immediately after birth from the mother for approximately 1 month. This was included in the criteria for maternal death (42 days after birth).

This research showed that BDNF expression mean of 3 days old *Rattus norvegicus* cerebrum and cerebellum with maternal death model was lower than control group (Table 1; Table 3). The decrease of BDNF expression could caused by several things.

In early life, babies were prone to experiencing pain and stress. Research by Shi *et al* (2010) states that chronic stress could reduce mRNA expression and BDNF protein expression in hippocampus. The study by Calabrese *et al* (2015) also showed that the separation of rat's pups from the mother in the postnatal day 2 to day 14 had reduced BDNF expression in the ventral hippocampus and ventromedial prefrontal cortex. However, the separation in the study was only carried out 3 hours every day then returned to the mother after the treatment. In another study, Binggio *et al* (2014) showed that a decrease in BDNF expression occurred in the postnatal separation from the 3rd to the 15th day postnatal.<sup>4,8,22</sup>

Brain-Derived Neurotrophic Factor (BDNF) was a protein that played an important role in the development, maintenance, and synaptic plasticity.<sup>16</sup> This protein was expressed in the brain, which included the frontal cortex, parietal, cingulatus, temporal, retrospenial, prirhinal, hippocampal, entorhinal cortex, brain stem, cerebrum, and cerebellum. Each area in the brain had different BDNF concentrations.<sup>5</sup> The BDNF gene expression

in the brain was influenced by many stimuli, both in physiological and pathological conditions. BDNF regulation was influenced by activation of NMDA receptors (NMDAR), calcium influx ( $Ca^{2+}$ ), and through activation of CREB.<sup>10</sup> BDNF was one of the most important endogenous mediators of stress response in the human and mammalian brains. The developing brain was very sensitive to the initial exposure to stressors, especially because of the reprogramming number of stress-sensitive gene pathways.<sup>9</sup>

Stressor at early of life would cause glucocorticoid to increase. Glucocorticoid played an important role in the BDNF regulation. Glucocorticoid decreased the activity of activator protein-1 (AP-1) and CREB needed in transcription of BDNF genes, influenced the cascade of BDNF signals via TrkB and p75NTR receptors, decreases the infusion of  $Ca^{2+}$  ions in postsynapsed membranes, inhibits trkB-mediated signal cascades, and decreases expression phospho-TrkB (pTrkB), and influence the PLC- $\gamma$  signal cascade regulation by BDNF and inhibit the PI3K-Akt pathway.<sup>23,24</sup>

With the BDNF presence, the TrkB receptor homodimerizes and initiates several signaling pathways and would support neuron survival, growth, and differentiation. Glucocorticoid(GC) passed through the plasma membrane and entered the cytosol to bind to glucocorticoid receptor (GR), and induces homodimerization (GR-GC complex). The GR-GC complex would target BDNF promoters. Increased glucocorticoid levels caused relocation of nucleus CREB regulated transcription coactivator 2 (CRTC2) to the cytosol. This could decreased the transcription activity of CREB which would caused a decrease in BDNF expression.<sup>12</sup>

In addition, regulation of BDNF expression by glucocorticoid was also related to DNA methylation and histone modification. BDNF transcripts containing exons I, II, IV, and VI were mostly expressed in transcript neurons so that they display different subcellular localization and could showed that protein was translated by different efficiency in soma or dendritic which would produce local effects. Decreasing BDNF expression was also often associated with increased DNA methylation in BDNF promoters. DNA methylation was one of the contributing factors to long-term epigenetic reprogramming and gene activity in the developing brain. Methylation of BDNF genes was often considered a key mechanism of early life stress and influenced brain

function.<sup>13,25</sup> Research by Roth *et al* (2009) and Blaze *et al* (2013) showed that early life stress in children caused changes in DNA methylation in BDNF accompanied by reduced expression in BDNF.<sup>6,18</sup>

Stress also could caused the glucocorticoid receptor translocation from the cytoplasm to the nucleus that would result in the imbalance of mitochondria and the production of NADPH oxidase (NOX). Some stress signaling pathways would follow NOX stimulation and would led to cell damage and lower BDNF expression.<sup>19</sup>

Changes in BDNF expression indicated a dependence on the time period, that was on direct or long-term effects, acute or chronic. A recent analysis of hippocampal transcriptomics showed that the stress effects on children on BDNF expression were very dependent on age and could vary over the lifetime.<sup>25</sup>

The mean BDNF expression of cerebrum and cerebellum with maternal death model were lower than control group but there were no significant different. Acute stress could increased BDNF level but with longer stress exposure it would led to chronic stress that decreased BDNF level.<sup>21</sup> The 3 days separation and the decrease of BDNF in this research showed chronic stress but the decreasing of BDNF not significant might be caused by chronic stress that not happened in long period and not severe.

### Conclusion

The results showed that the mean BDNF expression of 3 days old *Rattus norvegicus* cerebrum and cerebellum with maternal death model which newborns separated from the mother after birth until 3 days were lower than control group which not separated from the mother though there were no significant different.

**Ethical Clearance:** This study had obtained an ethical feasibility permit based from Research Ethics Commission of the Faculty of Veterinary Medicine, Airlangga University.

**Source of Funding:** This study was self funding by authors.

**Conflict of Interest:** There was no conflict of interest in this study.

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# Is it a Common Oral Lichen Planus or a Part of Grinspan's Syndrome?

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## Abstract

**Introduction:** Grinspan's syndrome has triad of clinical symptoms: Oral Lichen Planus (OLP), diabetes mellitus, and hypertension. OLP is a disorder commonly found in oral mucosa. The symptoms and clinical features are often misdiagnosed which potentially harm the patients.

**Discussion:** A 74-year-old female had chief complaint of ulcers on the lower lip for 2 years. She had history of diabetes mellitus and hypertension for years. Previously, she went to dentist with an alleged herpes simplex virus infection and was treated with antiviral for a week but no improvement. The patient is diagnosed with erosive type OLP. Exploration was necessary to find out whether it was OLP or part of Grinspan Syndrome.

**Conclusion:** The diagnosis was Grinspan's Syndrome. Dentists must be familiar with medical management of hypertension and diabetes mellitus to take a role in the diagnosis and treatment of oral lesion with both of diseases in order to maintain optimum health.

**Keywords:** Grinspan's syndrome, oral lichen planus, diabetes mellitus, hypertension.

## Introduction

Lichen Planus (LP) is a mucocutaneous disorder present in the chronic squamous epithelium that may affect the mucosal, genital, and skin, including scalp and nails. Oral Lichen Planus (OLP) is the most commonly found oral disease and often found in the buccal mucosa, tongue, palate, mole, gingiva, and lips. The clinical features of OLP have one or more of six classical appearances: reticular, erosive, atrophic, plaque, papulla, bullous. The erosive form has a symptom relation ranging from mild discomfort to pain or burning sensation, especially when consuming hot or spicy foods.<sup>1-3</sup> The diagnosis of

OLP is obtained from clinical examination and mucosal biopsy of the oral cavity if there is no doubt of a clinical diagnosis. The criteria used for histological diagnosis are abnormal keratinization, the presence of stratum granulosum, basal cell degeneration, and inflammatory cell infiltration, such as ribbons dominated by lymphocyte cells, which are present in connective tissue.<sup>4-9</sup> Grinspan et al found an interesting association between OLP and diabetes mellitus (DM) and vascular hypertension which is then called Grinspan Syndrome.<sup>10-12</sup> This case report is unique because presenting rare case of Grinspan's Syndrome, especially in geriatric.

**Case History:** A 74-year-old female came with chief complaint of ulcers on lower lip for 2 years. History of fever was denied. A couple months ago patients went to Mecca to perform the pilgrimage. While being there, she could not eat regularly and drink enough. Ulcers on the lips progressively worsened until a week ago when she came to hospital. In the previous treatment, the patient's complaint was diagnosed from herpes simplex

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virus infection. She had taken acyclovir for 2 weeks. Her lower lips feel drier, sometimes the brown liquid would come out from the wound. Communication with the patient was constrained by age, she had a limited hearing and memory disorientation. She also suffered from diabetes mellitus and hypertension for years. Blood pressure was 150/90 mmHg and she claimed for taking antihypertensive medication, such as 5 mg Amlodipine twice daily. The patient's blood glucose was above 300mg/dl, and she took Metformin twice daily before and Glimperide after eating. Even though she regularly consumed drugs for hypertension and diabetes mellitus, blood pressure and blood sugar levels remained above normal. The patient used removable dentures in the upper and lower jaws for 5 years. Since the ulcers on her lips appeared, she felt uncomfortable using her dentures. She had less appetite and sleepless nights. On extra-oral examination, the lower lip border of the vermilion contained brown crust surrounded by erosive areas with white striae. On intraoral examination, there was atrophy and fissure in the dorsal portion of the tongue and all the teeth in the upper and lower jaws have disappeared. Laboratory results of blood tests obtained a rate of sedimentation of blood above the reference value and hemoglobin at the lower limit of the reference value. The possibility was iron deficiency anemia. From the results of clinical examination, the diagnosis of work suspected Lichen Planus Oral erosion type with systemic factors diabetes mellitus and hypertension was found. This case was about the Grinspan's Syndrome.

Management for erosive-type OLPs is by using topical corticosteroids on the red lip margin and the use of triamcinolone acetinoid cream ointment 4 times daily on thin lips. Patients were administered with an iron-deficiency anemia by taking multivitamins containing folic acid and ferrous fumarate twice daily for 2 weeks and supportive therapy using Zinc, B, and E once daily. Communication, instruction, and education were emphasized in patients to consume foods high in iron, such as red meat, red beans, red fruits, such as beet, and vegetables. She was also advised to replace her dentures.

After a week of treatment, the patient came back for visit. Patients felt several improvements, especially on the bottom lip. After extra-oral examination, the wound and crust on the lower lip were healed with marked thin red areas on the lower lip, better hygiene of the mouth, and comfort in the mouth was increasing. She used triamcinolone acetinoid cream ointment on her lower lip according to the doctor's instructions, and she felt

the lower lip was softer. She took vitamins according to each dose before breakfast and dinner. She continued to take diabetes and hypertension drugs according to the dose. In general, she felt better than last week and more comfortable when eating.



a



b

**Figure 1. Lesions on the lower lip: (a) Before treatment: there was white erosive area and stria on the lower lip with a brown crusted coating; (b) After treatment: the erythema area of the lower lip, crust and erosion disappeared and the white striae fades.**



a



**b**



**a**

Figure 2. Patient uses removable dentures: (a) Before treatment: erosive areas bordered red lips and lower labial mucosa; (b) After treatment: erythema of the lower lip was still out of the blood point.



**b**

Figure 4. Lateral of the right tongue (a) Before treatment: atrophic papilla tongue and erosive area surrounded by a thin white layer (b) After treatment: erosive area disappeared.



**a**



**b**

Figure 3. Dorsum of the tongue has papillary atrophy and tongue fissure (a) Before treatment: erosive area of the posterior dorsum of the tongue; (b) After treatment: erosive area narrowly oval shaped surrounded by white edges.



Figure 5. Denture hygiene was full of poor release.



**Figure 6. Extraoral and fingernails after two weeks of treatment.**

### Discussion

Lichen planus is common in patients over 50, and more in women than men. With changes in daily diet, patients with OLP consumed too few fresh vegetables and fruits. Stress and emotions can be considered as contributing factors, especially in the exacerbation phase of OLP.<sup>5,13-16</sup>

Patients with OLP lesions and using drugs related to reactions in the oral mucosa are also a possible implication of the drugs. The patients will experience symptoms described as Grinspan's Syndrome with a wide variety of drugs which now is known as oral

lichenoid reactions. The clinical picture will look like a phenomenon of drug reactions and is no longer referred to Grinspan's Syndrome.<sup>10</sup> Clinical manifestations of OLP and medical history suggest that drug consumption may lead to lichenoid changes. It is important to note that the lichenoid response appears as an agent response that amplifies the presence of drug-induced abnormalities rather than the induction of a disease. Clinical response to OLP management is done such as by removing suspected drugs in amplifying OLP or by using topical steroids in OLP lesions.<sup>6,17-20</sup> The main goal of OLP therapy is to reduce the symptoms of pain, remove oral lesions, reduce the risk of oral cancer, and maintain oral hygiene.<sup>21</sup>

Circumstances in the oral cavity reflect the health of the body and systemic diseases. Good dental and oral hygiene are partially dependent on the patients' mental health status. A state of stress, depression, and excessive anxiety lead to the cleanliness of the oral cavity which will be neglected. When experiencing stress, the body releases adrenaline and noradrenaline so that it not only leads to a decrease in blood circulation, but there is the possibility of altering the blood elements needed to maintain the body's resistance to disease.<sup>22,23</sup>

In this article, the patient was diagnosed as having Grinspan's Syndrome, which is associated with erosive lichen planus, diabetes mellitus, hypertension. Dentists must be familiar with medical management of hypertension and diabetes mellitus patients by taking important role in the diagnosis and treatment of oral lesion with both of diseases in order to contribute to maintain optimum health.

### Conclusion

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**Conflict of Interest:** All authors reported no conflict of interest of this work

**Source of Funding:** This study was conducted with individual funding

**Ethical Principle:** This study is original and accordance with the ethical principle of non maleficence and confidentiality. This article has never been published and is not under consideration in other publications.

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# Effect of Chitosan on the Reproductive System of Female Rats (*Rattus Norvegicus*) Exposed to Lead Acetate

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## Abstract

**Context:** Lead exposure can have a harmful effect on the body, one of which is the reproduction system. Lead can increase oxidative stress that can cause damage to organ. This research aims to prove the effect of chitosan in reducing MDA levels and increasing 17 $\beta$  estradiol level and VEGF expression due to lead exposure. This study was a true experimental in vivostudy using apost-test only group control design. This study used female wistar strain rats as the experimental animals that were divided into a negative control group, a positive control group (dose of lead 175 mg/kg/BW) and treatment groups (dose of chitosan 16, 32, and 64 mg/kg/BW) for 30 days. Surgery was carried out during the proestrus phase. The MDA level was measured using a microplate reader, 17 $\beta$  Estradiol level using ELISA, and the VEGF expression using IHC. This study used One Way ANOVA test and LSD test. The dose of chitosan that was considered capable of reducing uterine MDA level was treatment group 2 (dose of 32 mg/Kg/BW). Administration of chitosan at dose 3 (dose of 64 mg/Kg/BW) was able to increase Estradiol 17 $\beta$  levels and VEGF expression optimally. Chitosan can quantitatively reduce MDA level and increase 17 $\beta$  estradiol. In addition, chitosan administration can significantly increase VEGF expression.

**Keywords:** *Reproduction, Lead, chitosan, Malondialdehyde, 17 $\beta$  Estradiol, VEGF.*

## Introduction

Lead is highly found in the environment because it is difficult to degrade and can come from exhaust fumes, industrial waste, batteries, etc. Its toxicity can adversely affect the reproductive system.<sup>[1]</sup> Lead can induce oxidative stress.<sup>[2]</sup> Cadmium, mercury and arsenic Oxidative stress is caused by high free radicals because of the mechanism in reducing levels of antioxidant enzymes (SOD, CAT, and GSH).<sup>[1]</sup> Lead can deactivate ALAD (Amino Laevulinic Acid Dehydrase) which is an enzyme in heme biosynthesis resulting in an increase

in ALA (Aminolaevulinic Acid) that stimulates the production of ROS.<sup>[2]</sup> Cadmium, mercury and arsenic

Oxidative stress can cause damage to membrane lipids, proteins, and DNA.<sup>[3]</sup> Lipid peroxidation is a chain reaction during oxidative stress derived from unstable and easily decomposed Poly Unsaturated Fatty Acid (PUFA), and also forms a complex set of compounds consisting of Malondialdehyde (MDA). MDA is an important indicator of lipid peroxidation.<sup>[4]</sup>

In addition, lead is able to pass through the Brain Brain Blood (BBB) because it has a high affinity in binding to CaM compared to Ca<sup>2+</sup> which is the second messenger at the cellular level.<sup>[5]</sup> This change can affect the biosynthesis of sex hormones by damaging the hypothalamus function, so GnRH stimulation is disrupted.<sup>[6]</sup> Lead in the blood results in decreased production of LH, FSH, and 17 $\beta$  estradiol.<sup>[7]</sup> A high level of 17 $\beta$  estradiol plays an important role in fertility

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because it can increase LH in the ovulation process and stimulate folliculogenesis.<sup>[8]</sup>

17 $\beta$  estradiol is also involved in angiogenic factors in the endometrium, including Vascular Endothelial Growth Factor (VEGF) that is the main regulator of angiogenesis in various tissues including endometrium.<sup>[9]</sup> VEGF imbalance can trigger abnormal bleeding during menstruation.<sup>[10]</sup>

Antioxidant administration can reduce the toxic effects of lead. One of the antioxidants that can be used is chitosan. Chitosan is a modification of a chitin compound found in the outer shells of Crustacean species such as shrimp. Chitosan has an antioxidant mechanism through its ability to stabilize free radicals (Scavenging) and bind metal ions (Chelating). The interaction between chitosan and heavy metals includes absorption, ion exchange, and chelation. The hydroxyl (OH) and amino groups (NH<sub>2</sub>) are key chitosan groups as antioxidant agents that can prevent free radicals.<sup>[11]</sup>

This study aimed to determine the effect of oral chitosan administration on MDA level, 17 $\beta$  estradiol level, and VEGF expression on the endometrium rats exposed to lead acetate.

## Material and Method

**Research Description:** This *in vivo* study is true experimental with a post-test only control group design. The experimental animal was wistar strain rats (*Rattus norvegicus*) exposed to lead and given an chitosan. Observations were carried out on utery MDA level, blood serum 17 $\beta$  estradiol level, and endometrium VEGF expression.

**Experimental Animal:** The inclusion criteria were wistar strain rats, female, healthy (clean white fur, active), not pregnant, aged 8 weeks old, and 125-175 gr of body weight. The exclusion criteria were rats that appeared sick before being treated. This research has gone through the ethical feasibility step (Ethical Clearance) at the Ethics Commission of Faculty of

Medicine, University of Brawijaya.

**Experimental Design:** The number of samples used in this study was 25 white female wistar strainrats. After acclimatization, the random sampling technique was carried out. Rats were divided into five groups, two control groups (negative and positive controls), and three treatment groups (given chitosan doses of 16, 32, and 64 mg/kg/BW). All groups were given a lead at a dose of 175 mg/kg/BW/day, except for the negative control group. The administration of lead acetate (dissolved with aquades) and chitosan (dissolved with asetat acid) was carried out orally. Surgery was done after a 30 day treatment and in the proestrus phase by vagina swab.

**Measurement of MDA, 17 $\beta$  Estradiol, and IHC Staining:** The bloods then centrifuged to obtain the serum, ELISA method was carried to measure 17 $\beta$  estradiol level using ELISA Kit (from the Elabscience trademark catalog no.E-EL-0152). The left endometrial tissues were crushed and centrifuged to obtain a supernatant then using a microplate reader to obtain the MDA level using MDA Assay Kit (from the Elabscience trademark catalog no.E-BC-K142). The right endometrium was stained using IHC used antibodies from Santa Cruz trademark sc-57496 to observe the VEGF expression.

**Statistical Analysis:** Statistical analysis was begun with the data normality test and homogeneity test with a significance level of  $p > 0.05$ . One Way ANOVA Test was used to compare more than two sample groups. LSD test was used to determine the most effective chitosan dosage.

## Result

**Effect of Chitosan Administration on Uterine MDA Level after Induced by Lead:** One Way ANOVA test results on uterine MDA levels obtained a P-Value of 0.309 ( $> 0.05$ ), which means that there were no significant differences, then there was no need to do LSD test.

**Table 1: One Way ANOVA Test Results for MDA leve**

Research Group	N	Mean±SD(nmol/gr)	P-Value
Negative Control	5	15,354±4,676	0,309
Positive Control (lead 175 mg/kg/BW)	5	21,259±18,139	
Treatment 1(lead 175+chitosan 16 mg/kg/BW)	5	10,475±5,165	
Treatment 2(lead 175+chitosan 32 mg/kg/BW)	5	10,114±4,372	
Treatment 3(lead 175+chitosan 64 mg/kg/BW)	5	20,279±11,831	

Table 1 shows that the comparison of the positive control group (21,259±18,139) to the negative control group (15,354±4,676) shows a difference in the mean of the uterine MDA levels quantitatively. In the treatment group 1 (10,475±5,165) compared to the group of treatment group 2 (10,114±4,372), there was a quantitative decrease. However, in the treatment group 3, there was an upward trend of uterine MDA levels. This

shows that the group 2 given chitosan dose of 32 mg/kg/BW was capable of reducing uterine MDA levels.

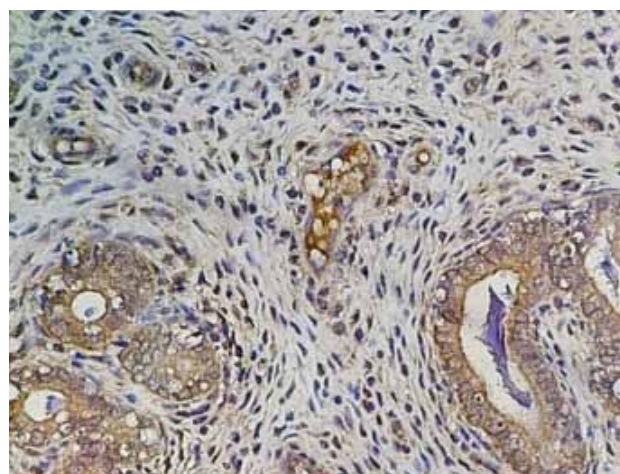
**Effect of Chitosan Administration to 17β Estradiol after Lead Exposure:** One Way ANOVA test results on 17β estradiol levels obtained P-Value of 0.968 (>0.05), which means that there no significant difference, then there was no need to do the LSD test.

**Table 2: One Way ANOVA Test Results of 17β Estradiol Levels**

Research Groups	N	Mean±SD (pg/dl)	P-Value
Negative Control (without treatment)	5	36,614±18,32 <sup>a</sup>	0,968
Positive Control (lead 175 mg/kg/BW)	5	33,817±14,28 <sup>a</sup>	
Treatment 1(lead 175+chitosan 16 mg/kg/BW)	5	34,804±15,22 <sup>a</sup>	
Treatment 2(lead 175+chitosan 32 mg/kg/BW)	5	36,328±26,29 <sup>a</sup>	
Treatment 3(lead 175+chitosan 64 mg/kg/BW)	5	41,554±14,44 <sup>a</sup>	

Table 2 shows that the comparison of the negative control group (36.614±18.32<sup>a</sup>) to the positive control group (33,817±14,28<sup>a</sup>) revealed a difference in the mean level of 17β estradiol quantitatively. From the comparison of treatment group 1 (34.804±15.22<sup>a</sup>), treatment group 2 (36.382±26.29<sup>a</sup>), and treatment group 3 (41.554±14.44<sup>a</sup>), there was a quantitative difference through the consecutive increases in the three treatment groups. The administration of chitosan at a dose of 64 mg/kg/BW showed the most effective dose in increasing 17β estradiol level.

**Effect of Chitosan Administration on Uterine VEGF Expression after Lead Exposure:** VEGF expression scan results are seen in the cytoplasm of endometrial glandular epithelial cells in brown color (Figure 1).



**Figure 1. Expression of VEGF in the cytoplasm of endometrial glandular epithelial cells in brown color**

The following table is the One-Way ANOVA test results of VEGF:



**Table 3: One Way ANOVA Test Results of Uterine VEGF (%)**

Research Groups	Mean±SD	P-Value
Negative Control (without treatment)	75.18±4.142 <sup>c</sup>	0.000<
Positive Control (lead 175 mg/kg/BW)	61.10±3.89 <sup>a</sup>	
Treatment 1 (lead 175+chitosan 16 mg/kg/BW)	67.16±3.97 <sup>b</sup>	
Treatment 2 (lead 175+chitosan 32 mg/kg/BW)	72.28±1.66 <sup>c</sup>	
Treatment 3 (lead 175+chitosan 64 mg/kg/BW)	75.26±3.94 <sup>c</sup>	

**Description:** The mean±sd shows the Duncan test results, if carrying different letters means that there is a significant difference (P-Value<0.05).

One Way ANOVA test on the mean of uterine VEGF expression obtained p-value=0,000<0,05, which showed significant differences, then test on LSD was conducted.

Table 3 shows that there are significant differences in the mean of VEGF expression (61.10±3.89<sup>a</sup>%) of the positive control with treatment group 1 (67.16±3.97<sup>b</sup>%). In the positive control group (61.10±3.89<sup>a</sup>%) with treatment group 2 (72.28±1.66<sup>c</sup>%), there were significant differences. Also, in the positive control group (61.10±3.89<sup>a</sup>%) with the treatment group 3 (75.26±3.94<sup>c</sup>%), there were significant differences. The chitosan dose which is considered the fastest to increase VEGF is 64 mg/kg/BW.

## Discussion

Lead toxicity mechanism is oxidative stress because of ROS production and decreased antioxidants.<sup>[1]</sup> Lead causes ALAD inhibition that increases ALA substrate that produces hydroxyl radical generation.<sup>[2]</sup> cadmium, mercury and arsenic. All of these mechanisms cause cells to be susceptible to oxidative stress.

Lipid peroxidation is another biomarker of oxidative stress. MDA is a lipid peroxidation product formed from the reaction of oxygen radicals with PUFA in phospholipid membrane and shows the damage of cells.<sup>[4]</sup>

In this study, the differences present in the positive and negative control groups were in accordance with the studies conducted on male rabbits that showed a difference in MDA levels between the control group and the treatment groups exposed to lead acetate.<sup>[12]</sup>

However, the study of lead acetate administration to male rats for four weeks explained that there was no statistically significant increase in plasma MDA levels in dose of 5,10,20,40, and 80 mg/kg/BW compared to the control group.<sup>[13]</sup> The differences in the results of MDA levels in these studies were thought to be caused by different length of exposure time.

In the brain, lead can substitute calcium as the second messenger and disrupt the hypothalamus and pituitary gland, thus causes disruption of GnRH stimulation. So, it can reduce FSH and LH production and reduce the 17β estradiol in serum.<sup>[14]</sup>

In this study, a dose of 175 mg/kg/BW lead acetate was able to reduce the 17β estradiol level. This is in line with the research by Dhir and Dhan (2010) that there will be a decrease in steroidogenesis activity in lead-exposed rats.<sup>[15]</sup> Estrogen functions as a growth hormone in the reproductive system, ovulation triggers, and oocyte development.<sup>[8]</sup>

In this study, the mean of 17β estradiol levels in positive controls was decreased compared to negative controls, but not significant. The treatment groups 1, 2, and 3 also increase the 17β estradiol level but were not significant. The dose and length of exposure are some possible mechanisms that might occur so that they are not significant.<sup>[16]</sup> This study used 30 days of exposure with a lead dose of 175 mg/kg, which was considered in the subchronic category. Decision making was based on previous research by Sari et al. (2018) who conducted lead exposure in rats for 30 days at a dose of 175 mg/kg to obtain subchronic categories.<sup>[17]</sup> Several other studies had a longer time, such as 15 weeks.<sup>[18]</sup> Many factors that cause lead exposure in this study were not significant. This is consistent with the research of Iavicoli et al. (2004), that lead exposure in rats with eight different doses showed an increase in 17β estradiol levels but was not significant.<sup>[19]</sup>

The estrogen and progesterone hormones play a role in forming a new layer of blood vessels in the endometrium. New blood vessels develop during each menstrual cycle through angiogenesis and vascular remodeling originating from pre-existing blood vessels in the endometrial basal zone.<sup>[20]</sup> In addition to progesterone and estrogen, many factors play a role in angiogenesis, one of which is VEGF. VEGF is a key compound of angiogenesis.<sup>[21]</sup> In this study, VEGF expression in positive controls decreased compared

to negative controls that were significant. VEGF expression and its receptors on human and mammalian endometrium, throughout the menstrual cycle, increase during the final proliferation and luteal phase, a period which is consistent with angiogenesis.<sup>[22]</sup> whose specific receptors have not been examined in detail thus far. We conducted the present study to determine, by immunocytochemistry and computerized image analysis of the functional is, the expression and modulation of the receptors Flk-1/KDR and Flt-1, which mediate VEGF effects on endothelial mitogenicity, chemotaxis, and capillary permeability. VEGF receptors are expressed mainly in endometrial endothelial cells, with variations of intensity and number of stained capillaries related to the phase of the cycle. The number of capillaries immunostained for Flk-1/KDR was maximal in the proliferative phase (ratio Flk-1/CD34: 1

Previous studies in rats and rabbits showed that VEGF and its receptors participated in increased angiogenesis and vascular permeability needed in the implantation process. Lack of VEGF expression and its receptors in rats leads to the development of poor blood vessel tissue in the endometrium that can lead to implantation failure and abortion.<sup>[23]</sup> In addition, a decrease in VEGF can have an impact on abnormal angiogenesis. Disrupted angiogenesis will disrupt blood vessel function such as abnormalities of menstruation.<sup>[24]</sup> which have been linked to the activation of both of these transcription factors. Therefore, the involvement of these pathways in estrogen-induced VEGF expression was investigated. Inhibitors of the MAPK (U0126

Chitosan can prevent oxidative stress through its reaction with free radicals so that it is not reactive, stabilizes free radicals, and inhibits the free radical chain reactions. Chitosan has an amino group that is able to bind to metals (including lead), so lead acetate is stable and can reduce toxic properties in lead.<sup>[25]</sup>

The greater the dose of chitosan given, the more amino groups that bind to lead, so it can reduce uterine MDA level, increase 17 $\beta$  estradiol level, and increase VEGF expression. However, in treatment group 3 on examination of uterine MDA levels, the treatment of lead acetate exposure and chitosan at a dose of 64 mg/kg/BW was not much different from the positive control group. The authors suspect that the chitosan dose 64 mg/kg/BW/day was not appropriate because it can increase the risk of changes in antioxidants to be prooxidants in MDA level. It was thought to produce more superoxide anion radicals.<sup>[26]</sup>

## Conclusion

A dose of 32 mg/Kg/BW chitosan can quantitatively reduce MDA level and a dose of 64 mg/Kg/BW chitosan can increase 17 $\beta$  estradiol. In addition, a dose of 64 mg/Kg/BW chitosan administration can significantly increase VEGF expression.

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# Physiological Response of Men Over 50 to Dosed Physical Activity: The Basis for Preventing the Development of Diseases of the Cardiovascular System

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**Context:** It is known that the increase in chronological age itself is a serious risk factor for the development of cardiovascular disease, especially in men. In men over the age of 50 who have several risk factors for cardiovascular disease, the risk of starting coronary heart disease or hypertension is very high. Therefore, it becomes necessary to develop affordable and safe programs to minimize this danger, based on the physical recovery of men older than 50 years, through the use of dosed and acceptable physical activity complexes for this age. Their effectiveness will be based on the possibilities of regular physical exertion in terms of toning up the cardiovascular system, enhancing metabolism and increasing the general endurance of the body. The study showed that the use of a set of physical activities for 1 year, including classes on the simulators “SPIRIT Medical Systems MU100 vertical ergometer” and “Finnlo”, with the addition of classes at “Finnlo MAXIMUM-S” from the second half of the year provides a more pronounced overall health the effect and greater increase in the level of physical fitness than the annual physical activity, including classes on the “Finnlo MAXIMUM-S elliptic” trainers with the addition of physical training in the second half of the year on the “ SPIRIT Medical Systems MU100 vertical ergometer”.

**Keywords:** Dosed physical activity, exercise equipment, men, pre-retirement and retirement age, cardiovascular diseases.

## Introduction

The relationship between low levels of physical activity and the development of cardiovascular diseases with age has long been observed<sup>1</sup>. The danger of physical inactivity is associated with the risk of development of

a number of negative changes against its background, including in the heart and blood vessels<sup>2</sup>. Even the reports of the World Health Organization officially indicated that more than 20% of cases of the development of cardiovascular diseases in the developed countries of the world occur due to the low level of physical activity in the population<sup>3</sup>. To fill the body's need for motor activity, comprehensive cardiorehabilitation programs are regularly developed, which necessarily include physical exercises<sup>4,5</sup>.

Among the positive effects of physical training in middle-aged and elderly people there is a decrease in overall mortality by 20% (primarily mortality from

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cardiovascular diseases), a modification of risk factors for the development of cardiovascular pathology, and an increase in the general functional capabilities of the body<sup>6</sup>. However, despite the continuous methodological improvement of the process of rehabilitation of cardiological patients, the prevention of premature aging of the cardiovascular system in people older than 50 years, as a rule, is limited to general recommendations for increasing motor activity<sup>7</sup>.

In Russia, serious attention is traditionally paid to solving age-related health problems in the male population. As a rule, this is done by restoring the traditions of maintaining athletic form, for which age norms of the general functional capabilities of the human body were introduced into the practice of healthcare<sup>8</sup>. However, the majority of able-bodied men over 50, obeying the contradictory behavioral stereotypes that have formed in Russian society, independently organize their leisure in the field of recovery, which is very far from a healthy lifestyle<sup>9</sup>.

Due to the fact that the relationship between walking distance per day and the possibility of reducing early mortality of men from cardiovascular causes was previously found, it was of great interest to create complexes of physical exercises that could provide not only an increase in their general physical fitness, but also improvement of their cardiovascular system with minimizing the risk of early cardiovascular death<sup>10</sup>. In this regard, it becomes necessary to develop affordable and safe programs for physical recovery of men over 50 years of age, based on dosed and acceptable for this age complexes of physical activity, which is convenient to dose.

In this regard, the goal is set to develop and test a comprehensive program for their general improvement for able-bodied men of pre-retirement and retirement age.

## Materials and Method

The study was conducted at the Faculty of Physical Education of the Russian State Social University. It was approved by the local ethics committee of the Russian State Social University (protocol №10 of 2017.11.10). The study involved 57 men aged 52-63 years (mean age  $58.3 \pm 0.78$  years). All men were randomly divided into two equal comparable groups - observation group 1 (28 people) and observation group 2 (29 people). All men were clinically healthy and had not previously

been physically trained. They did not have metabolic, oncological diseases and diseases of the cardiovascular system. All examined had risk factors for the development of cardiovascular pathology: they all smoked at least a pack of cigarettes a day, were overweight (weight index  $27.7 \pm 0.5$  kg/m<sup>2</sup>), and were regularly tested for various reasons, emotional stresses and had a blood cholesterol level above the normal level ( $5.8 \pm 0.7$  mmol/l). All men noted regular vague discomfort in the heart and episodes of destabilization of blood pressure.

To improve the health of the examined men, the authors have developed two programs of fitness training and evaluated their effectiveness.

Program №1 (developing) included daily exercises on simulators, the structure of which included the following:

- Preparatory part (6 min) with breathing exercises and the use of walking.
- The main part in the first six months of classes included special exercises for the muscles of the pelvic floor, perineum, and thighs on a “Finnlo MAXIMUM-S elliptic” (figure 1) (20 min). Due to the smooth increase in resistance during training, the muscles of the legs and abdominal muscles are trained and the functions of the cardiovascular system are dosed.



**Figure 1: Simulator “Finnlo MAXIMUM-S elliptic”**

After six months of classes, classes (10 min) were added to the main part of the classes on the simulator “SPIRIT Medical Systems MU100 vertical ergometer” (figure 2). A feature of this simulator is the ability to change the direction of the impact of an uneven load

on the limbs with alternating isokinetic muscle tension, which stimulates the blood circulation throughout the body (figure 2).



**Figure 2: Simulator “SPIRIT Medical Systems MU100 vertical ergometer”**

The final part of the lesson (4 minutes) included standard gymnastic and breathing exercises. In addition to training on simulators, the developing program included daily walking for 4 km at a measured pace.

Program №2 (training) included daily training on simulators, the structure of which included the following:

- Preparatory part (6 min) from dosed walking and breathing exercises;
- The main part included special exercises on the simulator “SPIRIT Medical Systems MU100 vertical ergometer” (20 min) (figure 2) and 10 minutes on the simulator “ Finnlo EllypsisSX1” (figure 3). The use of these simulators made it possible to activate all the large muscle groups of the body, primarily the thigh muscles.



**Figure 3: Simulator “Finnlo EllypsisSX1”**

Six months later, classes were added on the simulator “Finnlo MAXIMUM-S” (10 minutes) (figure 4). During the classes, resistance to the work of the legs and abdominal press sets in, which additionally trains the cardiovascular system (figure 4).



**Figure 4: Simulator “Finnlo MAXIMUM-S”**

The final part of the lesson (6 minutes) included standard gymnastic and breathing exercises. In addition to training on simulators, the training program included daily walking for 6 km at an accelerated pace.

In order to achieve the goal set in the work, the examined motor activity by the number of steps per day, conducted a 12-minute Cooper test, recorded the heart rate during exercise, determined the endurance coefficient, and the values of systolic and diastolic blood

pressure. Men who made up both observation groups were examined twice - at the end and after a year of daily training according to the schemes proposed by him. The obtained digital values of the considered indicators were processed using Student's t-test (t).

## Results

Obtained during the examination of all men included in the study, the digital values of the examination are presented in table 1.

**Table 1: Dynamics of the considered indicators in the observation groups**

Parameters	Study time	Observation group 1 (n=28), M±m	Observation group 2 (n=29), M±m
Physical activity, thousand steps / day	Initially	6.5±0.10	6.3±0.07
	At the end of the observation	7.5±0.16 p<0.05	9.2±0.13 p<0.01 p <sub>1</sub> <0.01
The results of the 12-minute Cooper test, km	Initially	1.6±0.03	1.6±0.02
	At the end of the observation	1.7±0.07	1.9±0.04 p<0.01 p <sub>1</sub> <0.01
Heart rate during class, beats / minute	Initially	119.0±0.29	118.4 ±0.34
	At the end of the observation	109.0±0.28	101.0±0.30 p<0.05 p <sub>1</sub> <0.05
Endurance ratio	Initially	19.8 ±0.09	20.0±0.11
	At the end of the observation	21.3±0.16	23.8±0.12 p<0.05 p <sub>1</sub> <0.05
Systolic blood pressure, mmHg	Initially	138.6±0.39	136.6±0.29
	At the end of the observation	132.5±0.27	120.6±0.18 p<0.05 p <sub>1</sub> <0.05
Diastolic blood pressure, mmHg	Initially	94.6±0.27	93.5±0.25
	At the end of the observation	90.2±0.20	82.2±0.14 p<0.05 p <sub>1</sub> <0.05

**Legend:** pre liability of dynamics in groups, p<sub>1</sub> - significance of differences in results by the end of observation in groups.

The initially low physical activity of the examined increased among them as a result of the application of both fitness programs. However, the application of program №2 (training) provided a more pronounced increase in this indicator in the second observation group. By the

end of the observation in her, this indicator exceeded that in the first group of men by 22.7%. When assessing both groups using the 12-minute Cooper test, initially the same indicators improved also more pronounced in the second group. By the end of the observation, they exceeded the results in the first group by 11.7%. In the process of classes in both groups there was a decrease in the value of heart rate, more pronounced in the second group by 17.2% versus 9.4% in the first. This was accompanied

by an increase in the coefficient of endurance, which by the time the observation was completed in the second observation group exceeded that in the first group by 11.7%. As a result of regular physical exertion, the observed men managed to lower their blood pressure by transferring it from a zone of high normal to a zone of normal blood pressure. At the same time, the results in the second group of observations were preferable due to the fact that they were inferior to those in the first group: in systolic blood pressure by 9.9%, in diastolic blood pressure by 9.7%.

## Discussion

Rational feasible muscle activity at any age contributes to the increase in adaptation to it of all organs, systems and the body as a whole<sup>11</sup>. A prominent role in the adequate adaptation of the body to the effects of physical activity belongs to the strengthening of the cardiovascular system, which largely limits the severity of the oxygen supply of the working organs<sup>12</sup>. Already against the background of a single physical load, the volume and speed of blood flow increases, vascular resistance is optimized, rheological properties of blood change, which affects the level of oxygen delivery to tissues. With prolonged, regular and feasible physical exertion at any age, an increase in the level of training of the heart muscle is noted and the activity of hemostasis decreases, which reduces the risk of thrombosis<sup>13</sup>.

It is known that in men older than 50 years, the vascular wall often experiences a tendency to spasm. In addition, several risk factors for the formation of cardiovascular diseases very often accumulate in this population group. They are, without a doubt, based on functionally unfavorable changes in the metabolism and in the state of the heart and blood vessels. Under conditions of low physical activity and minimal functional reserves, they can accelerate the formation of dysfunctions, and then pathologies in the circulatory system<sup>14</sup>.

In this work, two effective approaches to the recovery of men older than 50 years who have a risk of cardiovascular pathology were developed and tested. The trainees managed to achieve more pronounced results according to the program based on more intensive regular physical activities. Against their background, it was possible to achieve not only a pronounced optimization of the considered indicators of the cardiovascular system, but also an increase in

its reserve capabilities, which exceeded the effect of the application of a developing program of physical activity. The achieved effect on program №2 in men starting to age is more effective, as it provides a more pronounced healing effect on their organs. So, against the background of the daily execution of program № 2, men over 50 were able to significantly develop strength and endurance, which helps to optimize their state of the heart and blood vessels<sup>15</sup>.

The achieved beneficial effect on the body of both physical activity programs was largely realized due to the strengthening of metabolic processes. During physical exertion, there was a “soft” increase in the level of fitness of the male organism as a whole, strengthening their cardiovascular system, revealing the reserves of their respiratory system and thereby stimulating the work of the hormonal system and the central and autonomic parts of the nervous system<sup>16</sup>.

Obviously, from the early stages of the implementation of both recovery programs, the phenomena of muscle elasticity and endurance, as well as the flexibility of the spine, increase. It is known that regular exercise, especially on simulators, normalizes the production of neurotransmitters (acetylcholine, catecholamines and histamine), which provide a balance of functional processes in the brain.

When comparing the results in both observation groups, it became clear that program №2 has significant advantages over program №1, since only it allowed the indicators available for students to reach the optimal level. This gives grounds to consider it highly effective and promising for wide testing, including for various forms of dysfunctions and the beginning pathology in the heart of people of mature and old age, even if they have any concomitant compensated diseases.

## Conclusion

If men over the age of 50 have several risk factors for cardiovascular disease at once, the risk of coronary heart disease or hypertension becomes quite high. It is known that regular physical activity can tone up the cardiovascular system, enhance metabolism and increase the overall stamina of the body. The study showed that the use of a set of physical activities for 1 year, including classes on the simulators “ SPIRIT Medical Systems MU100 vertical ergometer “ and “Finnlo EllypsisSX1”, with the addition of classes at “Finnlo MAXIMUM-S” from the second half of the year provides a more



pronounced overall health the effect and greater increase in the level of physical fitness than the annual physical activity, including classes on the “Finnlo MAXIMUM-S elliptic” trainers with the addition of physical training in the second half of the year on the simulator “SPIRIT Medical Systems MU100 vertical ergometer”.

**Conflict of Interest:** No conflict of interest is declared.

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**Ethics Committee Resolution:** The study was approved by the local ethics committee of the Russian State Social University (protocol №10 of 2017.11.10).

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# The Difference of Exposure Effect of the Mozart, Javanese, Sundanese and Balinese Gamelan Music During Pregnancy to the Number of Neuronal Cells on Cerebrum and Cerebellum of Offspring *Rattus Norvegicus*

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## Abstract

**Background:** Improve the human resource requires good brain quality since the phase of conception. Offering stimulus with classical music and regional music (gamelan) which is believed can help to boost the brain cells and intellectual intelligence. Exposure to Mozart's music, Javanese, Sundanese and Balinese gamelan affects the number of neuron cells.

**Objective:** Analyze the different of the number of neuronal cells on cerebrum and cerebellum offsprings *Rattus norvegicus* from mothers were exposed with Mozart music, Javanese Gamelan, Sundanese, Balinese and not exposed to music during pregnancy.

**Method:** This study was a experimental study with post test only control group design. The samples were divided randomly into 5 groups. The treatments were given the 10th day of pregnancy, for one hour in soundproof box with an intensity 65 db. On the 20th day of pregnancy, The *Rattus norvegicus* offsprings were born by sectio and selected three with the heaviest, medium and lightest of each mothers to sacrificed their brains were decapitated and dissection and counted the number of neuron cells using Hematosicline-Eosin stainin and analyzed using comparison test, with significancy  $p < 0,05$ .

**Results:** There were significant differences from the number of neuron cells of offspring *Rattus norvegicus* on cerebrum between groups with  $p = 0.001$  and on cerebellum with  $p = 0.001$ .

**Conclusion:** There are differences the number of neuron cells on cerebrum and cerebellum between offsprings *Rattus norvegicus* were not exposed to music and those exposed to music.

**Keywords:** Balinese Gamelan, Javanese Gamelan, Mozart, Number of Neuronal cells, Sundanese Gamelan.

## Introduction

The one of the efforts to improving the national development is improve the human resource requires

good brain quality since the phase of conception<sup>1</sup>. Intelligence is the biopsychosocial potential used to find a idea, solve a problem and process information quickly<sup>2</sup>. Information and stimulus are processed through interwoven between nerve cells or synapses, the more the number of neuron cells, the more synapses are formed so that the apoptosis also reduced and the brain will process information<sup>3</sup>.

The brain starts to grow and develop from 8 weeks of gestation and cell proliferation will stop when the

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pregnancy is  $\pm 20$  weeks with stages of proliferation, migration, differentiation, myelinisation and synaptogenesis. The brain that grows by getting stimulus will increase brain capacity due to fewer cell apoptosis<sup>4</sup>. Stimulus can be given after  $\pm 20$  weeks pregnancy because at this time axons arising from neurons have reached the target organ and form a network (neural network). The fetus begins to be able to hear voices from outside because at this phase the fetal ear has been fully formed and begins to function<sup>4</sup>. Recent research has shown the Cerebellum to be associated with the contralateral cerebrum via the polysynaptic circuit. The input stimulus is captured by the pond then crosses to the cerebellum profundus nucleus to the thalamus then to the cerebrum cortex<sup>5</sup>.

Music is one of effective stimulus that can improve fetal intelligence<sup>6</sup>. Music that can be used as a stimulus is classical music from Mozart. Study in mice that received Mozart’s music exposure, the number of neuron cells was higher than group with Beethoven and Chopin’s exposure<sup>6</sup>. Mozart’s music with a frequency of 75-10,000 Hz and intensity of 70-130 dB provides a lower apoptotic index than other music<sup>7</sup>. Gamelan musics are the original music from Indonesia and divided into big three gamelan according to the area of origin, that are Javanese, Balinese and Sundanese.

The aim of the study is differences of the number of neuron cells in the *cerebrum and cerebellum Rattus norvegicus* offspring between those exposed to Mozart music, Javanese gamelan, Sundanese gamelan, Balinese gamelan and not exposed to music during pregnancy.

**Material and Method**

This was an analytic study with post test only control group design and conducted at the Pathology Laboratory of the Faculty of Veterinary Medicine, Universitas Airlangga Surabaya which had been ethically legalized before. **Participants.** Sample size in this study were five sample in each group that randomly divided into five groups. Total sample were 25 rats. Pregnant *Rattus norvegicus* aged 2-3 months and fulfilled the criteria of study subjects were healthy, weighing 110-130 grams and gestational age 19-20 days. *Rattus norvegicus* mothers that was sick or dies during treatment and the *Rattus norvegicus* offspring dies or born before the gestational age 19th day can’t be used. **Intervention.** Each sample was given treatment

according to the group which were given Mozart music exposure, Javanese Gamelan exposure, Sundanese gamelan exposure, Balinese Gamelan exposure and not given music exposure from the gestational age 10th until 19th day for one hour in a soundproof box to anticipate maybe *Rattus norvegicus* can hear any voices from outside. Music was presented by using Windows media player program with 65 dB intensity using Sound level meter. **Outcome.** Brain samples were taken after *Rattus norvegicus* offsprings were born by *sectio caesar* on the 20<sup>th</sup>-day pregnancy, then their brains were taken. For one preparat contains 3 brains sample. Using *Hematosicline-Eosin (H-E)* staining with dark blue nuclei and viewed with 5x visual field with 400 magnification after that, samples counted the number of neuron cells. The data was carried out a comparative test using ANOVA test and LSD (Least Significant Difference) to see the differences in each group.

**Findings:** Pregnant *Rattus norvegicus* were randomly grouped and no rats deaths were found in pregnant *Rattus norvegicus*. the three heaviest, medium and lightest of offspring *Rattus norvegicus each group* were did decapitation, made into one preparation and stained. The Shapiro-Wilk test showed a normal distribution of *Rattus norvegicus* weight data ( $p > 0.05$ ).

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**Table 1: Mean body weight Rattus norvegicus mothers and offspring.**

Group	BW Mothers			BW offspring		
	Mean	SD	p	Mean	SD	p
Control	119,8	3,34	0,211	0,49	0,03	0,561
Mozart	121,8	3,49		1,74	0,82	
Java	121,2	4,65		1,56	0,92	
Sunda	121,2	4,08		1,51	0,97	
Bali	120,2	4,14		1,30	0,66	

Based on the table 1, The highest mean *Rattus norvegicus* body weight was Mozart exposure group ( $121.8 \pm 3.49$ ) and the highest mean body weight offspring was the Mozart group ( $1.74 \pm 0.82$ ).

**Table 2: Characteristics numbers of neurons cells of *Rattus norvegicus* offsprings.**

Group	cerebrum			cerebellum		
	Mean	SD	p	Mean	SD	p
Control	12,56	0,97	0,896	8,68	0,72	0,858
Mozart	22,08	2,21	0,399	13,08	1,15	0,721
Java	18,24	1,49	0,951	10,76	1,73	0,697
Sunda	17,84	3,2	0,394	10,64	1,99	0,892
Bali	17,2	4,21	0,403	9,16	0,63	0,884

Based on table 2, The number of neuron cells of Mozart group was the group with the highest average on cerebrum (22.08 ± 2.21) and cerebellum (13.08 ± 1.15).

**Analysis of the Results on Cerebrum:** The results of the normality test showed that normal data distribution so we used ANOVA and *Post Hoc LSD* for difference each group. Table 3 shown the results of the that there was a significant difference of numbers of neuron cells between all group (p<0,005).

**Table 3: Anova and post hoc LSD test result**

Group	P			
	Mozart	Java	Sunda	Bali
Control	0,000*	0,003*	0,016*	0,013*
Mozart		0,036*	0,022*	0,010*
Java			0,818	0,550
Sunda				0,712
Anova*	0,001			

Table 3 shown that the number of neuron cells from *Rattus norvegicus* offspring on cerebrum have significant differences between control group and all of groups study and Mozart’s music exposure group has also significant differences with all groups.

**Analysis of the Results on Cerebellum:** Table 4 shown the results that indicate there is a significant differences of numbers of neuron cells between all group p=0,001.

**Table 4: Anova and post hoc LSD test result**

Group	p			
	Mozart	Java	Sunda	Bali
Control	0,000*	0,025*	0,034*	0,583
Mozart		0,014	0,010*	0,000*
Java			0,891	0,078
Sunda				0,101
Anova*	0,001			

Table 4 shown that number of neuron cells of *Rattus norvegicus* offspring on cerebellum have significant differences between control group and all groups of music exposure except Balinese gamelan music exposure (p = 583). Mozart’s music exposure group also has significant.

### Discussion

Classical music has proven to have a good stimulating effect to improve brain function. *Rattus norvegicus* with Mozart’s music exposure have higher a number of neuron cells than Beethoven and Chopin’s music exposed<sup>7</sup>. The study of Mozart’s composition in humans proves that the provision of Mozart’s composition affects the fetal biophysical profile where there was increased in the rate of acceleration, the length of acceleration, increased fetal heart rate during acceleration, and the amount of fetal motion due to exposure to Mozart composition during the day<sup>10</sup>.

The musical component consists of intensity, frequency, beats and major-minor tones. Mozart’s music has high rhythms, melodies and frequencies that can stimulate creative areas and motivate the brain, so as to be able to calm listeners, improve concentration, memory and spatial perception<sup>11</sup>. This study was found that there were differences on the number of cerebrum and cerebellum neuron cells of *Rattus norvegicus* offsprings whose parents were exposed to Mozart’s music with those who were not exposed to music during pregnancy. the results had been supported by of a previous study that Mozart’s music exposure increased the number of neuron cells compared to without music exposure<sup>12</sup>. Other studies mentioned that more stimuli from the environment, then more synapses form and then more number of neuron cells that survive not to be apoptosis<sup>13</sup>.

Mozart was music which best combination of sounds with frequency, intensity, rhythm, timbre and melody<sup>4</sup>. The theory was suitable with the results of our study and the application of Mozart’s music also affects the average expression of higher BDNF where BDNF has defense capabilities and the potential to activate the growth of neurons<sup>14,15</sup>. In this study the only modifiable musical element was the intensity. So for all types of music exposed have been adjusted to the intensity of 65 db using a sound level meter. Noise exposure (95 dB supersonic for 1 hour) in experimental animals resulting in impaired growth, decreased neurogenesis in the

hippocampus and impaired spatial ability<sup>16</sup>. Whereas, experimental animals with music exposure (65 dB for 1 hour) found increased neurogenesis and higher spatial ability.

Another result of this study was there were differences on the number of neuron cells in the cerebrum and cerebellum between those exposed to Javanese and Sundanese gamelans music with those not exposed to music. The brain that grows in an environment with rich stimulus has a thicker cortex, a larger nucleus of neuron cells and more glia cells and also have more dendritic sites that allow more synapses to be formed so that brain capacity will be increased. Javanese gamelan is a gamelan music originates from Java island, Indonesia. This music have slow harmony, consistent tone color, and low pitch while Sundanese gamelan music was original music from the Sunda region, West Java<sup>17,23</sup>. This music also has the characteristics of a slow harmony, lively and dominated by musical instruments such as flutes, degung and lutes<sup>17,23</sup>.

Slow tempo gamelan music like Javanese and Sundanese gamelan has a beat which almost same as Mozart's music, which is approximately 60 beats/minute<sup>9</sup>. Where the beat is in accordance with the mother's heart rate. Gamelan music was music which using the Pelog and Slendro scales (*laras*). Slendro was group of pentatonic scales (*laras*) which are usually cheerful, lively and joyful and the Pelog scales was exactly the same as the major pentatonic scales (5 tones). Generally it is played with a state of calm, respect, noble and whole<sup>18</sup>. Javanese and Sundanese gamelans pelogone usually played using a major base tone and the majority of major notes are same as Mozart which is dominated by major tones<sup>19</sup>.

The Javanese and Sundanese gamelan exposure groups have difference number of neuron cells on cerebellum with not music exposure group but there was no difference between Balinese gamelan exposure group and the control group. Balinese gamelan was original music from Bali island which having a strong character and most fast rhythm because Balinese gamelan has a lot of music equipments that was shaped like a small cymbal called Ceng-Ceng that was made sounds loud and played quickly<sup>20</sup>. Javanese and Sundanese gamelans has a softer tone compared to Balinese Gamelan with harder and faster tone<sup>21</sup>. Balinese gamelan also has pelog and slendro scales. The pelog scales were played using a minor basic tone<sup>22,25</sup>. This is different which different

with classical music which dominated by major tones.

Mozart's music exposure group has higher numbers of cerebrum and cerebellum neurons than all gamelan exposure group. Previous study explained that the sensitivity of the basilar membrane at the base of the chinchilla cochlea obtained sensitivity at a frequency of around 8000 Hz which is useful for charging brain cells<sup>23</sup>. The music used in this study has been analyzed using the cool edit pro 2.0 software which Mozart has a range of 8,000 Hz, while Javanese, Sundanese and Balinese gamelan music have range 15,000 Hz. This frequency is higher than Mozart's music. This difference of frequency will be captured differently by cochlear photocopying, so the response to the brain will be different. Mozart's music has the best combination to be stimulation during pregnancy.

## Conclusion

The exposure of Mozart's music during pregnancy has an effect on number neurons in the cerebrum and cerebellum of *Rattus norvegicus* offsprings and exposure compared to the Javanese gamelan, Sundanese gamelan and Balinese gamelan. For the next study can be added from other brains composition like glia cells, sinapsin or bdnf.

**Conflict of Interest:** There was no conflict of interest in this study.

**Ethical Clearance:** This study was received ethical approval from the Health Research Ethics Committee, Faculty of Dental Medicine, Universitas Airlangga.

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# Correlation the Components of Health Belief Model and the Intensity of Blood Tablets Consumption in Pre-Conception Mother

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## Abstract

**Introduction and Objective:** The high number of prevalence of anemia in women of childbearing age has reached 22.7%. Anemia causes complication which increase maternal mortality rate, low birth weight, and stunting. Government efforts to tackle anemia through the blood tablets program have not reduced the prevalence of anemia. The coverage of blood tablets in pre-conception mothers in Tambakrejo Public Health Center is still at a low level with 64.22%. The side effects of blood tablets such as nausea, vomiting, constipation, and black defecation often make the consumers feel uncomfortable. Pre-conception mother perceptions can be figured out by measuring instruments in the form of Health Belief Model (HBM). This study was conducted to analyze the correlation the components of HBM and the intensity of blood tablet in pre-conception mothers.

**Material and Method:** This study used an observational analytic method with a cross-sectional study design. The samples were 37 pre-conception mothers were collected through random sampling technique. The independent variables consisted of perceived susceptibility, severity, threats, benefits, barriers, and self-efficacy. Meanwhile, the dependent variable was the intensity of blood tablets in pre-conception mothers. This study also used questionnaires as an instrument. As for the data analysis, it was done using the Mc-Nemar test.

**Findings:** Most pre-conception mothers have sufficient perceived of susceptibility (62.2%), severity (54.1%), and threats (56.8%) of anemia as well as the benefits, barriers, and self-efficacy to consume blood tablets (54.1%). Besides that, most of the pre-conception mothers (35.1%) have a low intensity in consuming blood tablets. The Mc-Nemar test showed a p-value by <0.05.

**Conclusion:** There is a correlation the perceived of susceptibility, severity, threats, benefits, barriers, and self-efficacy and the intensity of blood tablets in pre-conception mothers.

**Keywords:** *Health Belief Model, intensity, blood tablets, pre-conception mothers*

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## Introduction

A pre-conception mother is a married woman of fertile age and is planning for a pregnancy.<sup>(1)</sup> Pre-conceptions or periods of pregnancy preparation are efficiently run for at least 2-6 months before pregnancy.<sup>(2)</sup> Women with good pre-conception preparation can reduce the occurrence of maternal and

infant pregnancy complications.<sup>(3)</sup> Nutritional adequacy during the pre-conception period will have an impact on nutritional adequacy during pregnancy and can affect fetal growth during the first 8 weeks of life in the intrauterine phase.<sup>(4)</sup> Anemia is a nutritional problem which is prone to children and women. The prevalence of anemia in Indonesia has not been decreased, anemia is found in women of fertile age has reached 22.7% and will increase in pregnancy by 37.1%.<sup>(5)(6)</sup> Anemia in developing countries can be caused by conditions of blood disorders such as thalassemia, malaria, worm infections, and most often due to iron deficiency and folic acid during the preparation of pregnancy to delivery.<sup>(7)</sup> The Centers Disease Control and Prevention (CDC), recommends all women of childbearing age to consume iron supplements of 60 mg and folic acid of 0.4 mg per day.<sup>(5)</sup> TTD for preconception mothers is consumed once a week for 1-2 months. The Minister of Health Regulation (Permenkes) Number 75 of 2013 concerning Nutritional Adequacy recommended for the Indonesian recommends that the need for Fe(iron) for women in childbearing age is 26 mg per day.<sup>(8)</sup> Oral of TTD may cause side effects on the gastrointestinal tract in some people, such as heartburn, nausea, vomiting, diarrhea, constipation, and black defecation.<sup>(9)</sup> Iron needs for pre-conception are crucial to avoid iron deficiency or anemia which can lead to complications in pregnancy such as miscarriage, Intrauterine Growth Restriction (IUGR), neonatal asphyxia, and postpartum bleeding.<sup>(10)</sup> Folic acid is important to support fetal growth early in pregnancy.<sup>(7)(10)</sup> Adequate consumption of folic acid can reduce the risk of disability in the fetus such as spina bifida.<sup>(11)</sup>

The Health Belief Models (HBM) is a concept of individual perceptions which able to influence feedback behavior in decision making regarding their health conditions.<sup>(12)</sup> The HBM theory according to Rosenstock consists of several types of perceptual models, including perceived susceptibility, severity, threats, benefits, barriers, and self-efficacy. The concept of HBM theory states that perceived susceptibility and severity of an illness can affect the perceived of threats. This means that when an individual feels that the disease might be prone to her and is a serious illness, the person will tend to perceived threats posed as a health disorder. Perceived of benefits and barriers obtained may influence each other in the prevention and treatment behavior of an illness. Individuals tend to make decisions if the benefits obtained will outweigh the problems. The

benefits of prevention and treatment are more decisive than the possible problems.<sup>(12)(13)</sup> Perceptions of have a direct influence on an individual perceived of self-efficacy. Individuals will perform health behaviors if the individual believes that the effort he or she is doing is useful and believes that they can overcome the problems.<sup>(12)</sup> Factors of individual awareness about the importance of maintaining balanced nutrition and the low nutritional adequacy of the pre-conception period need to be addressed in order to improve the health of the mothers and children. The low consumption of blood tablets is still low due to its side effects that are perceived as barriers by individuals. However, these individuals still have a low awareness of the benefits obtained, which can prevent complications of anemia. Individuals with low awareness also tend to feel that anemia is not a serious disease and can threaten health. This study was conducted to analyze the correlation components of HBM and the intensity of blood tablets consumption in pre-conception mothers.

## Material and Method

This research was conducted in the working area of the Tambakrejo Public Health Center. The design of this study is an observational analytic with cross sectional design. The sampling was done through random sampling technique with the number of samples as many as 37 pre-conception mothers who meet the inclusion criteria, namely married and planning a pregnancy. The sample exclusion criteria were mothers with reproductive organ disorders and contra indications to the consumption of blood tablet. The independent variable consists of perceived of susceptibility, severity, threats, benefits, barriers, and self-efficacy. The dependent variable is the intensity of blood tablets consumption. The instrument for this research is in the form of a questionnaire consisting of 27 parameters. The respondent's perception indicator uses the calculation of T score formula and standard deviation to avoid the bias value. The scale of the perception data is divided into three categories, adequate ( $T\text{-score} > \text{mean} + \text{sd}$ ), sufficient ( $\text{mean} - \text{sd} < T\text{-score} < \text{mean} + \text{sd}$ ), and deficient ( $T\text{-score} < \text{mean} - \text{sd}$ ).<sup>(14)</sup> As for the indicators of the intensity of blood tablet consumption, the researcher used assumptions, namely, high ( $>6$ ), moderate (3-6), and low ( $<3$ ) times over the past two months. The data was analyzed through the Mc-Nemar test in the SPSS program.

**Findings:** Based on the respondents characteristics data, the highest amount of respondents was in the age



category of 20-25 year old category with 15 people (40.5%). The lowest age of respondents was 22 years old and the highest with 44 years old and the average age of respondents was 29 years old with a standard deviation of 1,300. The respondents with senior high school education of 26 (70.3%), while respondents who worked as a private company employees as many as 19 (51.4%).

**Table 1: Correlation of Perceived Threats with Intensity of Blood Tablets Consumption**

Perceived Threats	Intensity Consumption of Blood Tablets					
	High		Moderate		Low	
	N	%	N	%	N	%
Adequate	3	25	0	0	0	0
Sufficient	8	66,7	12	100	1	7,7
Deficient	1	8,3	0	0	12	92,3
Total	12	100	12	100	13	100

Individuals who believe that they are susceptible will perceived anemia as a serious disease, and pose a health threats, which they will tend to try to prevent or treat the illness.<sup>(12)(13)</sup>The results showed that the majority of respondents had low intensity of consumption, most of them were respondents with perceived susceptibility categories with 11 respondents (84.6%), and lower severity degrees with 12 respondents (92.3%).The Mc-Nemar test data analysis on the three components of HBM obtained p values of 0.004, 0.029, and 0.019 or  $p < \alpha$  (0.05) respectively, which means that there is a correlation between the perceived susceptibility and consumption intensity of blood tablets for anemia prevention. Respondents who have perceived of susceptibility, severity, and sufficient threats to anemia should feel that anemia may have a bad impact, thus the individual must increase the intensity of consumption of the blood tablets. However, in this study respondents with perceived of susceptibility, severity, and threats are quite likely to ignore and assume that anemia is not a disease that will cause adverse effects, which made them tends to have weak intensity of consumption. This also happens because according to respondents, they do not feel susceptible to anemia, do not think anemia is a serious disease, and poses a health threat therefore they will not try to prevent or treat it. This research is in line with the research conducted by Aryanti (2018) who stated that perceptions of susceptibility and threats are related to compliance with HIV testing in pregnant women.<sup>(15)</sup>Based on the cross tabulation test analysis, it

is found that the respondent felt that they are susceptible and threatened by anemia, thus they will tend to try to prevent or threats it by taking blood tablets during the pre-conception period. Although, this study is inversely proportional to the research conducted by Annisa (2017) who found that there was no correlation between perceived susceptibility and threats with the intention of young women to take blood tablets.<sup>(16)</sup>This happens because the young women are reluctant to discuss anemia, which made them tend not to know that anemia is prone to women and should be avoided to prevent complications.

**Table 2: Correlation of Perceived Benefits with Intensity of Blood Tablets Consumption**

Perceived Benefits	Intensity Consumption of Blood Tablets					
	High		Moderate		Low	
	N	%	N	%	N	%
Adequate	4	33,3	0	0	0	0
Sufficient	8	66,7	11	91,7	0	0
Deficient	0	0	1	8,3	13	100
Total	12	100	12	100	13	100

**Table 3: Correlation of Perceived Barriers with Intensity of Blood Tablets Consumption**

Perceived Barriers	Intensity Consumption of Blood Tablets					
	High		Moderate		Low	
	N	%	N	%	N	%
Adequate	0	0	0	0	12	92,3
Sufficient	8	66,7	11	91,7	1	7,7
Deficient	4	33,3	1	8,3	0	0
Total	12	100	12	100	13	100

**Table 4: Correlation of Perceived Self Efficacy with Intensity of Blood Tablets Consumption**

Perceived Self Efficacy	Intensity Consumption of Blood Tablets					
	High		Moderate		Low	
	N	%	N	%	N	%
Adequate	4	33,3	0	0	0	0
Sufficient	8	66,7	11	91,7	0	0
Deficient	0	0	1	8,3	13	100
Total	12	100	12	100	13	100

A person will take into account the susceptibility and degree of risk of an illness, then the person will consider the benefits and barriers that will be received so as to affect the self-efficacy to attempt health behaviors.<sup>(13)(17)</sup>

Based on the results of the data analysis with the McNemar test which obtained p value in the perceived barriers of 0.007, the benefits and self-efficacy with 0.011 or  $<\alpha$  (0.05) respectively, which means there is a correlation between perceived benefits, barriers, and self-efficacy, with the intensity of blood tablets consumption in pre-conception mothers to prevent anemia. Most pre-conception mothers who claim to receive good benefit or have good perceived of benefits have assessed various risks of anemia. But the results of these considerations may vary according to the information and the process of managing the information which leads to perception that will be applied as health behavior. Respondents who have perceptions of sufficient benefits in consuming the blood tablets should be able to consider these benefits to increase their intensity of consumption. But in this study, the respondents with perceived of benefits were quite likely to still consider their barriers in consuming the blood tablets, therefore they tended to have low intensity of consumption. This also happened because according to the respondents, they felt that the barriers which they experienced were greater, thus they refuse to prevent or treat them. These findings are in line with the research conducted by Afifah (2018) which stated that there is a correlation between the perceived of benefits, barriers, and self-efficacy with efforts to prevent TB disease in adolescents.<sup>(18)</sup> On the other hand, Hendrastuti's research (2018) says there is no relationship between perceived of benefits, barriers, and self-efficacy perceived by mothers towards basic immunization status in their children.<sup>(19)</sup> This happens due to the respondents still consider negative obstacles or impacts caused by prevention and treatment efforts. Based on the HBM theory, although the benefits of action are more decisive than the barriers, if these barriers are massive, they will certainly hinder and inhibit the health behavior.<sup>(20)</sup>

### Conclusion

The Health Belief Model consists of six interrelated components. The perceived of susceptibility and severity can affect perceptions of threats. While the perception of benefits and barriers tends to be a consideration for decision making. The perceived of susceptibility, severity, threats, benefits, and constraints that may affect perceived of self-efficacy. This study shows that there is a correlation between perceived of susceptibility, severity, threats, benefits, barriers, and self-efficacy with the intensity of blood tablets consumption in preconception mothers.

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National Unity, Politic and Community Protection Agency, Research Recommendation No. 070/1907 / 436.8.5 / 2019 (Badan Kesatuan Bangsa, Politik, dan Perlindungan Masyarakat, Rekomendasi Penelitian No. 070/1907/436.8.5/2019).

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# Factors Affecting the Survival of Antiretroviral (Arv) Therapy Patients in One of the Hospitals in Jakarta 2007-2017

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## Abstract

**Context:** Antiretroviral therapy (ARV) is a revolution in the treatment of HIV/AIDS patients. Some prognosis factors that are known to affect the survival of ARV patients are age, gender, education level, marital status, clinical stage, functional status, initial CD4 level, transmission of HIV, opportunistic infections, type of ARV used, and adherence. This study aims to determine prognosis factors that influence the survival of ARV therapy patients at the Central Army Hospital (RSPAD) GatotSoebroto Jakarta in 2007-2017. The design of this study was a retrospective cohort using medical record data on ARV therapy patients at GatotSoebroto Hospital in Jakarta. The study sample was a naive ARV patient as many 812 patients. This study found the probability of survival of antiretroviral therapy patients during the 11 years of observation was 66.5%. The results of the analysis with Extended Cox show that the most significant prognosis factor affecting the survival of ARV therapy patients is opportunistic infections, where patients who have opportunistic infections have a risk of death 9.5 times compared to those who do not have opportunistic infections.

**Keywords:** Survival, antiretroviral therapy, prognosis factors.

## Introduction

The revolution in the treatment of people with HIV/AIDS has occurred since 1996, where since that year Antiretroviral (ARV) therapy has been carried out on PLWHA. Some prognosis factors that affect the survival of antiretroviral therapy are transmission of HIV<sup>(4-6)</sup>, CD4 levels<sup>(4,7,8)</sup>, opportunistic infections<sup>(7,9)</sup>, nutritional status<sup>(10)</sup>, age and sex<sup>(11,12)</sup>, marital status<sup>(4)</sup>, type of work<sup>(5,12)</sup>, education level<sup>(5,9)</sup> and adherence<sup>(13)</sup>.

GatotSubroto Hospital in Jakarta is one of the referral hospitals in DKI Jakarta for ARV treatment. The

GatotSubroto Jakarta Army Hospital not only serves patients with military (TNI) backgrounds but is also one of the hospitals that is accessed by the general public. This study aims to determine the prognosis factors that affect the survival of ARV therapy patients at GatotSoebroto Army Hospital in Jakarta in the period 2007 - 2017. The outcome of this outcome is the probability of survival of ARV therapy patients based on the prognostic factors that influence it and the contribution of independent variables together.

## Material and Method

The study design used was a retrospective cohort study using a dynamic cohort population system. This study took data from medical record data from GatotSoebroto Jakarta Army Hospital in 2007-2017 for HIV/AIDS patients who received ARV therapy.

The source population of this study was all HIV/AIDS patients who received ARV therapy. Eligible populations are determined based on inclusion and

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exclusion criteria. The inclusion criteria were HIV/AIDS patients who started the first ARV therapy (naive) based on medical records dynamically (during the observation period January 2007 - December 2017), adults >15 years old, starting treatment maximum 31 December 2016. While the exclusion criteria are incomplete patient data for research. The minimum sample size of the study was obtained from the sample calculation formula hypothesis test two different rates for survival analysis, that is equal to 352 subjects. The sampling technique in this study was exhaustive sampling which means that all members of the population can be taken as samples in the study, which collected 812 data.

The outcome of this study was the time of death, within the time of observation until 2017. The dependent variable produced was the survival of ARV therapy patients in units of days and the survival status of ARV therapy patients. The independent variables studied included age, gender, education level, marital status, clinical stage, functional status, initial CD4 level, opportunistic infections, types of antiretroviral drugs used, HIV transmission, and adherence.

Analysis of the data used Kaplan Meier, Log Rank Test, and Proportional Hazard (PH) Assumption with the Goodness Of Fit (GOF) test. There were one independent variables that did not fulfill the PH Assumption so that the multivariate analysis used Extended Cox.

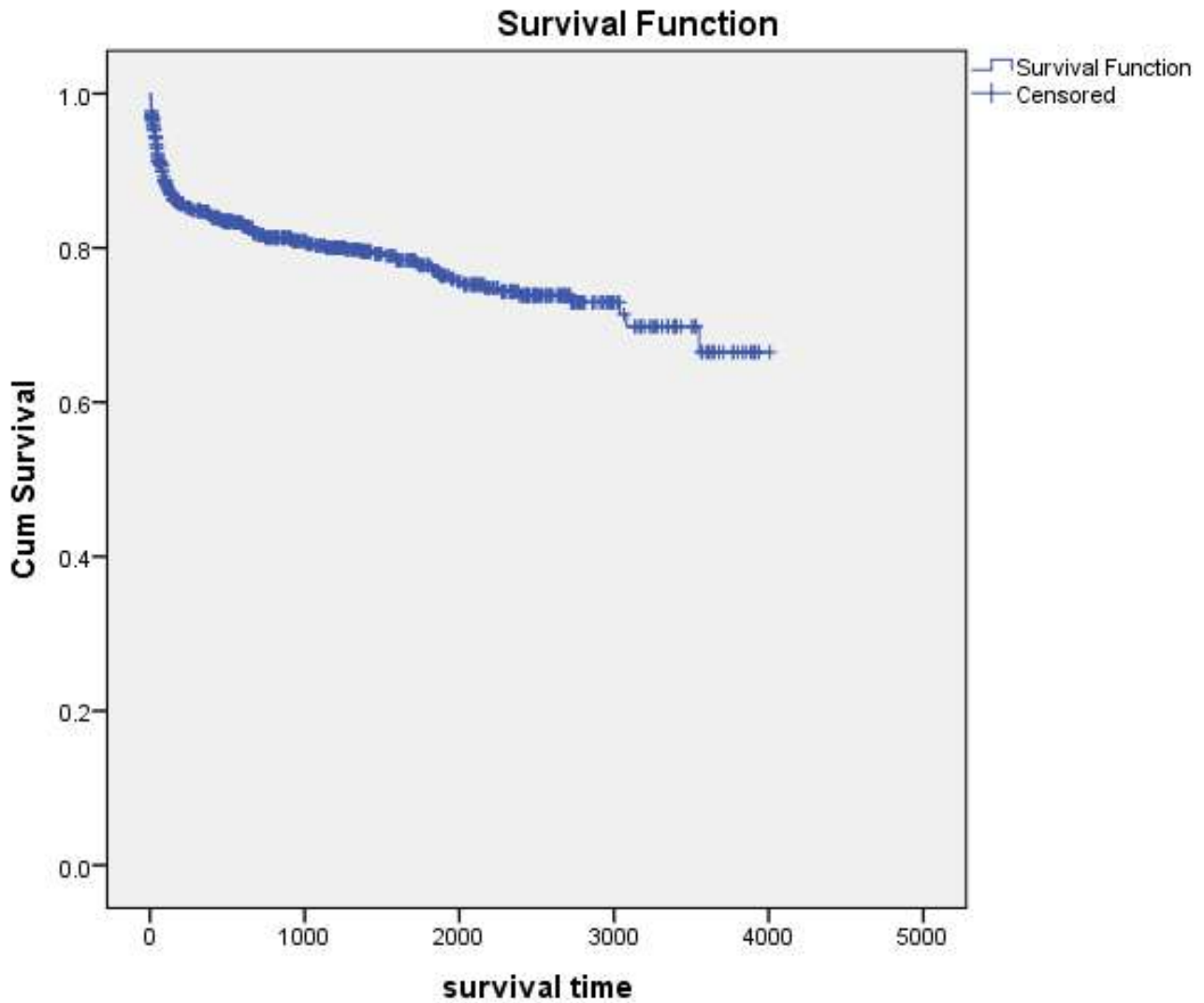
## Result

Most ARV therapy patients are seen as male patients in productive age. Age variables use the cut off point based on the ROC curve, with a sensitivity of 52.4% and specificity of 46.6%.

The clinical stage categorization is in line with the categorization of CD4 levels, and seen in 2007 - 2017 more HIV/AIDS patients started therapy after the disease reached stage III or IV or with CD4 levels reaching <200 cells/mm<sup>3</sup>. Categorization of adherence to taking medication using indicators is negligent in scheduling drug taking with variations in the number of drugs.

**Table 1: Characteristics of ARV Therapy Patients at GatotSoebroto Hospital in Jakarta**

Variable	Total	Percentage (%)
<b>Age</b>		
≤ 30,5 years	385	47,8
> 30,5 years	420	52,2
<b>Sex</b>		
Female	242	29,9
Male	568	70,1
<b>Education Level</b>		
College	160	19,9
≤ High School	646	80,1
<b>Marital Status</b>		
Married	349	46,0
Not married/divorced	410	54,0
<b>Clinical Stage</b>		
I-III	610	75,6
IV	197	24,4
<b>Functional Status</b>		
Work	634	79,4
Ambulatory	94	11,8
Lie down	70	8,8
<b>Initial CD4 Level</b>		
≥200 sel/mm <sup>3</sup>	165	20,4
<200 sel/mm <sup>3</sup>	643	79,6
<b>Transmission of HIV</b>		
Sexual	558	68,7
IDU	254	31,3
<b>Opportunistic Infection</b>		
No	101	12,4
Yes	711	87,6
<b>Type of ARV</b>		
First-line ARVs	637	78,4
First-line ARV substitution	154	19,0
Second-line ARV substitution	21	2,6
<b>Adherence</b>		
Obey	471	58,7
Disobedient	332	41,3



**Picture 1. Cumulative Probability of Survival of Patients on ARV Therapy at GatotSoebroto Army Hospital in 2007 - 2017**

From the graph, there were 166 patients (20.4%) as event and 646 patients (79.6%) as sensor. From observations for 11 years (4007 days) from January 2007 - December 2017, the last event occurred on the 3550th day, and obtained a cumulative survival probability of 66.5% with a standard error of 0.043.

The results of observations from 2007 to 2017 in this study showed that about 79.6% of patients categorized as censors, 35.7% of patients still continued treatment until the observation was completed, 19.6% of patients

were loss to follow-up and 24.3% of patients moved hospital (refer out) before the observation is complete.

The final model of Extended Cox showed that the factor that significantly affected the survival of other ARV therapy patients was the level of education (HR = 2,69; 95% CI: 1,64 - 4,42), clinical stage (HR = 2,02; 95% CI: 1,43 - 2,84), functional status (HR = 5,07; 95% CI: 3,38 - 7,60), transmission of HIV (HR = 1,77; 95% CI: 1,29 - 2,42), and opportunistic infections (HR = 9,49; 95% CI: 1,31 - 68,64).

**Table 2. Final Model of Extended Cox Analysis Factors Affecting the Survival of ARV Therapy Patients at GatotSoebroto Hospital in 2007-2017**

Variable	Coef (B)	SE	P	HR <sub>Adj</sub>	95%CI
<b>Education Level</b>					
College				1	
≤ High School	0,991	0,253	0,000	2,69	1,64 – 4,42
<b>Clinical Stage</b>					
I-III				1	
IV	0,701	0,174	0,000	2,02	1,43 – 2,84
<b>Functional Status</b>					
Work				1	
Ambulatory	1,006	0,211	0,000	2,74	1,81 – 4,14
Lie down	1,622	0,207	0,000	5,07	3,38 – 7,60
<b>Transmission of HIV</b>					
Sexual				1	
IDU	0,571	0,161	0,000	1,77	1,29 – 2,42
<b>Opportunistic Infection</b>					
No				1	
Yes	2,251	1,009	0,026	9,49	1,31 – 68, 64

\*Multivariate analysis was performed using the backward method. Variables that are released in stages are step 1: adherence, step 2: age, step 3: gender, and step 4: initial CD4 level.

## Discussion

This study uses a retrospective cohort design with survival analysis so that all subjects can be taken into account the time contribution given until the observation ends. The causal effect that results from this study can be justified because the prognosis factors for survival of ARV therapy patients precede the consequences (death). Selection bias in cohort studies can occur due to lost to follow-up or loss of subjects of observation before the observation period ends. However, because the percentage of lost to follow-up is less than 20% so it can still be tolerated. Information bias that might occur in this study is information about medication compliance which is only based on adherence to the promise of taking the drug, but not based on compliance with taking the drug. However, the possibility of this bias occurs in both groups, so that the bias that occurs is categorized as non-differential misclassification.

The probability of survival for 11 years obtained from this study was 66.5%. This result lower than the study conducted by Lela Amelia (2007) in Fatmawati General Hospital who found a 33-month survival probability of ARV therapy patients at 78.2%, but higher than the Sri Rami (2008) study that had a 3-year survival probability at RSKO Jakarta at 40.60%. What needs to be noted was the number of patients referred out. Judging from the

adherence factor, the patients referred out, which almost all belonged to the obedient category, so we can assume the patients who referred out were still alive until the end of the observation period. Based on the results of multivariate analysis, several prognosis factors affecting the survival of ARV therapy patients are education level, clinical stage, functional status, transmission of HIV, and opportunistic infections.

From the survival curve it was found that the cumulative survival probability of patients with tertiary education was 78.5%, while patients with education ≤ high school amounted to 62.6%. Variables of education level statistically influenced the survival of ARV therapy patients with P 0,000 (HR 2,69, 95% CI: 1,64 - 4,42), in other words patients with ≤high school educational levels equivalent had 2.7 times greater risk of death than college education level. This is in line with the Apidechkul (2011) study which states that the survival of ARV therapy patients is lower in people with lower levels of education because they are far from health information and health services caused by poverty. However, this result is different from the results of the research by Guerreiroet. al (2002) which states that highly educated ARV therapy patients have a risk of death of 15.58 times than those of low-educated ARV therapy.

The division of clinical stadium categories was divided into groups starting ARV therapy at clinical stages I, II, III and in clinical stage IV. The division of this category is based on the data of the patients studied starting from 2007 where in the range of 2007-2011 the policy of ARV therapy began after the patient had a CD4 level <200 cells / mm<sup>3</sup> or had entered stage IV, whereas from 2012 onwards the policy changed where the patient can start ARV therapy with CD4 levels <350 cells / mm<sup>3</sup> or at clinical stages I, II and III. Clinical stage variables were statistically influencing the survival of ARV therapy patients with P 0,000 (HR 2,02, 95% CI: 1,43 - 2,84), in other words patients who started ARV therapy at IV clinical stage had twice the risk of death compared to patients who start ARV therapy at clinical stages I, II and III.

Functional status variables statistically affected the survival of ARV therapy patients with P 0,000 (HR = 2,74; 95% CI: 1,81 - 4,14) (HR = 5,07; 95% CI: 3,38 - 7,60) in other words the group of patients with ambulance functional status has a risk of death 2.7 times compared to the group of patients with functional status of work, while the group of patients with lie down functional status has a risk of death 5.1 times compared to the group of patients with functional status of work. From the results of the study, it was found that there was a dose response relationship in functional status variables.

Transmission of HIV variable were statistically significant for the survival of ARV therapy patients with P 0,000 (HR 1,77; 95% CI: 1,29 - 2,42), in other words patients who contracted HIV because IDU use had a 1.8 times greater risk of death than because of sexual intercourse. This is in line with the research of Mahdi (2005) which states that survival in patients with IDU transmission is shorter than non IDU. Michael Carter reports, people with HIV from heterosexual, or homosexual risk groups were more likely to survive longer than five years after taking ARVs than those who contracted HIV through injecting drug use (97% vs. 97% vs. 83%). Injecting drug use in people with HIV / AIDS has a risk of death (HR of 8.81 times compared to non-injecting drug users as in sexual behavior (Gorgoset. Al, 2006). Injection drug use will more easily spread intravenously to poison the whole blood flow so as to facilitate infection with the HIV virus which will gradually reduce immunity (Apidechkul 2011).

Opportunistic infection variables significantly

affected the survival of ARV therapy patients with P 0.026 (HR 9.49; 95% CI: 1.31 - 68.64), in other words patients who had opportunistic infections had a 9.5 times greater risk of death than patients who did not have opportunistic infection. The results of this study are in line with the research of Nastiet. al (2003) who stated in the results of his research that HIV / AIDS sufferers who had diseases due to opportunistic infections had a 2.8 times the risk of death (HR) to die compared with patients without opportunistic infections. Whereas from the results of the research Guerreiroet. al (2001) stated that HIV / AIDS sufferers with opportunistic infections had a risk of death (HR) of 3.03 times compared to patients without opportunistic infections. The relationship between opportunistic infections and the survival of ARV therapy patients in the study showed a significant relationship, but the range of HR confidence intervals obtained was quite wide. This is probably due to the low number of respondents who did not have opportunistic infections and only 1 (one) event occurred in this group.

## Conclusion

The probability of surviving ARV patients at the GatotSoebroto Army Hospital in Jakarta from 2017 to 2017 is 66.5%. Factors affecting the survival of ARV therapy patients include education level, clinical stage, functional status, transmission of HIV and opportunistic infections. The most dominant factor affecting the survival of ARV therapy patients is opportunistic infections, where patients who have opportunistic infections have a risk of death 9.5 times compared to those who do not have opportunistic infections.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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# Assessment of Medical Rehabilitation Patients on Service Convenience

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## Abstract

**Background:** In the last 3 years outpatient installations have not been able to reach the specified patient satisfaction standard. The existence of a tiered BPJS system made the visit of the Medical Rehabilitation Poly to be poly with the most number of visits among other poly. After conducting the data survey at the beginning it was known that the patient's satisfaction was still low at the Medical Rehabilitation Poly with 70% of patients stating that they were not satisfied with the facilities and services available.

**Objective:** The purpose of this study was to analyze the respondents' assessment of service convenience at the Medical Rehabilitation Center.

**Method:** This study was analytic observational with a cross sectional approach. The population in this study were all patients at the Medical Rehabilitation Poly in 2017. The samples used were 333 respondents. The study was conducted using a questionnaire by asking questions directly to the respondents.

**Result:** Based on service convenience dimensions, respondents rated decision convenience as good, very good access convenience, good transaction convenience, and good benefit convenience. There is only one variable that is poorly assessed, namely service waiting time in transaction convenience.

**Conclusion:** The conclusion of this study is that respondents considered that service convenience in the Medical Rehabilitation Poly of Rumah Sakit Islam A. Yani Surabaya was good.

**Keywords:** *Assessment, Satisfaction, Service Convenience.*

## Introduction

Health is a basic need for society. Today people are becoming increasingly aware of the quality or quality of health services that are able to provide satisfaction to the community itself. Satisfaction is closely related to the expected service and the reality of the service that has been provided. Satisfaction will be fulfilled if the service provided in a hospital is felt to be in line with expectations.

Consumers or patients in choosing to utilize health services from a hospital prioritizing comfort is one of the most important things<sup>2</sup>. It is very important to understand the concept of comfort that consumers want (the target market) of a hospital because the increasing technology

that facilitates public access to various hospitals with competitive prices causes consumers to have many choices and increasingly want comfort<sup>7</sup>. Convenience of consumers needs to be evaluated or measured in order to improve the quality of health services. Five types of customer convenience that can be identified, namely (1) Decision Convenience, consumer perceptions of deciding to use a service, (2) Access Convenience, ease of access to service places, (3) Transaction Convenience, ease of transaction when serving, (4) Benefit Convenience, ease in obtaining conformity between benefits obtained with the sacrifices made, (5) Post Benefit Convenience, reuse of these services.

In 2018 patient satisfaction for the Outpatient Installation of the Rumah Sakit Islam A. Yani Surabaya

with a satisfaction score of 76.23% still did not meet the patient satisfaction standard of  $\geq 90\%$ . During the last 3 years based on data from the medical record unit, outpatient units experienced a rapid increase in visits. This is also due to the existence of a tiered referral system from BPJS. Among all work units, the Medical Rehabilitation Poly is a work unit with the highest number of visits in 2017.

After conducting the initial data survey and interviewing 30 patients at the Medical Rehabilitation Police, they said they were not satisfied with the facilities and services available. So the problem raised in this study is the low patient satisfaction at the Medical Rehabilitation Poly in 2018.

The purpose of this study was to analyze the respondents' assessment of service convenience at the Medical Clinic of the Yogyakarta Yani Islamic Rehabilitation Hospital.

### Material and Method

This study is an observational analytical study, in which data and information are collected without intervention or treatment in the population. The research design was reviewed in terms of the time of the study, this study used a cross sectional research approach, namely data collection and research subjects were only observed once at a certain time or time.

The population in this study were all patients in the Medical Rehabilitation Poly of the Y Yani Hospital in Surabaya in 2017. The number of patient visits in 2017 was 29761. The sample criteria in this study were respondents who had received service, respondents were aware and were able to communicate with well, the respondent is willing and agrees to fill out the questionnaire. The sample for this study was 333 patients.

This research was carried out at the Medical Rehabilitation Clinic of the Islamic Hospital of A. Yani Surabaya during April - May 2019. The research was conducted by asking respondents directly about questions related to their assessment of service convenience.

### Result

**Service Convenience:** Convenience services are consumer perceptions of time and effort in using services<sup>1</sup>. This conceptualization uses the dimensions of time and effort as convenience (saving time or effort)

or costs or the burden of inconvenience (waste of time and or effort). There are five types of identification, namely decision convenience, access convenience, transaction convenience, convenience benefits and post benefit convenience. Each type of convenience reflects the stages of consumer activity related to the purchase or use of services<sup>1</sup>.

- a. **Decision Convenience:** Consumer perceptions of the cost of time and effort to make a purchase decision or service use. Decisions include consumers who will do themselves or buy services, choose service suppliers and determine the specific services to be purchased<sup>5</sup>.
- b. **Access Convenience:** Consumer perceptions of the cost of time and effort to initiate service delivery. Consumers do when deciding to use one service, access is needed to reach or receive these services such as actions that must be taken by customers to order or request services / services, for example consumers must come directly, order with telephone, internet and fax)
- c. **Transaction Convenience:** Customer perception of the cost of time and effort to enter into a transaction. This is done when the consumer has decided and accesses the services, then the consumer participates in receiving services<sup>6</sup>. This type of convenience focuses on the actions that consumers must take in obtaining the right to use services<sup>4</sup>.
- d. **Benefit Convenience:** Customer perceptions of the cost of time and effort to experience the core benefits or services<sup>5</sup>. Consumers can estimate the fairness between the direct and indirect costs spent with the core benefits obtained. Consumers who have a negative perception of benefit convenience will have a worse effect on overall service convenience. This is due to the cumulative negative perceptions of decision, access and transaction convenience<sup>1</sup>.
- e. **Post-Benefit Convenience:** Customer perception of the cost of time and effort when contacting the service provider again after the benefit stage. This stage is felt by consumers after getting the core benefits of consumer services. This type of convenience relates to consumer needs for product repairs, maintenance and exchange. This also includes situations where a postoperative patient must follow up<sup>5</sup>.

Service quality starts from customer needs and ends at the customer's perception. This means that the

image of good quality is not based on the point of view or perception of the service provider, but based on the customer's point of view or perception. Customers are consumers who consume and enjoy company services, so customers are the ones who should determine the quality of services<sup>4</sup>.

**Respondent's Assessment of Service Convenience in the Medical Rehabilitation Poly of the Rumah Sakit Islam A. Yani Surabaya:** Respondents' assessment of service convenience at the Medical Rehabilitation Poly of Rumah Sakit Islam A. Yani Surabaya, which included decision convenience variables, access convenience, transaction convenience, and convenience benefits performed by scoring and then calculated the total score and mean. Comparison of the average results of each

service convenience variable is explained in table 1 below.

Mean 1,00 – 1,75 : Very Bad

Mean >1,75 – 2,50 : Bad

Mean >2,50 – 3,25 : Good

Mean >3,25 : Very Good

**Explanation:**

1 = very dissatisfied

2 = dissatisfied

3 = satisfied

4 = very satisfied

**Table 1: Respondent's Assessment of Service Convenience in the Medical Rehabilitation Poly of the Rumah Sakit Islam A. Yani Surabaya in 2019**

No.	Service Convenience	Score				Total Score	N	Mean	Exp.
		1	2	3	4				
<b>I. Decision Convenience</b>									
1.	Ease of information in decision making	0	7	279	47	1039	333	3,12	Good
<b>Average Assesment Decision Convenience</b>								<b>3,12</b>	<b>Good</b>
<b>II. Access Coveniencie</b>									
2,	Distance between hospital and respondent's house	7	40	160	126	1071	333	3,21	Good
3.	Costs incurred to go to hospital	0	7	159	167	1159	333	3,48	Very Good
<b>Average Assessment Access Convenience</b>								<b>3,34</b>	<b>Very Good</b>
<b>III. Transaction Convenience</b>									
4.	Presence of a doctor	0	33	210	90	1056	333	3,17	Good
5.	The existence of nurses	0	12	161	160	1147	333	3,44	Very Good
6.	Doctor's skills	0	0	209	124	1123	333	3,37	Very Good
7.	Nurse skills	0	21	271	41	1019	333	3,06	Good
8.	Doctor's modesty	0	6	228	99	1092	333	3,27	Very Good
9.	Courtesy nurses	0	7	234	92	1084	333	3,25	Good
10.	Ease of administrative procedures	7	34	258	34	985	333	2,95	Good
11.	Waiting time before receiving service	67	114	152	0	751	333	2,25	Bad
12.	Sophisticated medical devices	0	27	258	48	1020	333	3,06	Good
13.	Cleanliness of the waiting room	0	0	227	106	1105	333	3,31	Good
14.	Cleanliness of service space	0	0	141	192	1191	333	3,57	Very Good
15.	Security during service	0	14	223	96	1081	333	3,24	Good
<b>Average Assessment Transaction Convenience</b>								<b>3,16</b>	<b>Good</b>
<b>IV. Benefit Convenience</b>									
16.	Benefits obtained after service	0	25	207	101	1075	333	3,23	Good
<b>Average Assessment Benefit Convenience</b>								<b>3,23</b>	<b>Good</b>
<b>Average Assessment Service Convenience</b>								<b>3,21</b>	<b>Good</b>

As ed on table 1, it can be learned that the decision convenience dimension is considered good by the respondents. In the dimension of access convenience, the average value of the results shows a very good category. In the transaction convenience dimension, the average respondent judges good. However, on transaction convenience, the item waiting time before receiving service is considered bad by the respondent. While on the benefits convenience dimension, respondents were considered good. Overall, respondents' assessment of service convenience is good with a mean overall dimension of 3.21.

## Discussion

**Respondents' Assessment Analysis of Convenience Service at the Medical Rehabilitation Poly of the Rumah Sakit Islam A. Yani Surabaya:** At this time the patient's comfort factor is very important. The comfort felt by patients when obtaining health services will have an influence on the utilization of health services. The variables used to measure patients' convenience (satisfaction) with satisfaction in this study are decision convenience, access convenience, transaction convenience and benefit convenience<sup>1</sup>.

**Decision Convenience:** Decision convenience is a patient's perception of the time and effort that must be sacrificed in making a decision to utilize health services<sup>1</sup>. Based on the research results of the respondents at the A. Yani Surabaya Islamic Hospital Medical Rehabilitation Poly, the decision-making process and speed of decision-making to carry out medical rehabilitation services at the A. Yani Islamic Hospital in Surabaya were carried out quickly because 100% of the respondents came from BPJS, they are bound by health insurance regulations so that the decision-making process and speed of decision making are carried out very easily and quickly<sup>4</sup>.

**Access Convenience:** Access Convenience is the patient's perception of the costs, time and effort that must be sacrificed in order to be able to start to obtain health services<sup>1</sup>. Access means that health services are not hindered by geographical, social, economic, cultural, organizational or language barriers. Geographical access can be measured by the type of transportation distance, travel time and other physical barriers that can prevent a person from obtaining health services.

Based on the results of the study, access convenience at the Poli of Medical Rehabilitation of the Islamic Hospital of A. Yani Surabaya has been very good and

needs to be maintained. According to respondents' comments regarding the costs incurred in obtaining services they did not burden them. Likewise with regard to distance, the position of the A. Yani Surabaya Islamic Hospital is near shopping centers, stations, and major roads making the respondents' assessment of the distance very good because it is easily accessible.

**Transaction Convenience:** Transaction convenience is a patient's perception of the costs, time and effort that must be sacrificed to make a transaction<sup>1</sup>. The comfort type focuses on the actions that must be taken by the customer to obtain the right to use the service. The greater the effort made by respondents to get health services, the smaller the value of the convenience of transactions obtained<sup>8</sup>. Customer assessment of a service can also be influenced by the personal interaction of respondents to health workers in health services.

Based on the research results of transaction convenience at the A. Yani Hospital Surabaya Medical Rehabilitation Polyclinic, the variable presence of nurses, doctor's courtesy, and cleanliness of the service room were considered very good, while nurses 'skill variables, nurses' courtesy, administrative procedures, sophistication medical devices, cleanliness of the waiting room, and security during service are considered good. But there is one variable that is considered bad, namely the waiting time before service. According to respondents' comments, the waiting time is still too long but has increased from the previous year from the old poly room.

**Benefit Convenience:** Convenience benefit is the fourth type of convenience examined in this study<sup>1</sup>. Benefit convenience is the consumer's perception of the cost of time and effort to get the core benefits of services. This type of comfort is comfort while getting or utilizing health services<sup>7</sup>.

Based on the results of the benefits convenience study at the Medical Rehabilitation Poly of the Rumah Sakit Islam A. Yani Surabaya, respondents were considered good.

## Conclusion

he conclusion of this study is that the service convenience model is that respondents consider that service convenience in the Medical Rehabilitation Center of the Islamic Hospital of A. Yani Surabaya is good. This can be seen from the results of the study, from

the decision convenience it was considered good, access convenience was considered very good, transaction convenience was considered good, and benefit convenience was considered good. But in transaction convenience, the waiting time variable is considered bad by the respondent. This is due to the high number of patient visits in one year. So that the advice that can be given to the management of the Medical Unit of the Medical Rehabilitation Center of the Islamic Hospital of A. Yani Surabaya is to maintain the existing facilities and services because the respondents consider that the service convenience is good.

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# Relationship Between Safety Promotion and Perception of the Use of Personal Protective Equipment (PPE) on Workers at Pt Aneka Gas Industri Region V East Java

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## Abstract

**Context:** The behavior of not using personal protective equipment (PPE) is an unsafe decision that can increase the number of work accidents and work-related illnesses in the industrial environment. One of the factors that can influence the behavior of using PPE is individuals' perception. Perception can be analyzed using a theory called as the Health Belief Model (HBM). Cues to action according to the safety promotion is one component of HBM, which is an external factor that can influence individual's perception. Hence, this study aims to analyze the relationship between safety promotion and worker's perception about the use of PPE.

This research is a quantitative descriptive study with a cross-sectional design. The samples were chosen based on the slovinformula and obtained a total sample of 87 operating unit workers of various departments at PT. Aneka Gas Industri Region V, East Java. The independent variable in this study is the effectiveness of Safety Promotion. While the dependent variable in this study is the perception of the use of PPE. The data was analyzed using the Chi-Square correlation test.

The results show that there is a relationship between the effectiveness of safety promotion and the perception of PPE ( $p = 0.013$ ). This study concludes that there is a relationship between the effectiveness of safety promotion with the perception of the use of PPE.

**Keywords:** *Safety Promotion, Personal Protective Equipment (PPE), Health Belief Model (HBM).*

## Introduction

The rapid development of industrial sector may be affected by increased potential hazards in the workplace. If industries do not controlled their application of good occupational safety and health, it will cause increase the

number of work accidents and occupational diseases. Data from the International Labor Organization (ILO) in 2018 states that 2.78 million workers die each year due to workplace accidents and occupational diseases<sup>(1)</sup>. Heinrich's research (1959) shows that 88% of work accidents are generally caused by unsafe behavior<sup>(2)</sup>. One example of workers' unsafe behavior that has a high risk of work accidents and occupational diseases is non-compliance in the use of Personal Protective Equipment (PPE).

Non-compliance behavior using PPE can be influenced by several factors and one of them is workers' perception on the use of PPE during work. A research by Ristia (2017) revealed that perceived risk and knowledge influenced workers compliance in using PPE<sup>(3)</sup>. One

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method for understanding workers perceptions is by analyzing it through the Health Belief Model (HBM) theory. There are four main types of perceptions within the HBM theory, namely the perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. In its development, the HBM model is expanded by adding a couple of variables, namely self-efficacy and cues to action<sup>(4)</sup>.

According to Rosenstock (1966), cues to action was added to the HBM model based on the assumption that it would stimulate individual perceptions<sup>(5)</sup>. Thus, programs in the workplace are capable of forming or changing worker's perceptions, especially in regard to information and messages related to the use of PPE, one of which is by implementing safety promotions. According to WHO (1998), Safety promotion is a process applied at a local, national and international level by individuals, communities, governments and others, including enterprises and non-government organizations, to maintain and develop safety<sup>(6)</sup>. A research by Saragih *et al.* (2016) shows that most workers have positive perception about the use of PPE due to the exposure of safety talk carried out every morning before they start to work<sup>(7)</sup>.

As one of the leading companies in the industrial gas processing sector in Indonesia, PT. Aneka Gas Industri Region V still encounter some issues related to the use of PPE. No studies have analyzed the workers' perceptions about using PPE and the association with safety promotion that has been taken by the company. Therefore, this study aims to analyze the relationship between the company's effort to perform safety promotion with the workers' perception of the use of PPE at PT. Aneka Gas Industri Region V based on the theory of HBM.

## Material and Method

This study is based on a framework of HBM theoretical concepts that was developed by Glanz *et al.* (2015). This framework explains that cues to action can affect individual healthy behaviour, both directly and indirectly, through its influence on individual perceptions which consist of perceived risk (perceived susceptibility & severity), perceived benefits, perceived barriers, and perceived self-efficacy<sup>(8)</sup>.

This research is a quantitative descriptive research with a Cross-Sectional study. This research was conducted at PT. Aneka Gas Industri Region V, East Java, Indonesia in February-May 2019. The sample of this study includes 87 operational unit workers from various departments; the number sample was determined by Slovin formula from a total of 105 worker populations. The primary data is obtained by distributing questionnaire to the respondents. Meanwhile, the secondary data was obtained by analyzing data owned by the company, including a general description of the company and safety programs. All data that obtained are displayed in the form of narratives, tables of frequency distribution and cross tabulation using the Chi-Square correlation test.

## Result

PT. Aneka Gas Industri Region V East Java is a company that produces different types of gases that are needed for the production of other industries. The company has a Safety Health and Environment (SHE) Department who is responsible for identifying and mapping potential hazards, as well as making ideas related to the safety program. One of the safety programs that has been implemented is Safety Promotion, which includes having safety talk, safety induction, safety sign & safety training.

The majority of respondents in this study were >35 years old male workers. The majority of respondents are high school graduates and the majority of respondents are classified as workers who have work in the company for, at least, 3 years.

**1. Effectiveness of Safety Promotion:** The effectiveness of the safety promotion is measured through a questionnaire containing 14 statements that represent 5 main components of safety promotion effectiveness measurement. The measurements consists of the content of the message, types of media used, the goal target, target involvement and leader involvement. Frequency distribution effectiveness of safety promotion for each statement can be seen in **Table 1**.



**Table 1: Frequency distribution effectiveness of safety promotion**

Component of effectiveness of safety promotion	Answer	N	%
<b>Message Content</b>			
1. There is information about using PPE on Safety Promotion	Yes	79	90,8
	No	8	9,2
2. The messages on Safety Promotion are informative or explains in detail	Yes	66	75,9
	No	21	24,1
3. The messages on Safety Promotion are persuasive or invites	Yes	77	88,5
	No	10	11,5
4. The messages on Safety Promotion are emotional or has the effect of fear and deterrence	Yes	16	18,4
	No	71	81,6
<b>Media</b>			
5. The Safety Promotion is delivered using media that are easily seen and understand	Yes	84	96,6
	No	3	3,4
6. The Safety Promotion uses various and diverse media	Yes	31	35,6
	No	56	64,4
7. The Safety Promotion medias always replaced and updated	Yes	46	52,9
	No	41	47,1
8. There is a media platform that shows the Safety Promotion messages,which contains picture of thepractices, training or video	Yes	58	66,7
	No	29	33,3
<b>Goal Target</b>			
9. The Safety Promotion has delivered equally to all workers	Yes	55	63,2
	No	32	36,8
10. At least every week the workers received Safety Promotion	Yes	33	37,9
	No	54	62,1
<b>Target Involvement</b>			
11. The workers are involved in planning and making of the Safety Promotion	Yes	25	28,7
	No	62	71,3
12. The workers can give advice or feedback on the Safety Promotion	Yes	81	93,1
	No	6	6,9
<b>Leader Involvement</b>			
13. The leader of the company is involved in the planning and the making of the Safety Promotion	Yes	73	83,9
	No	14	16,1
14. Safety Promotion is given bythe SHE (Safety, Health & Environment) department	Yes	85	97,7
	No	2	2,3

Based on **Table 1**, the 4 components have a less effective category. Respondents who have assessed the messages on the Safety Promotion said that the messages weren't emotional or does not create a fear and deterrence emotion. Respondents considered the Safety Promotion doesn't use various and diverse types of media. Respondents considered the safety promotion is not applied every week. While some workers, felt that they were not involved in the design and manufacture of the safety promotion .

**Table 2: Frequency distribution total effectiveness of safety promotion**

Safety Promotion	N	%
Effective	70	80,5
Less effective	17	19,5
Total	87	100

Overall, 70 respondents (80.5%) agree that the safety promotion applied at PT. Aneka Gas Industri Region V have been effective. While as many as 17 respondents

(19.5%) say that the safety promotions that was applied is still not as effective.

**2. Perception of Use of PPE:** The perception of the use of PPE consists of 4 components, namely perceived risk, perceived benefits, perceived barriers and perceived self-efficacy. Each component consists of 5 statements that are answered based on a Likert scale.

**Table 3: Frequency distribution Perception of Use of PPE**

Perception of the use of PPE	Category	N	%
Perceived Risk	Positive	76	87,4
	Negative	11	12,6
	Total	87	100
Perceived Benefits	Positive	56	64,4
	Negative	31	35,6
	Total	87	100
Perceived Barriers	Positive	59	67,8
	Negative	28	32,2
	Total	87	100
Perceived Self-Efficacy	Positive	86	98,9
	Negative	1	1,1
	Total	87	100

Based on Table 3, all components are included in the positive category. The number of respondents with the highest number of positive perception category is the perceived self-efficacy (98.9%). While the number of respondents with the least positive perception category is perceived benefits (64.4%). Overall, 29 respondents (33.3%) had negative perceptions while 58 respondents (66.7%) had positive perceptions about the use of PPE.

**3. Relationship Between Safety Promotion and Perception of the Use of PPE:** Based on Table 4, the highest value shows that the workers who assess the safety promotion agrees that the promotion have been effective and create positive perception about the use of PPE during work (58.6%). The relationship between the effectiveness of safety promotion and the perception of the use of PPE was then analyzed using the Pearson chi-square statistical test and obtained a p-value = 0.013 ( $p < \alpha$ ). This shows that there is a relationship between the effectiveness of safety promotion and the perception of the use of PPE.

**Table 4: Frequency distribution Perception of Use of PPE**

Safety Promotion	Perception of the Use of PPE				Total		Pearson Chi-Square
	Positive		Negative		N	%	
	N	%	N	%			
Effective	51	58,6	19	21,8	70	80,5	0,013
Less effective	7	8,1	10	11,5	17	19,5	
Total	58	66,7	29	33,3	87	100	

**Discussion**

**1. Effectiveness of Safety Promotion:** Overall, majority of respondents agree that the safety promotion applied at PT. Aneka Gas Industri Region V have been effective. But there are 4 components show as a less effective category. The first component is the messages on safety promotion aren't emotional or does not form a feeling of fear and deterrence. The most frequently way to arouse emotions is to touch the feeling of fear. According to Planek (1998) in Primadana (2013), emotional messages can increase the strength of safety promotion because it can cause feelings of pressure, which makes workers be more careful when working<sup>(9)</sup>.

The second component is Safety Promotion doesn't use various and diverse types of media. According to Notoatmodjo (2005), the use of several diverse and integrated media will increase the scope, frequency, and the effectiveness of the messages delivered to the target audience. The diversity of media will be able to attract the attention of the workers so that workers are not bored and always interested in seeing and understanding the content of the messages<sup>(10)</sup>

The third component is frequency of applying the safety promotion, which so far has been done weekly. According to the Department of Safety, Health, and Environment (SHE), most of the safety programs has been done daily, including the safety talk. However,

other programs, such as renewal of safety sign and OHS training, are rarely implemented. The frequency of communication about safety messages is useful to reach a broad range of target population and also to deepen the recognition, understanding, and formation of images of these messages (Salmon, 2003)<sup>(11)</sup>

The fourth component is that workers are not actively involved in the design and manufacture of the safety promotion. According to Planek (1998) in Primadana (2015), the involvement of workers in planning and designing safety promotion is beneficial to increase the positive effect of the safety promotion<sup>(9)</sup>. Involving the workers in the process of creating the safety instructions will increase the interest of the workers. In addition, feedbacks from the workers is needed so that the company can choose messages that suit the needs of the workers accordingly.

- 2. Perception of the use of PPE:** Based on the results of the questionnaire, 76 respondents (87.4%) responded positively towards the perceived risk of the use of PPE. This shows that the workers are aware of the risk when they do not use PPE at work. Individuals who believe that they have a high risk of an illness or accident are more likely to carry out healthy or safer behaviors<sup>(12)</sup>. Perceived self-efficacy is classified on the positive perception category (98.9%). The workers in the company feel confident that they are able to implement safe and obedient behavior in using PPE. The behavior to prevent health problems can be influenced by how confident the individual is to their ability in making healthy behavioral changes. People tend to adopt healthy behaviors if they think they will succeed<sup>(13)</sup>

Perceived benefit in using PPE has a positive value, but is not too high (64.4%). This shows that a number of respondents have a negative perception about the use of PPE. So, the company must evaluate their safety promotion actions by assessing each aspects of the information, more importantly information that may increase workers' perception about the benefits of implementing PPE. Perceived barrier also has a positive value that is not too high (67.8%). Some respondents felt there were still some barriers in using PPE when working. Perceived barriers will affect a person's healthy behaviour and decision. If there are a lot of barriers exist in performing the behavior, then the individuals are less likely to adopt the behavior.

- 3. Relationship Between Safety Promotion and Perception of the Use of PPE:** The results of this study shows that there is a relationship between the effectiveness of safety promotion with the perception of the use of PPE. The results of this study are in line with Tinoco *et al.* (2019) research which explains that the perceptions of using PPE is related to daily behavior as a result of the interpretation of external stimuli (information). External factors, such as safety training, have an indirect effect on the behavior of using PPE through its influence on risk perceptions. Thus, the higher the availability of instructions on matters relating to health, work safety, and the correct use of PPE, the higher the chance of using PPE effectively<sup>(14)</sup>. Saragih's research (2016) also shows a similar result where most workers have a positive perception of PPE when a company held a safety talk every morning before starting work<sup>(7)</sup>

### Conclusion

1. The majority of the respondents agree that the safety promotion at PT. Aneka Gas Industri Region V has been effectively applied. However, the company needs to reconsidered several components related to the existing safety promotion, such as messages that are less emotional, limited variety of media use, not enough frequency of application that needs, and the lack of workers involvement in designing the safety promotion
2. Respondents have a positive perception regarding the use of PPE.
3. There is a relationship between the effectiveness of safety promotion with the perception of the use of PPE.

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**Conflict of Interest:** There are not any of conflicts amongst the authors

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# Correlation of Multidetector 64 Ct Pulmonary Angiography and Well's Clinical Score in Pulmonary Embolism

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## Abstract

**Objective:** To correlate the findings of 64 MDCT Pulmonary angiography & Well's clinical scoring system in cases of pulmonary embolism

**Patients and Method:** The study was done between April 2010 to May 2012, 50 patients with suspected clinical pulmonary embolism underwent 64- Multislice CT pulmonary angiography. CT angiography was used in examination and evaluation for patients suspected of having PE with Correlation with clinical Well's scoring system.

**Results:** Images from "41 of 50" thoracic CT pulmonary angiography examination revealed clots within pulmonary arteries, which equals a prevalence of PE of 82%, overall (10 of 41 at pulmonary trunk, 8 of 41 at segmental pulmonary arteries and 18 of 41 at subsegmental pulmonary arteries, of 24%, 19.5% and 43.9% respectively, 5 of 41 at multiple central/segmental and segmental/subsegmental arteries of 12%)

Patients with low Well's score probability confirmed to have very low incidence of pulmonary embolism, while patients with both medium & high Well's score probability having high incidence of pulmonary embolism in CT Pulmonary angiography in our study

**Conclusion:** Correlation of Both 64-MDCT Pulmonary Angiography & Clinical Scoring Well's systems showing high relation in-between, considering that group having low clinical probability to have PE,

**Keywords:** MDCT, Angiography, Pulmonary

## Introduction

Multidetector CT has allowed the development of new imaging techniques such as CT angiography, which has become a reliable noninvasive technique for vascular imaging <sup>(1)</sup>.

MDCT technique allows increase in gantry speed and acquisition of contiguous sections with a section thickness of 1 mm or less throughout the thorax, with a reduced acquisition time. The reduced acquisition time

yields optimal contrast enhancement on all acquired sections. <sup>(2)</sup>.

A variety of congenital and acquired pulmonary vascular disorders can be diagnosed using pulmonary CT angiography (PCTA) including pulmonary embolism, pulmonary artery aneurysm, pulmonary hypertension, pre-therapeutic management of bronchial carcinoma, postoperative incidents, AVM, primary pulmonary artery sarcoma, and pulmonary arterial and venous anomalies <sup>(3)</sup>.

PCTA it is now the imaging modality of choice in pulmonary embolism and has replaced other investigations as scintigraphy and conventional angiography in many institutes <sup>(4)</sup>.

PCTA plays a role in detecting pulmonary artery hypertension where dilatation of the pulmonary artery

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suggests increased pressure in the pulmonary system. In addition, evaluation of the lung windows helps in detection abnormalities of perfusion. It is also of great value in detecting pulmonary obstruction in the most common cases of secondary pulmonary hypertension <sup>(5)</sup>.

### Patients & Method

The study was done in between April 2010, and May 2012, 50 patients with suspected clinical pulmonary embolism (31 women, 19 men; age range 19-73 years, were recruited from Assuit university hospital, included patients presenting to the emergency, coronary, general ICU & surgical inpatients at the time of diagnosis presenting with signs & symptoms of suspected pulmonary embolism.

#### The 50 patients divided into two groups:

**Group I :** 40 patients with high risk

**Groups II:** 10 patients with low risk

Division & groups were done according to the clinical Well's scoring system

Also group I was reclassified according to heart rate into tachycardiac group with HR > 100 and normal heart rate group with HR < 100

Group I was divided according RV / LV ratio measured on computed tomographic (CT) angiography into 2 groups with no RVD (RV/LV<1) and with RVD (RV / LV > 1) "CT feature".

#### Inclusion Criteria:

- Sudden onset of dyspnea sudden deterioration of existing dyspnea sudden onset of pleuritic chest pain without another apparent cause.
- Any other symptoms like haemoptysis, syncope or unilateral leg pain.

#### Exclusion Criteria:

- Pregnancy
- Allergy to intra-venous contrast agents
- Renal insufficiency.

### Method

**All patients were examined and subjected to the following:**

#### I. Full history taking:

- Age, sex, Special habits
- Risk factors for venous thromboembolism as
- Surgery and related conditions:
- Surgical procedures
- Medical conditions
- Cancer
- immobilization
- Previous DVT or PE
- Increased age
- Obesity
- Pregnancy
- Certain medications
- Smoking
- Heart failure
- Kidney problems
- **Presenting symptoms including:** Dyspnea .Chest pain, Hemoptysis, Fainting, cough .leg pain or swelling.
- **Associated co-morbidity including:**
  - Ischemic heart disease
  - Hypertension
  - Diabetes mellitus
  - Stroke
  - Malignancy
  - Chronic lung disease

#### II. Referred clinician Clinical examination:

**Vital signs:** Examination of extremities either upper or lower limbs to detect signs of DVT.

**Local Examination:** Local examination (chest and heart) with emphasis on signs of pulmonary hypertension as accentuated second heart sound also presence of signs of consolidations, Pleural effusion

**Assessing Clinical Likelihood:** Different probability scores for pulmonary embolism were calculated for each patient.

### III. Imaging:

**CT Pulmonary Angiography (CTPA):** All patients underwent **64 Multislice CT** pulmonary angiography. CT angiography was used in examination and evaluation for patients suspected of having PE.

**CTPA diagnostic criteria for acute Pulmonary embolism included:**

- Complete arterial occlusion with failure to opacify the entire lumen and the artery may be enlarged in comparison with the pulmonary arteries of the same order of branching
- Central arterial filling defect surrounded by IV contrast material
- Peripheral intraluminal filling defect that makes an acute angle with an arterial wall.

### Results

The proportion of dyspnic patients was 74), patients with chest pain was 40%, and patients with positive DVT was 34% . The proportion of acute presentation of **PE** on the obtained CT findings was 80.5%, and chronic presentation was 19.5% with patients with normal CT pulmonary angiography with no evident embolism with average percentage of 19.5%

Images from “41 of 50” thoracic CT pulmonary angiography examination revealed clots within pulmonary arteries, which equals a prevalence of **PE** of 82%, overall (10 of 41 at pulmonary trunk, 8 of 41 at segmental pulmonary arteries and 18 of 41 at subsegmental pulmonary arteries, of 24%, 19.5% and 43.9% respectively, 5 of 41 at multiple central/segmental and segmental/subsegmental arteries of 12%). In *eight* patients referred for suspicion of acute pulmonary embolism **PE**, thoracic CT angiography showed abnormalities typical of chronic **PEs**, with marginal clots or arterial retraction, which was combined in *three* patients with pulmonary trunk enlargement (range 3.2 – 3.8-cm). Marginal clots were seen in labor arteries in *two* patients, and were associated with chronic obstruction, which in the other *three* patients marginal clots were present only at segmental levels. All patients with chronic clots had mosaic attenuation of the pulmonary parenchyma at lung window settings.

The proportion of dyspnic patients was 74% (37 of 50), means most of our patients presented with dyspnea representing that it is of great clinical significance, only (13 of 50) patients not presented with dysnea

The proportion of patients with chest pain was 40% (20 of 50) with (30 of 50) not presented with chest pain, representing that chest pain is not of great clinical value

Patients with positive DVT was 34% (17 of 50) & 66% (33 of 50) wasn't having DVT prior to the CT Pulmonary angiographic study

Most of patient in our study presented with acute presentation of pulmonary embolism about 33 (80.5%) of overall 41 patients with only 8 patients representing about only 19.5 % were presented with Chronic PE

Most of our patients were presented with Subsegmental pulmonary embolism (18 of 41 positive patients) representing about (43.9%) with the second common findings were in the pulmonary trunk (10 of 41 patients) about 24%, 8 patients were diagnosed to had segmental PE with 19.5% & 5 patients (12%) were diagnosed to had mixed site of the emboli

There were several risk factors for pulmonary embolism within study population . DVT was present in 34% of patients while immobility was present in 50% of patients, estrogen use was present in 8%, surgery was present in 24% of patients while malignancy was equal 6%, 4% of patients was in the postpartum period and 14% of patients had no identifiable risk factor.

Therefore Immobility is the most common risk factor for PE, followed with DVT In the present study table 13 shows comparison between the two groups group I was 41 patients in whom mean age was 44±13 ranging from 19 to 73,median 55 and IQR 33 :62.

Male patients was 35% and Female was 65%, the most frequent co morbidity was hypertension represent 27% followed by ILU & COPD 19% and 17% of cases have more than one co morbidity while no co morbidity was found in 29% of cases.

Group II was nine patients in whom mean age was 50 ± 16 ranging from 21 to 73, with median 57 and IQR 33 :63 .

Male patients was 55% while Female patients was 45%, the most frequent co morbidity was diabetes, ILD & COPD 22% for each followed by hypertension in

11% of cases and 33 % of cases have more than one co morbidity while no co-morbidity was present in 66 % of cases

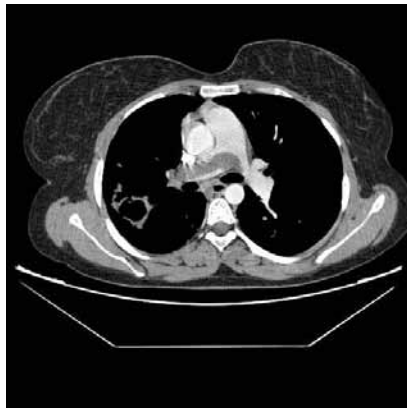
The study representing dyspnea in 82% in group I and 33% in group II followed by haemoptysis 48% in group I and 22% ill group II, haemoptysis Was 48% in group I and 22% in group II and syncope was 17% in group I with no cases of syncope in group II .

Clinical probability score wells score was in group I  $6.5 \pm 2$  and in group II was  $2.5 \pm 1$  the sensitivity and specificity of well's clinical probability score in CT diagnosing pulmonary embolism showing that it has Sensitivity 90.00% and Specificity 50% (it seems to be of high sensitivity & moderate specificity).

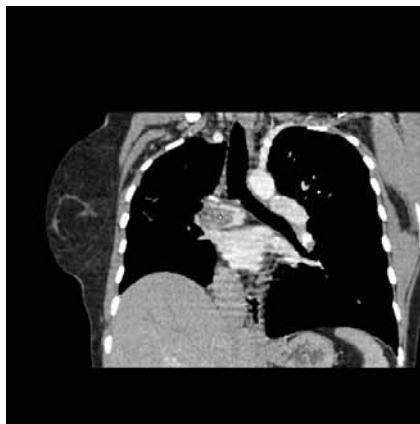
Group II had 9 patients with low clinical probabilities according to Wells scoring system and 3 (37.5 %) patient was confirmed to be -ve according to PERC rules

CT finding in cases of pulmonary embolism there was no associated parenchymal abnormality in 22 cases (54%), 8 cases (19%) with pulmonary consolidation, 4 cases (10%) with interstitial lung disease, 6 cases (14%) with pleural effusion, peripheral wedge shaped density (Humpton's Hump), pleural thickening was 5 cases (12%) & 2 cases with 5% show mediastinal LNs

The most common finding is pulmonary consolidation, followed by pleural effusion with no parenchymal abnormalities were detected in more than 50% of patients.



**Fig 1-a:** Axial CT cuts showing a large hypodense filling defect seen at the lower aspect of the pulmonary trunk and extending to the proximal portions of both main pulmonary arteries more on the right side occluding it with a thin rim of contrast at its periphery. An irregular thick walled cavitary lesion is seen at the apical segment of the right lower lobe.

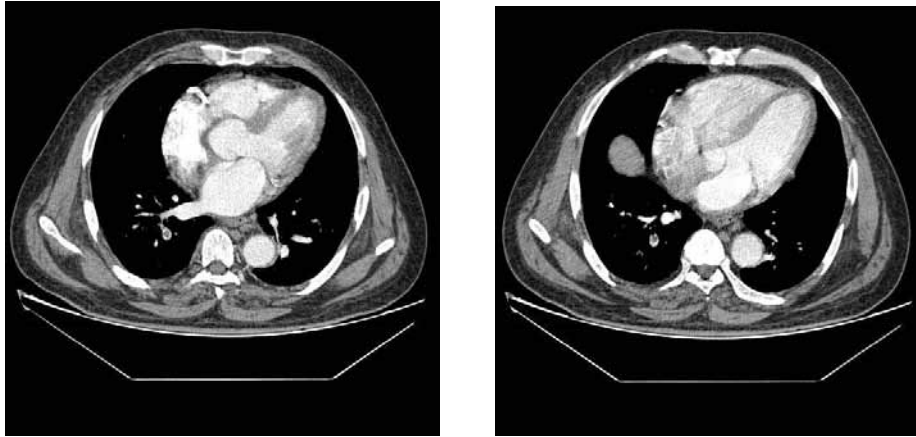


**Fig 1.b:** Oblique coronal images showing the hypodense filling defect within the main, right pulmonary artery and the proximal portion of the left one.

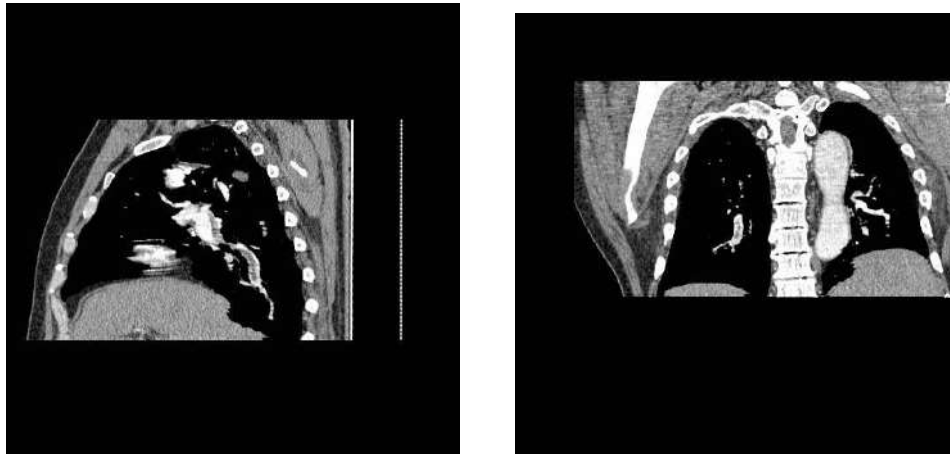
**Diagnosis:** Saddle pulmonary embolism involving the bifurcation of the pulmonary trunk and mainly the right pulmonary artery.



**PCTA:**



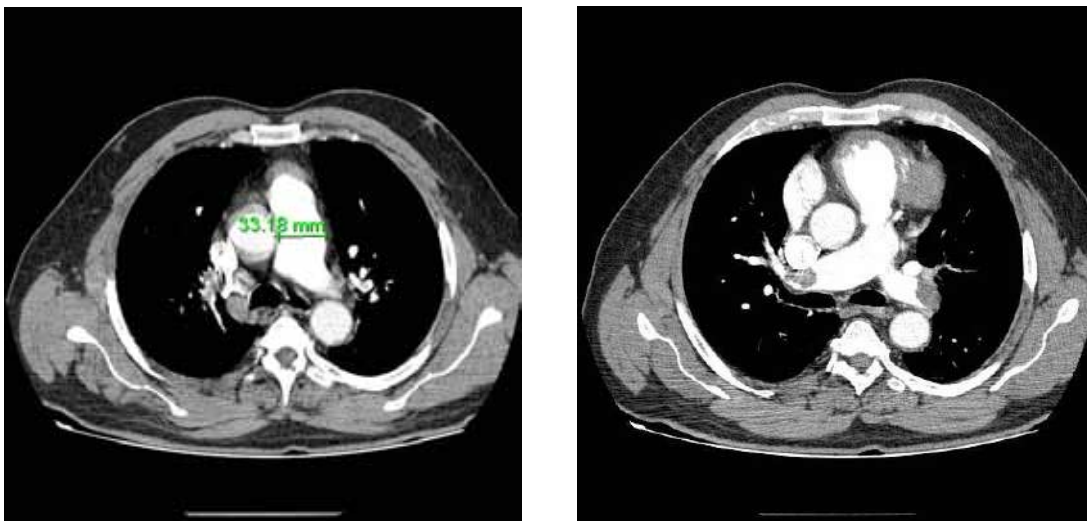
**Fig 2-a: Axial CT cuts showing a central hypodense filling defect in the right posterobasal sub segmental right lower lobe (arrow).**

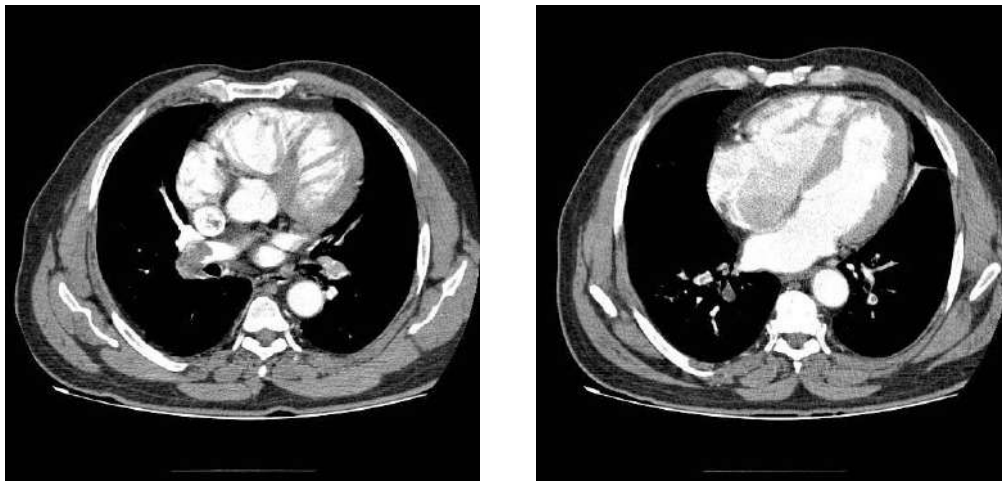


**Fig 2-b: Sagittal and Coronal reconstructed images showing a right basal subsegmental filling defect (railway track sign) (arrow).**

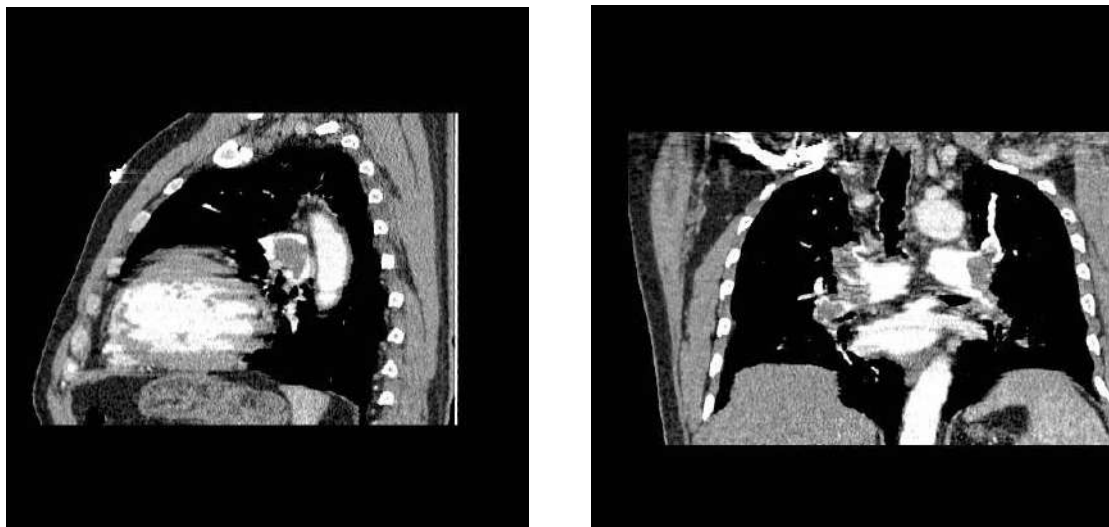
**Diagnosis:** Right basal subsegmental acute pulmonary embolism.

**PCTA:**





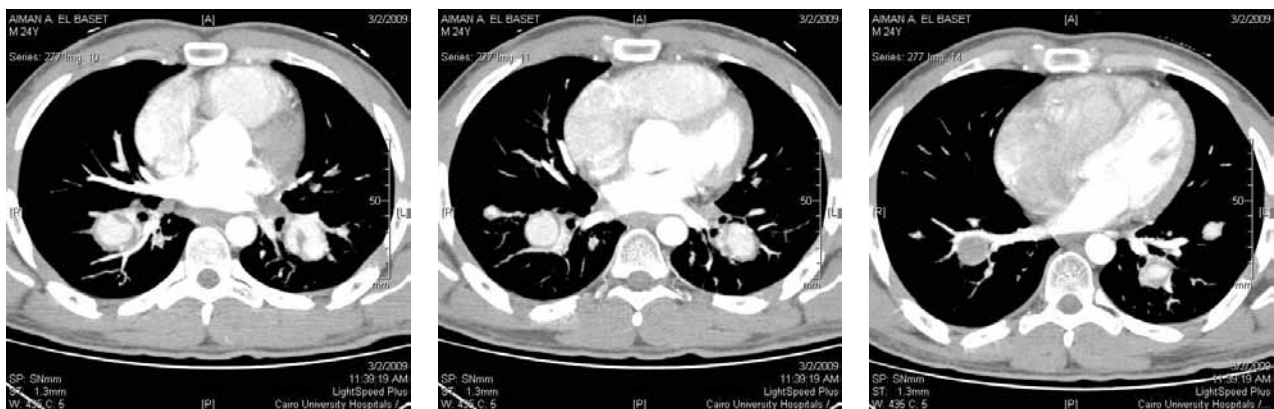
**Fig 3-a:** Axial CT cuts showing dilated main pulmonary trunk. Bilateral large hypodense filling defects in both main pulmonary arteries with a thin rim of contrast surrounding the filling defects. Bilateral few subsegmental basal pulmonary embolic filling defects



**Fig 3-b :** Sagittal and Coronal CT images showing the bilateral pulmonary arteries emboli.

**Diagnosis:** Bilateral main and subsegmental pulmonary emboli associated with pulmonary hypertension evident by dilated main pulmonary trunk.

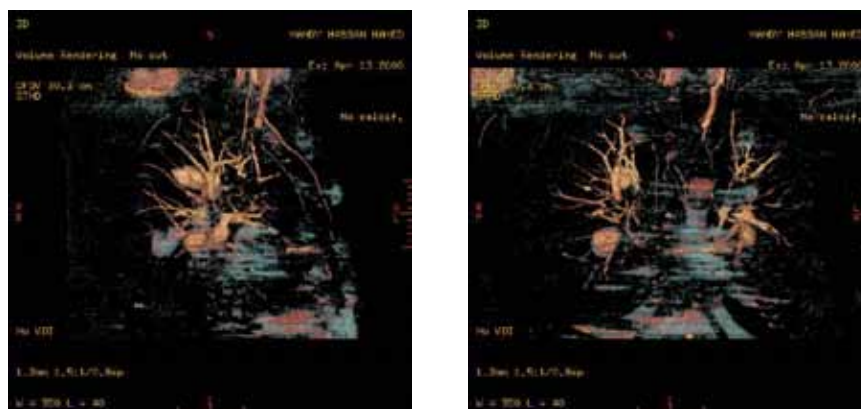
**PCTA:**





**Fig 4-a :Axial, Coronal and Sagittal CT images (mediastinal window) showing multiple bilateral variable sized aneurysmal dilatation of the segmental and subsegmental pulmonary arteries.**

**Diagnosis:** Bilateral multiple pulmonary aneurysms in a known patient with Behcet’s disease with Mural thrombus. Most of them are surrounded by mural thrombus and one of them on the right side is nearly totally occluded.



**Fig 4-b:VR images showing the multiple bilateral pulmonary artery aneurysms & Thrombus.**

### Discussion

Diagnosing pulmonary embolism can be difficult. Problems may arise not only because symptoms and signs can be nonspecific or occult, but because in assessing the accuracy of any diagnostic test for PE there is no universally accepted reference standard (7).

Both under diagnosis and over diagnosis are associated with substantial morbidity and mortality rates. Untreated pulmonary embolism can be fatal, and over treatment exposes the patient who does not have pulmonary embolism to an unjustified risk for major bleeding . The BTS guidelines for the management of suspected acute pulmonary embolism in 2003 recommended

that all patients with possible PE should have clinical probability assessed and documented(7).

On correlating the results of the current study regarding PE with other studies using-64MDCT scanners, we found that lower percentages were detected by Revel et al (2005) detected PE in only 24.5% (in a study population of 220 patients), this could attributed to wide variation of risk patient in that study involving high percentage of low risk group compared with our study

The difference of the results in our study in some entities compared to other studies can be attributed to the fact that PCTA is being nowadays a routine investigation, so the referred patients were those highly suspected of having PE. Also, the available scanner in our study is a

64-MDCT which relatively provides more accurate data compared to other studies using a lower scanners.

All patients in our study showed variable degrees of pulmonary artery dilatation, but, only some of them showed other CT signs of pulmonary hypertension.

We found that lower percentages were detected by *Hofman* et al.,<sup>(9)</sup> study showing that only 5 cases (10%) having mainpulmonary trunk PE, compared with about 10 cases (24%) in our study

According to<sup>(7)</sup>, with 70 Patient examined with 64-MDCT 60% were female & 40% were males, with also similar high percentage In our study where we found 51.7 PE in female patients & 48.3 in Males

Regarding pulmonary parenchymal signs in our study, emphysema was seen in four patients, mosaic attenuation in three, bronchiectatic changes in three, peribronchial thickening in one, and a large area of right perihilar consolidation in one patient.

Similar findings were seen in the<sup>(9)</sup> where honeycombing and bronchiectasis were seen in one patient each.

Compared with study population of 120 patients<sup>(7)</sup>, that shows high percentage of chronic presentation of PE . (43% 52 patient of 120) were found, compared with 8 patients (19.5 %) in our study; this is attributed to larger volume of patients

Compared with<sup>(7)</sup> study that show low percentage of patients presented with dyspnea (70 patient of total 120 study population, 58%), compared with (37 patient from 50 total population study, 74%); this could be seen as a result of being most of our study population are in-patients & admitted to intensive care unit

### Conclusion

Correlation of Both 64-MDCT Pulmonary Angiography & Clinical Scoring Well's systems showing high relation in-between, considering that group having low clinical propability to have PE, MDCT was at the lest positive level, with the other group with high clinical possibility to have PE, MDCT findings are at the high level of positive results

64-MDCT Pulmonary Angiography has as great correlation with the clinical probability Well's scoring system

64-MDCT is the first imaging modality of choice in cases suspecristted with pulmonary embolism

Other radiological imaging modalities involving X-ray chest & MRA maybe of great value

**Ethical Approval:** This study was approved by the Institutional Ethics Committee of School of Medicine, Minia University, Egypt, and all patients gave informed consent before participation in this study. The study conducted in accordance with the ethical guidelines of the 1975 Declaration of Helsinki and International Conference on Harmonization Guidelines for Good Clinical Practice.

**Source of Funding:** None

**Conflict of Interest:** The authors declare that there are no conflict of interests.

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# Functional Lapin-Human Simulation of Knee Joint Synovial Mucosal Cytokine Responses in Staphylococcus Aureus Septic Arthritis

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## Abstract

A functional simulation approach has been tempted between clinically proven lapin and human septic arthritis, in which twenty experimentally induced lapin S aureus septic arthritis and 20 natural human S.aureus septic arthritis were the human simulation materials. Lapin synovial fluids were aspirated by the veterinarian of the team and human synovial fluids were aspirated by the rheumatologist of the team. Direct synovial fluid Giemsa stained smears were showing neutrophilic infiltration responses both for lapin and human. Cell free synovial supernatants for lapin and human were found positive for S.aureus agglutinins up to the titre of 32. Sandwich eliza for TNF alpha, INF gamma and IL4 for lapin synovial fluid and same for human synovial fluid TNF alpha, INF gamma and IL4. Lapin knee joint synovial mucosal compartment was found valid model for human synovial mucosal compartment during the course of S, aureus septic arthritis. Likewise, the lapins knee joints synovial mucosal cytokine responses simulate that of man. Herd immunity concept was found operable in both lapin and human populations. Herd tripartite nature of the immune responses as low moderate and high responders both for rabbit and man. The herd immune plots were of skewed type for TNF alpha, normal distribution curves to INF gamma and IL4 both for lapin and human. This functional simulation study appear to be novel contribution in knee joint synovial mucosal cytokine responses.

**Keywords:** Agglutinins, arthritis, compartment, cytokines herd immunity, herd plots

## Introduction

The pathogenesis of lapin and human arthritis can be traced into three pathways, haematogenous, lymphogenous and osteogenous. The osteogenic infection spread from the local affected bone<sup>[1]</sup>. In comparison, the immunopathogenesis of both rabbit and man septic arthritis may be triggered by the immunodominant epitope(s) of the infectious agent which might be; immunogenic, allergenic and/or autoimmunogenic<sup>[2]</sup>. The local synovial mucosal compartment immune responses can be humoral, cellular and/or humoral and cellular<sup>[3,4]</sup>. Such responses actually are both of mucosal and cellular responses<sup>[5]</sup>. Excess antibodies and/or excess cytokine production may take part in the local

immunopathogenesis for both of lapin human septic arthritis through the mechanisms of immune tissue injuries<sup>[6]</sup>. The families of lapin cytokines are somewhat limited so far compared human cytokine families<sup>[7]</sup>. To date the known cytokines of rabbits are; IL 1 alpha, IL4, IL8, IL17A, INF gamma, IL21, TGFB<sup>[8]</sup>. While, that of man are; IL1, IL2, IL4, IL5, IL6, IL8, IL17, IL18, IL21, IL23 and so on<sup>[7]</sup>. S.aureus are known to trigger proinflammatory and immunomodulatory molecules<sup>[4]</sup>. The nature of the Saureus induced immune responses are humoral, cellular, humoral and cellular mucosal and systemic immune responses in septic arthritis<sup>[3,4]</sup>. Herd systemic immunity has been found operable in human arthropathy patients<sup>[9]</sup>. The objective of the

present communication was aimed at the investigation of knee joint synovial mucosal cytokine responses in experimental lapin septic *S. aureus* septic arthritis as compared to cytokine synovial mucosal immune responses in man. Where by, macrophage cytokine responses was represented by TNF alpha, Th2 was represented by IL4 while TH1 was represented by INF gamma. To check for; the extent of individual variation, herd immunity, herd plots and lapin-human functional simulation

## Materials and Method

1. **Patients:** In a group of 400 human arthropathy patients, the rheumatologist in this research team interviewed patients, request confirming laboratory investigations and reached to a disease entity of septic arthritis. Twenty of these patients were found in association with *Staphylococcus aureus* and considered to be the test patients<sup>[2,10]</sup>.
2. **Staphylococcus Aureus Strain 6:** Erythrogenic, coagulase positive, beta haemolytic *S. aureus* strain 6. The genetic background of its virulence was found with an array of several virulence genes as; sea+, spa+, hla+, protein a gene+ and, leukocidin gene+<sup>[11]</sup>. This test strain was elected from ALJanabi [the second author] *S. aureus* strain collection.
3. **Infectious Doses:** A series of *S. aureus* cell suspensions were made ranging from 1x10 to three up to 1x10 to nine CFU/ml. as a test infectious doses<sup>[12]</sup>.
4. **Rabbits:** A group of Newzealand white rabbits were brought to the animal house, checked for any gross pathologic lesions. Abnormal ones were excluded. The rest were acclimatized for the housing conditions for two weeks before setting experimentation during which they were kept ad libidum<sup>[13]</sup>.
5. **The program for induction of lapin septic arthritis:** 0.1 ml of each of the test infectious doses were injected by the veterinarian of the research team through intra-articular in the knee joints in a rate of three rabbits per each test dose. The inoculated rabbits were followed up for up to five days. The dose of 1 x10 to eight was the infectious dose. Thus this dose were used for the experimental induction of septic arthritis. In which, 0,1 ml of the infectious dose were injected by the veterinarian [the fourth author in the team] for each of the twenty test rabbits through the knee joint. Ten rabbits were injected by 0.1 ml sterile saline in the same as controls. Rabbits were followed for up to five days to score arthritis<sup>[12,14]</sup>.
6. **Synovial fluid:** The twenty *S. aureus* natural human septic arthritis patient were subjected to synovial fluid aspiration by the rheumatologist. Likewise, the infected rabbits were subjected for synovial fluid aspiration by the veterinarian in the team. The synovial fluid aspirate samples were centrifuged for 15 minutes at 3000 rpm, Giemsa Stained films were made. Cell free synovial fluid supernatants were collected in 0.5 ml. amounts and kept at -20 C till use. They were used for antibody and cytokine determinations<sup>[15,16]</sup>.
7. **Antibody Determinations:** Lapin and human cell free synovial fluids supernatants were checked with *S. aureus* 6 cell suspension for the presence of direct agglutinins through slide and tube agglutination tests<sup>[17]</sup>.
8. **Cytokine Determination:** Lapin and human sandwich elizakets for TNF alpha, INF gamma and IL4 were imported from Usobio Co. USA to check for synovial mucosal cytokines in accordance with manufacturer recommendations.
9. **Cytokine Balance:** The cytokine concentrations of the individual rabbit and individual human patient was compared to mean values of corresponding control to measure the number of folds increase than normal. The number of folds increase of IL4 was compared with that of TNF alpha and INF gamma, then the balance was deduced in each case<sup>[7]</sup>.
10. **Biometry:** The individual variation parameters; minimum, mean, medians, ranges and maximum as well as the class intervals usable in herd plots were measured as in<sup>[18]</sup>.

## Results

- I. **Gross Pathobiologic Features:** Both knee joints of lapin and human shown; limping. limitation of motion, tenderness, lameness, loss of weight as well as marked swelling which is an indication of inflammatory and immune responses.
- II. **Synovial Mucosal Immune Responses:**
  1. **Mucosal *S. aureus* antibodies:** The slide agglutination tests of the lapin and human cell free synovial fluid supernatants with *S. aureus*

suspensions were positive for S.aureus specific agglutinins. The specific agglutinin titres were; up to 16 for lapin and up to 32 for human.

**2. Synovial Mucosal Cellular Immune Responses:**

**3. Knee Joint Synovial cytokines:** The statistical range values of the lapin and human synovial TNF alpha, INF gamma and IL4 cytokines were spanning between 11 and 42, which indicates the individual variation limits, Table 1. The lapin cell free synovial fluid supernatants have shown evident cytokine responses. The S.aureus infection lead to around 15 folds rise for TNF alpha than normal rabbit .While human cell free synovial fluid supernatants have increased around 30 folds than in normal human .For INF gamma of rabbit synovial fluid samples were two folds more than normal rabbits. Human synovial INF gamma were around three folds than normal .Rabbit synovial IL4 values were around eight folds than normal .In comparison, human synovial IL4 values were around 20 folds than in normal human subjects, Table 2.

**4. Herd Immune Responses and herd plots:** Both of infected rabbits and arthritis human patients have express herd cytokine responses as low, moderate and high responders, Table 3. Skewd type immune herd plots were evident in TNF alpha cytokine responses both for rabbits and man. Normal or Gaussian distribution plots were noted in INF gamma and IL4 cytokine herd plots[IL4 not shown in plots] both in rabbits and man, Figures 1 and 2.

**III. Cytokine Balance:** In both of rabbit and man synovial mucosal IL4, INF gamma and TNF alpha were generally showing an in-balance state between IL4 and THF alpha, IL4 and INF gamma.

**IV. Comparative Immune Features:** The major functional immune features of induced lapin septic arthritis and natural human septic arthritis are even similar, Table 5.

**Table 1 : The individual Variation of the synovial cytokine responses in term of concentration pg/ml\*..**

Statistical features	Lapin	Human
<b>TNF alpha</b>		
Minimum	14*	15
Mean	29.8	35.81
Median	30.6	35
Maximum	35.1	56.25
Range	14-35.1[21.1]	15-56.25[41.25]
<b>INF gamma</b>		
Minimum	17.5	18
Mean	29.63	25.49
Median	17.5	34
Maximum	38.5	37
Range	17.5-38.5[21]	18-37[19]
<b>IL4</b>		
Minimum	12	15.58
Mean	16.22	19.51
Median	28	26.95
Maximum	36.8	26.95
Range	15-36.8[21.5]	15-26.95[11.15]

**Table 2: Comparative view to the knee joint synovial cytokine responses in term of pg/ml concentration means\***

Cytokine type	Test Rabbits	Control Rabbits	Test Human	Control Human
TNF alpha	29.98 +-40790*	2.407+-0.3559	35.81+-3.423	1.187+ _0.134
INF gamma	29.63+ _2.135	12.15+ _0.504	25.49+ _1.478	8.8409+ _0.7783
IL4	16.22+ _1.437	2.803+ _0.7246	19.51+ _0.667	0.7925+ _0.116

**Table 3: The Herd Immune Responder types**

Cytokine	LLR	HLR	LMR	HMR	LHR	HHR
TNF alpha	14-17	12-25	18-24	26-35	25-33	36-65
INF gamma	15-20	18-20	21-25	21-30	26-38	31-46
IL4	10-16	15-18	17-25	19-22	26-45	23-25

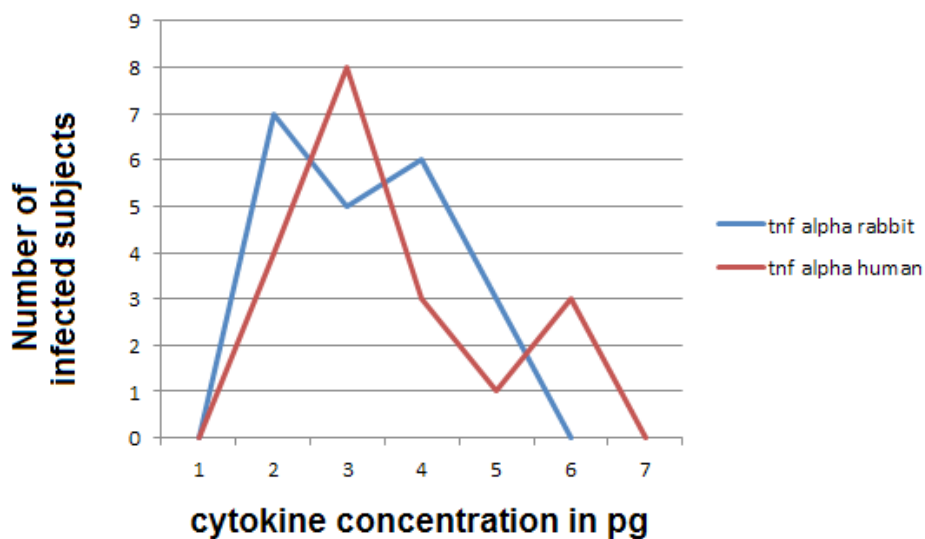
LLR = lapin low responders HLR=human low responders LMR=Lapin moderate responders, HMR=Human moderate responders LHR=lapin high responders HHR=Human high responder



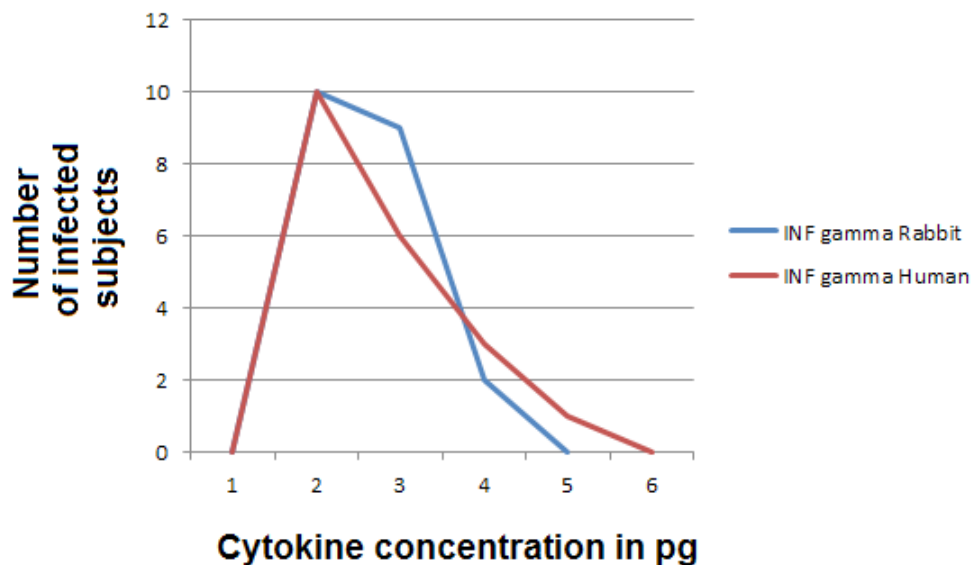
**Table 4: Immune features for lapin-human synovial mucosal compartment, a functional simulation approach**

Immune features	Lapin	Human
<b>Natural Immune cell responses</b>	<b>Neutrophilic</b>	<b>Neutrophilic</b>
S.aureus specific antibody titre	4-16	4-32
<b>Mucosal cytokine responses</b>		
<b>Concentration means</b>		
TNFalpha	29.98*	35.81
INF gamma	29.63	25.49
IL4	16.22	19.51
<b>Herd Immune responses</b>	<b>Low, moderate and high responders</b>	<b>Low, moderate and high responders</b>
<b>Herd Plots Nature</b>		
TNF alpha	Skewd	Skewd
INF gamma	Gaussian	Gaussian
IL4	Gaussian	Gaussian

\*Picogram/ml



**Figure 1 : TNF alpha herd plot in rabbit and man infected with S.aureus septic arthritis**



**Figure 2 : INF gamma herd plot in rabbit and man infected with S.aureus septic arthritis**

## Discussion

Rabbit have been tempted as a model for simulation of several human diseases, in which cytokine responses are evident; such as reagenic stimulation induced TH2 cytokines in the airway smooth muscle cell cells<sup>[19]</sup>, prenatal fetal infection induced IL1 and TNF alpha<sup>[20]</sup>, experimental pancreatitis initiate pro-inflammatory cytokines, IL5, IL1B and TNF alpha<sup>[21]</sup> and the experimental induced shigellosis provokes IL22, IL17A and IL17F<sup>[14]</sup>.

Lapin *S.aureus* septic arthritis induces mucosal humoral and cellular immune responses, Tables 1-4. The mucosal cytokine was used to; i-match limits of individual variation, ii –mapping the possibility of taking parts in herd immunity, iii-nature of herd responder types, iv – Immune herd plots natures and v-contouring the functional lapin-human simulation.

The TNFalpha be produced by either mucosal resident or migratory macrophages. INF gamma released from mucosal or migratory T cells. IL4, however may be produced by TH2 cells<sup>[1,5]</sup>. The individual variations in the cytokine concentration values were noted both in health and disease in rabbits and man<sup>[22]</sup>. The infectious *S.aureus* intra articular in rabbits induced three to 15 folds rise synovial mucosal cytokine as compared to that of normal control rabbits. Likewise, human *S.aureus* septic arthritis patients lead to an increase in cytokine concentration ranged between three to 25 folds as compared to that of normal human controls. The cytokine in-balance state reported in the current study have been reported by other workers in various forms of arthritis in human beings and implicated in evolution of the immune tissue injuries, as well as the deformities in the bone and cartilage<sup>[7]</sup>.

Herd immunity have been found in a number of infectious<sup>[22,23,24]</sup> and non-infectious<sup>[25]</sup> human disease conditions. Systemic herd immunity of human arthropathy patients was reported in this area by<sup>[9]</sup>. In the present communication a novel report on herd immunity in knee joint synovial cytokine responses with a three main responder types<sup>[23,24]</sup>. By this lapin knee joint synovial mucosal immune compartment can be a model compartment simulating the local human diseased knee joint mucosal immune compartment<sup>[22]</sup>.

## Conclusion

*S.aureus* infection in rabbit induce knee joint

synovial mucosal responses in both lapin and human. In which the synovial compartment was constituting valid model for knee joint synovitis in man. Mucosal herd immunity parameters were operable both in lapin and human. Hence, rabbit was functionally simulating human in sense of knee joint cytokine responses.

**Conflict of Interest:** Non-conflict.

**Source of Fund:** Self

**Ethical Clearance:** The research project is formally registered in the affiliated departments. Clinical samples were taken from patients with complete their own satisfaction. Rabbits were reared and kept under standard Add Libitum conditions during the experimentation period. On handling of rabbits, authors followed the international ethical guidelines for animals.

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# Influence of Predisposing Factors of Elderly on the Utilization of Health Services At the Health Centre in Sidoarjo District

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## Abstract

**Context:** Sidoarjo District is one of the districts in East Java Province, Indonesia which has an increase in the number of people aged 60 years and over each year. The achievement of health service performance indicators for residents aged 60 years and over in Sidoarjo District has not reached the standard of 60.31% of the target of 100%. Based on the results of the interviews, information was obtained that the target had not been achieved due to individual internal factors. The purpose of this study was to analyze the influence of predisposing factors of elderly individuals on the utilization of elderly health services held by the Sidoarjo district health centre. This type of research is analaitic observational and cross sectional. The population in this study were elderly people in Sidoarjo District. The sampling technique is proportional stratified random sampling so that the sample is 200 people. Data analysis using statistical tests of the influence of the dependent and independent variables.

The results showed that the predisposing factors of the elderly who influenced the utilization of Integrated Services Post for elderly were age ( $p = 0.029$ ) and gender ( $p = 0.000$ ). The predisposing factors for the elderly that influence the utilization of Community Health Centre services are Spatial Factors ( $p = 0,000$ ). The older the age increases the higher the utilization of the elderly Integrated Services Post for elderly. The utilization of Integrated Services Post for elderly services for elderly men is lower than for women. Elderly people who live in rural areas use health centres more than the elderly in urban areas. The recommendation of this study is that health centre needs to give education about the importance of medical examinations at older age can be done since the pre-elderly age. Integrated Services Post for elderly cadres can persuade elderly women to invite their husbands to take medical examinations. Elderly in addition to rural areas, namely urban and small urban areas, they need to get socialization regarding elderly health care programs in health centres to increase the interest of small urban and urban seniors to health centres.

**Keywords:** *Elderly, predisposing factors, utilization of healthcare.*

## Introduction

The elderly population in Indonesia is predicted to increase higher than the elderly population in the world

after the year 2100.<sup>(1)</sup>One of the districts in Indonesia that has an increase in the number of elderly population each year is Sidoarjo District. The increase in the number of elderly people is followed by the increase in diseases faced by the elderly population. The increasing number of elderly residents with a variety of diseases is felt because the aging process needs to be followed by an increase in visits of the elderly in health and routine examinations in health service activities held. Health service activities are held in the community health centre and outside the building in the form of an elderly Integrated Services Post for elderly. Health service activities are carried out

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in the form of promotive, preventive and rehabilitative activities. The population of the elderly has not been followed by an increase in the scope of utilization of health services by the elderly in Sidoarjo District. Coverage of elderly who get health services according to standards from 2014 to 2017 in Sidoarjo District has not yet reached the predetermined target of 100%. Coverage of elderly who get health services according to standards in 2017 is 60.31%.<sup>(2)</sup>

According to Green (1980) there are several factors that influence changes in health behavior, one of which utilizes health services to check health status. The influencing factors consist of predisposing factors, enabling factors, and reinforcing factors.<sup>(3)</sup> Predisposing factors consist of Socio demographic factors such as age, gender, education level, and marital status; Economic factors such as employment, income level; and spatial factors such as the area of residence. Enabling Factors consists of facilities or facilities available such as information from mass media. Reinforcing factors consist of reference group attitudes and behaviors that can influence changes in a person's behavior.

### Material and Method

This research is observational analytic research because researchers only make observations without giving treatment or intervention to the respondents and aim to determine the effect of the variables to be studied. The design of this study uses quantitative design. Based on the duration of the study, this study included a cross sectional study. Data retrieval is done by using questionnaire instruments and interviews with elderly people in several health centre areas in Sidoarjo District.

Instrument of data collection is a questionnaire. The study sample was 200 elderly people in Sidoarjo District who were calculated using proportional stratified random sampling technique. The independent variables in this study were individual predisposing factors in the form of socio-demographic factors, economic factors, and spatial factors. The dependent variable in this study is the score on the utilization of health services for elderly.

Calculation of the level of wrinkle utilizing elderly health services is by giving a score on each item question.

The scores on each question are explained as follows:

- a. Never (not utilized at all in the last 3 months) = 1
- b. Rarely (using the Integrated Services Post for elderly 1 time in the last 3 months or utilizing a Community Health Centre 1-2 times in the last 3 months) = 2
- c. Frequently (utilizing the Integrated Services Post for elderly 2 times in the last 3 months or utilizing the Community Health Centre 3 times in the last 3 months) = 3
- d. Always (utilizing the Integrated Services Post for elderly 3 times in the last 3 months or utilizing the Community Health Centre >3 times in the last 3 months = 4)

Measurements by adding up scores from the utilization of the Integrated Services Post for elderly as well as the utilization score of the Community Health Centre. The number of scores is categorized into three groups, namely:

- a. No = 4 - 7
- b. Rarely = 8 - 11
- c. Often = 12-15
- d. Always = 16-18

### Findings:

- A. Distribution of respondents based on Predisposing Factors:** Predisposing factors are factors that come from within an individual that can affect in a person's behavior. Predisposing factors consist of socio demographic factors, economic factors, and spatial factors. The following is the distribution of respondents based on their predisposing factors.

Based on Table 1, it can be seen that the majority of respondents aged 60-64 years, female sex, have an education level graduated from elementary school, are married. While the economic factors of the majority of respondents are not working and low income. The spatial factors of the majority of respondents are living in rural areas.

**Table 1: Distribution of Respondents Based on Predisposing Factors**

No.	Predisposing Factors		n	(%)
1	<b>Socio-Demographics Factors</b>			
	Age	60- 64 years	98	49,0
		65- 69 years	65	32,5
		>70 years	37	18,5
	Sex	Men	52	26
		Women	148	74
	Educational Level	Not School	17	8,5
		Elementary School	97	48,5
		Junior High School	25	12,5
		Senior HighSchool	46	23,0
		College	15	7,5
	Marital Status	Not Married	1	0,5
		Divorce	5	2,5
		Death Divorce	69	34,5
		Married	125	62,5
	2	<b>Economic Factors</b>		
Job		Retired	30	15,0
		Entrepreneurship	32	15,0
		Private Companies	11	5,5
		Farm Workers	19	9,5
		Not employed	102	51,0
		Others	6	3,0
Income Level		Low	114	57,0
	High	86	43,0	
3	Spatial Factors	Rural area	105	52,5
		Small Urban area	76	38,0
		Urban area	19	9,5

**B. Distribution of respondents based on the Routinity Utilizing Elderly Health Services:** Elderly health services consist of two types, namely outside and inside the building. Outside health services in the form of Integrated Services Post for elderly held in each village. Services in the building are health services carried out at the Community Health Centre. Health services carried out at the Integrated Services Post for elderly consist of routine health checks, elderly gymnastics, health socialisation and providing supplementary food. Health services carried out in the Community Health Centre building consist of health checks, elderly gymnastics, counseling, and treatment. The following is the distribution of respondents based on the level of routine utilization of health services for last three months of 2019.

**Table 2: Distribution of Respondents Based on the Routine Use of Elderly Health Services for the Last Three Months of 2019**

Elderly Health Services	Routinity Level							
	Not utilize		Rarely		Often		Always	
	n	%	n	%	n	%	n	%
Integrated Service Post For Elderly	86	43,0	27	13,5	67	33,5	20	10,0
Community Health Centre	171	86,5	24	12,0	3	1,5	2	1,0

Based on Table 2, it can be seen about the health care coverage of the elderly outside the building, namely the integrated elderly service post, respondents didnot use it for the past three months by 43%. Likewise in the utilization of health services in Community Health Centre, the majority of respondents did not use health services in the Community Health Centre for the past three months, which amounted to 86.5%.

**C. The Influence of Individual Predisposing Factors on the Use of Health Services:** Influence analysis used to determine the effect of socio-demographic factors consisting of age, sex, education level, marital status, economic factors including employment and income level, and spatial factors for the utilization of health services is multiple linear regression analysis. The test results of the influence of individual predisposing factors on health services can be seen in the following table.

**Table 3: Results of the Influence of Individual Predisposing Factors on the Use of Health Services in the Integrated Service Post For Elderly in Sidoarjo District**

No	Independen Variables	Dependen Variable	Sig.	Explanation
1	Age	Utilization of Health Services at Integrated Service Post for Elderly	0,029	Significant
2	Sex		0,000	Significant
3	Educational Level		0,796	Not Significant
4	Marital Status		0,452	Not Significant
5	Job		0,147	Not Significant
6	Income Level		0,120	Not Significant
7	Spatial Factors		0.234	Not Significant

Based on Table 3, it can be seen that the predisposing factors that influence the utilization of health services in the integrated service post for elderly age ( $p = 0.029$ ) and the sex of the respondents ( $p = 0,000$ ).

**Table 4. Results of the Influence of Individual Predisposing Factors on the Use of Community Health Services in the Sidoarjo District**

No	Independen Variables	Dependen Variable	Sig.	Explanation
1	Age	Utilization of Health Services at Community Health Centre	0,670	Not Significant
2	Sex		0,727	Not Significant
3	Educational Level		0,535	Not Significant
4	Marital Status		0,418	Not Significant
5	Job		0,945	Not Significant
6	Income Level		0,901	Not Significant
7	Spatial Factors		0,000	Significant

Based on Table 4, it can be seen that the predisposing factors of the elderly who influence the utilization of health services in the Community Health Centre are the area of residence of the respondents ( $p = 0,000$ ). More people living in rural areas use health services in Community Health Centre.

### Discussion

Based on the results of the study, it is known that the socio-demographic factors that influence the utilization of health services in Integrated Services Post for elderly are age and sex. Respondents who have an older age are increasingly utilizing health services. This is in line with research in the elderly in Malaysia, namely respondents with 65 years of age have higher utilization of out-patient and in-patient rates than other age groups (Institute of Public Health, 2011).<sup>(4)</sup> Based on Exavery research (2010) found that the elderly aged 60-69 years are significantly higher in using health services than those aged 50-59 years.<sup>(5)</sup> The older the age increases, the more often the elderly use health services. This is because increasing age is followed by a decrease in health and various diseases. The aging process which is followed by a decline in the body and physical condition of the elderly affects the utilization of health services by the elderly.

Based on the results of the study it was found that gender had an effect on the utilization of the elderly

Integrated Services Post for elderly. Elderly women are more likely to take part in Integrated Services Post for elderly activities because of the its activity attract the interest of elderly women such as gymnastics. In line with the study of Yunus, et al (2014) that gender is related to the utilization of health services.<sup>(6)</sup> Women are known to have a longer life expectancy than men but are reported to have a greater risk of disease and thus make the use of health services greater than men (Macintrye, et al., 1996).<sup>(7)</sup> Women are more proactive in seeking medical help than men. (Bertakis & Azari, 2011).<sup>(8)</sup> According to Redondo-Sendino (2006) this is indicated because women use health services more than men to visit medical practitioners and home medical visits, number of medications, and some utilization.<sup>(9)</sup> According to Intarti & Khoiriah (2018) there are more elderly women who use the elderly Integrated Services Post for elderly. This is because the elderly women pay more attention to their health condition than men. In addition, elderly women are more diligent in seeking information regarding health problems in their old age.<sup>(10)</sup>

Based on the results of the study, it is known that the predisposing factors that influence the utilization of health services in the Community Health Centre are spatial factors. More people living in rural areas use health services in Community Health Centre. According to Dinatya (2012), the majority of people in rural areas with livelihoods as farmers use services in Community Health Centre because of their strategic location of being on village or village roads.<sup>(11)</sup> Based on Anhar, et al. (2016) research, it was found that there were differences in utilization of health services between rural communities in the working area of the Lepo-Lepo Community Health Centre.<sup>(12)</sup> Based on observations it was found that more people in urban areas used health services in clinics, family doctor practices, private midwife practices compared to Community Health Centre. This is caused by clinic opening hours are more flexible and are suitable for treatment at their family doctor.

### ConclusionS

Based on the results of the study, the conclusion of this study can be seen that the socio-demographic factors of the respondents in Sidoarjo District are the majority of those aged 60-64 years, female sex, have graduated from elementary school and are married. The economic factor of respondents majority are not working and having low

income. The majority of respondents' spatial factors are living in rural areas. Based on the level of reliability of respondents in utilizing health services in the Integrated Services Post for elderly and Community Health Centre, majority did not use health services during the last three months of 2019.

The predisposing factors of the elderly who influence the utilization of health services in the Integrated Services Post for elderly are age and sex. The predisposing factors for the elderly who influence the utilization of health services in the Community Health Centre are regional factors.

The research recommendation for the Sidoarjo District Health Office and Community Health Centre is to train health workers to disseminate information on the importance of medical examination that can be started from the pre-elderly age. In addition, there is a need for the role of health workers and Integrated Services Post for elderly cadres to persuade elderly women inviting their husbands to be more aware of their health and take medical examinations. Elderly in urban and small urban areas need to get socialization regarding elderly health care programs in health Centres to increase the interest of small urban and urban elderly. Health workers need to innovate preventive health service activities to increase the interest of elderly in utilizing the Community Health Centre compared to only being treated at a family doctor/clinic.

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# Functional Features of the Endothelium in Conditions of Dysfunction of Cardio-Vascular System

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## Abstract

**Context:** Of great interest to modern researchers are processes that affect vascular tone in patients with coronary heart disease. It is known that in the atherosclerotic process in the coronary vessels there is a varying degree of severity of endothelial dysfunction with the dominance of vasoconstrictor mechanisms. The results of the examination of 63 patients with coronary heart disease and type II diabetes mellitus with concomitant arrhythmias and 20 practically healthy individuals aged 51 to 62 years are presented. All examined were divided into 6 groups. It was shown that the development of cardiac arrhythmias in patients with coronary heart disease with concomitant type II diabetes mellitus is accompanied by an increase in the level of endothelin-1, which reflects impaired endothelial function. Along with this, the activation of the renin-angiotensin-aldosterone system due to an increase in the level of angiotensin II, the activation of the sympathoadrenal system with a decrease in the level of cyclic guanosine monophosphate form the conditions for persistent cardiac arrhythmias and require timely intervention to eliminate neurohumoral disorders.

**Keywords:** Cardiovascular system, dysfunction, endothelium, coronary heart disease, heart rhythm disturbances, diabetes mellitus.

## Introduction

The vascular wall is an important link in maintaining homeostasis as a whole. In this case, the endothelium plays a crucial role in it. It is an autocrine, paracrine and endocrine organ with numerous regulatory functions. In addition to regulating vascular tone and hemostasis, the endothelium takes part in the immune response, ensures the migration of blood cells through the vascular wall, the synthesis of inflammatory factors and inhibitors, and performs a barrier function. The

balance of oppositely directed processes depends on the state of the endothelium: vascular tone (vasodilation / vasoconstriction), their anatomical structure (remodeling / inhibition of proliferation factors), hemostasis (synthesis and inhibition of fibrinolysis factors and platelet aggregation), local inflammation (production of pro-inflammatory and anti-inflammatory factors)<sup>1</sup>.

The vascular wall is multifunctional and is associated with other systems, organs that affect the state of aggregation of blood. The constant identification of new factors of the vascular wall deepens the understanding of the mechanisms of its regulation in physiological and pathological conditions, and opens up the possibility of predicting disorders in cardiac patients. For various cardiovascular pathologies, the synthesis of various biologically active substances by endotheliocytes is especially affected<sup>2</sup>.

Coronary heart disease is currently considered as one of the most common diseases in the civilized world, often combined with metabolic disorders<sup>3</sup>.

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In this regard, the study of processes that affect vascular tone in patients with coronary heart disease is of great interest<sup>4</sup>. As is known, with the development of the atherosclerotic process in the coronary vessels, varying degrees of severity of endothelial dysfunction with a predominance of vasoconstrictive mechanisms are observed<sup>5</sup>. In such conditions, periodic deterioration of coronary circulation leads to aggravation of myocardial ischemia, the occurrence of cardiac arrhythmias<sup>6,7</sup>. The relationship between local endothelial tissue hormones and the development of arrhythmias is not well understood, especially in clinical settings. In this regard, it is of great interest to study the mechanisms of endothelial dysfunction in supraventricular and ventricular extrasystoles, as well as atrial fibrillation in patients with coronary heart disease with and without concomitant diabetes mellitus.

Objective: to determine the leading mechanisms of the development of endothelial dysfunction in arrhythmias in patients with coronary heart disease and type II diabetes mellitus.

**Material and Research Method**

The study was approved by the local ethics committee of the Russian State Social University on September 15, 2017 (protocol №11).

83 people were examined, including 52 women and 31 men aged 50 to 62 years.

To determine the role of neurohumoral factors in the development of endothelial dysfunction and cardiac arrhythmias, all examined were divided into 6 groups:

1st group - healthy (n = 20);

Group 2 - patients with coronary heart disease and type II diabetes mellitus who did not have cardiac arrhythmias (n = 15);

3rd group - patients with coronary heart disease and type II diabetes mellitus, having supraventricular extrasystole (n = 12);

4th group - patients with coronary heart disease and type II diabetes mellitus, having ventricular extra systole (n = 13);

5th group - patients with coronary heart disease and type II diabetes mellitus, having a paroxysmal form of atrial fibrillation (n = 12);

6th group - patients with coronary heart disease and type II diabetes mellitus, having a constant form of atrial fibrillation (n = 11).

Statistical processing of the data obtained in the studies was carried out using variation statistics based on the program Statistica 5.0 for Windows, including the determination of t-student criterion and correlation analysis. Differences starting from p<0.05 were considered statistically significant.

**Research results and Discussion**

The Content Of Endothelin-1 in patients with coronary heart disease and type II diabetes was significantly higher than in healthy individuals (p<0.05). Its concentration was maximum in patients with a paroxysmal form of atrial fibrillation 11.2±0.49 (p<0.05), and ventricular extrasystole 8.3±0.44 (p<0.05).

Endothelin-1 levels were somewhat lower in patients with supraventricular extrasystole, a constant form of atrial fibrillation, and in patients with coronary heart disease without concomitant arrhythmias.

When analyzing the content of endothelin-1 in patients with coronary heart disease with type II diabetes mellitus, depending on the type of rhythm disturbances, it was found that in patients with ventricular extrasystole, a paroxysmal form of atrial fibrillation, its level was significantly higher than in patients with supraventricular extrasystole and constant form of atrial fibrillation (p<sub>1</sub><0.05, p<sub>3</sub><0.05). There were no statistically significant differences in the level of endothelin-1 between groups of patients with supraventricular extrasystole and a constant form of atrial fibrillation (p<sub>2</sub><0.05).

**Table 1: Plasma endothelin-1 level in patients**

Groups surveyed	Level endothelin-1 (ng/l)	P
1. Healthy	3.8±0.39	
2. Coronary heart disease + type II diabetes without heart rhythm disturbances	6.4±0.46	p<0.05
3. Coronary heart disease + type II diabetes mellitus + supraventricular extrasystole	6.4±0.37	p<0.05 p <sub>1</sub> <0.05

Groups surveyed	Level endothelin-1 (ng/l)	P
4. Coronary heart disease + type II diabetes mellitus + ventricular extrasystole	8.3±0.44	p<0.05 p <sub>1</sub> <0.05 p <sub>2</sub> <0.05
5. Coronary heart disease + type II diabetes mellitus + paroxysmal atrial fibrillation	11.2±0.49	p<0.05 p <sub>1</sub> <0.05 p <sub>2</sub> <0.05 p <sub>3</sub> <0.05
6. Coronary heart disease + type II diabetes mellitus + persistent atrial fibrillation	6.4±0.38	p<0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> <0.05 p <sub>4</sub> <0.05

**Note:** The significance of differences is estimated with the indicators of previous groups.

The level of endothelin-1 in patients with a paroxysmal form of atrial fibrillation significantly exceeded its value in patients with ventricular extrasystole.

The values are respectively 11.2±0.49 ng/l and 8.3±0.44 ng/l (p<sub>3</sub><0.05). As is known, endothelin-1 is the main form of endothelin, which is formed only in vascular endothelial cells and plays the most important role in the regulation of vascular tone, cardiac output and permeability of the microvascular bed. Endothelin-1 significantly increases myocardial contractility, causes vasoconstriction of the coronary vessels, which leads to increasing ischemia and arrhythmia<sup>8,9</sup>. The formation and release of endothelin-1 is influenced by a number of factors<sup>10,11</sup>. The mechanisms of stimulation of the production and release of endothelin-1 are angiotensin-II, catecholamines, insulin, vasopressin and others<sup>12,13</sup>.

In this regard, the state of the renin-angiotensin-aldosterone system and the catecholamine content in the same groups of patients with coronary heart disease and

type II diabetes mellitus with and without concomitant arrhythmias were studied (tables 2 and 3).

To assess the state of the renin-angiotensin-aldosterone system, it was justified to determine the plasma renin activity, the level of angiotensin-II, aldosterone, as well as sodium and potassium electrolytes<sup>14,15</sup>.

Plasma renin activity was significantly higher than the control group only in patients with ventricular extrasystole and paroxysmal atrial fibrillation (p<0.05). Significant differences in the content of aldosterone in groups of patients were not identified.

The content of angiotensin-II was the highest - 22.8±0.75 ng/ml and 27.8±0.81 ng/ml in patients with frequent ventricular extrasystole and paroxysmal atrial fibrillation. This indicator was significantly higher than in other groups of patients and in persons of the control group (p<0.05, p<sub>1</sub><0.05, p<sub>2</sub><0.05). Among themselves, the indices of endothelin-1 in other groups did not statistically significantly differ (p<sub>3</sub>>0.05).

**Table 2: The state of the renin-angiotensin-aldosterone system and the level of electrolytes in the examined**

Indicators	Groups surveyed					
	1-я (n =20)	2-я (n = 15)	3-я (n = 12)	4-я (n = 13)	5-я (n = 12)	6-я (n = 11)
Plasma renin activity, ng/ml/g	4.08±0.50	4.28±0.75 p>0.05	4.36±0.72 p>0.05 p <sub>1</sub> >0.05	6.82±0.46 p<0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05	7.79±0.96 p<0.05 p <sub>1</sub> <0.05 p <sub>2</sub> <0.05 p <sub>3</sub> >0.05	5.66±0.91 p>0.05 p <sub>1</sub> <0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05 p <sub>4</sub> >0.05

Indicators	Groups surveyed					
	1-я (n = 20)	2-я (n = 15)	3-я (n = 12)	4-я (n = 13)	5-я (n = 12)	6-я (n = 11)
Level aldosterone, pg/ml	286.7±2.97	322.4±2.86 p>0.05	316.5±3.94 p>0.05 p <sub>1</sub> >0.05	290.3±3.97 p>0.05 p <sub>1</sub> >0.05	245.1±3.88 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05	298.0±2.83 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05 p <sub>4</sub> >0.05
Angiotensin-II, pg/mg	14.7±0.52	17.8±0.41 p>0.05	17.6±0.36 p>0.05 p <sub>1</sub> >0.05	22.8±0.75 p<0.05 p <sub>1</sub> <0.05 p <sub>2</sub> <0.05	27.8±0.81 p<0.05 p <sub>1</sub> <0.05 p <sub>2</sub> <0.05 p <sub>3</sub> <0.05	18.8±0.94 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05 p <sub>4</sub> <0.05
Na <sup>+</sup> , mmol / l	134.5±0.63	143.8±0.87 p>0.05	134.8±1.02 p>0.05 p <sub>1</sub> >0.05	136.8±0.91 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05	131.2±0.68 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05	132.8±0.73 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05 p <sub>4</sub> >0.05
K <sup>+</sup> , mmol / l	4.20±0.19	4.21±0.16 p>0.05	3.41±0.25 p>0.05 p <sub>1</sub> >0.05	3.09±0.18 p>0.05 p <sub>1</sub> >0.05	3.02±0.29 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05	3.82±0.16 p>0.05 p <sub>1</sub> >0.05 p <sub>2</sub> >0.05 p <sub>3</sub> >0.05 p <sub>4</sub> >0.05

Note: the significance of differences is estimated with the indicators of previous groups.

The level of electrolytes in blood plasma of sodium and potassium did not statistically significantly differ between the groups of patients, although a tendency to a decrease in potassium levels, which did not reach statistical significance, was observed in groups of patients with ventricular extrasystole and a paroxysmal form of atrial fibrillation (table 2).

Along with endothelin-1, catecholamines also play an important role in the development of rhythm

disturbances<sup>16,17</sup>. As is known, through the stimulation of β-adrenoreceptors, catecholamines activate the adenylcyclase mechanism, which increases the content of cyclic guanosine monophosphate, which leads to increased calcium intake into the cell and its mobilization from the sarcoplasmic reticulum<sup>18,19</sup>. As a result of overflow of cardiomyocytes with calcium, the integrity of the membranes is violated, cell necrosis occurs, and prerequisites for the development of rhythm disturbances arise<sup>20,21</sup>.

**Table 3: The content of catecholamines in the plasma of the examined**

Groups surveyed	Adrenaline, nmol/l	Norepinephrine, nmol/l
1 healthy	3.22±0.26	30.12±0.75
2 coronary heart disease + type II diabetes without heart rhythm disturbances	3.48±0.32	33.75±0.96
3 coronary heart disease + type II diabetes mellitus + supraventricular extrasystole	3.52±0.30	31.52±0.38
4 coronary heart disease + type II diabetes mellitus + ventricular extrasystole	5.69±0.36*	37.51±0.41
5 coronary heart disease + type II diabetes mellitus + paroxysmal atrial fibrillation	7.23±0.42*	46.40±0.38*
6 coronary heart disease + type II diabetes mellitus + persistent atrial fibrillation	4.16±0.34*	37.12±0.73

Note: \* the significance of differences in indicators compared with the group of healthy (p<0.05).

Table 3 presents the results of a study of the level of adrenaline and norepinephrine in groups of patients with coronary heart disease and type II diabetes mellitus with and without arrhythmias.

The results indicate that in patients with cardiac arrhythmias, especially with a paroxysmal form of atrial fibrillation, and, to a lesser extent, ventricular extrasystole, an increase in the activity of the sympathoadrenal system is determined, which manifested itself in a statistically significant increase in adrenaline and norepinephrine levels (in patients paroxysmal atrial fibrillation) and increased levels of adrenaline (in patients with frequent

ventricular extrasystoles) compared with the control group (table 3).

It is known that cyclic guanosine monophosphate has an antiarrhythmic effect under experimental conditions against the background of the introduction of sympathomimetics<sup>22,23</sup>. In this regard, it was important to evaluate the content of cyclic guanosine monophosphate in all groups of patients taken into the study<sup>24</sup>. The level of cyclic guanosine monophosphate was lower in groups of patients with cardiac arrhythmias, however, this decrease was statistically significant in patients with a paroxysmal form of atrial fibrillation and to a lesser extent in patients with ventricular extrasystole (table 4).

**Table 4: The level of cyclic guanosine monophosphate in the plasma of the examined**

Groups surveyed	The concentration of cyclic guanosine monophosphate, nmol/l
1 healthy	7.28±0.26
2 coronary heart disease + type II diabetes without heart rhythm disturbances	7.45±0.22
3 coronary heart disease + type II diabetes mellitus + supraventricular extrasystole	6.24±0.38
4 coronary heart disease + type II diabetes mellitus + ventricular extrasystole	5.79±0.29*
5 coronary heart disease + type II diabetes mellitus + paroxysmal atrial fibrillation	5.38±0.31*
6 coronary heart disease + type II diabetes mellitus + persistent atrial fibrillation	6.23±0.39

Note: \* the significance of differences in indicators compared with the group of healthy (p < 0.05).

In other patients, when compared with the control group, a decrease in this indicator did not reach the level of statistical significance.

### Conclusion

The development of heart rhythm disturbances in patients with coronary heart disease with concomitant type II diabetes mellitus is accompanied by an increase in the level of endothelin-1, which indicates the development of endothelial dysfunction. The activation of the renin-angiotensin-aldosterone system under these conditions, the activation of the sympathoadrenal system with a decrease in the level of cyclic guanosine monophosphate create the conditions for chronic heart rhythm disturbances. In view of the presence of a relationship between rhythm disturbances and factors that can aggravate myocardial ischemia, it is advisable to use medications for the treatment of such patients that affect endothelial dysfunction, sympathoadrenal, renin-angiotensin-aldosterone systems, cyclic nucleotides

and angiotensin-converting inhibitors, beta-blockers, statins).

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**Ethics Committee Resolution:** The study was approved by the local ethics committee of the Russian State Social University on September 15, 2017 (protocol №11).

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# Functional Features of Modern Cardiological Patients

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## Abstract

**Context:** Modern studies have shown that one of the risk factors for recurrent thrombosis, coronary heart disease and cerebrovascular pathology is the level of homocysteine in the blood. An analysis was made of the severity of homocysteinemia in patients with coronary heart disease with episodes of painless myocardial ischemia, and it was corrected with B vitamins. 84 patients with coronary heart disease with functional angina pectoris I-III were examined. It was found that the combination of hyperhomocysteinemia and frequent episodes of painless myocardial ischemia is recorded mainly in patients with a high functional class of angina pectoris. Reception of B vitamins can significantly reduce the concentration of homocysteine in blood plasma and the frequency of episodes of painless myocardial ischemia.

**Keywords:** *Hyperhomocysteinemia, coronary heart disease, angina pectoris, painless ischemia.*

## Introduction

Currently, the pathology of the cardiovascular system occupies a leading position in the morbidity and mortality of the population worldwide<sup>1</sup>. Coronary heart disease has the status of the leading cause of death in most developed countries and accounts for about 30% of total mortality, with no tendency to decrease this indicator<sup>2</sup>. Moreover, back in 2001, cardiovascular diseases claimed the lives of about 16 million people, that is, a third of global world mortality, then by 2025 it is predicted that this figure will be 25 million and in almost half of the cases will be caused by coronary heart disease<sup>3,4</sup>.

In this regard, the search for new risk factors continues, the identification of which would allow to influence the mortality rate from cardiological causes. Today there is no doubt that inflammation factors and procoagulants circulating in the blood play an important role in the pathogenesis of vascular lesions and atherosclerosis<sup>5,6</sup>. It has been established that hyperhomocysteinemia is an important risk factor for recurrent thrombosis, coronary heart disease and cerebrovascular pathology<sup>7,8</sup>.

Homocysteine is a sulfur-containing amino acid that is not involved in the synthesis of protein. It is a demethylated derivative of the essential amino acid methionine, which in humans and animals is the only metabolic precursor of homocysteine. Foods in a normal diet contain an insignificant amount of homocysteine. The low content of this potentially cytotoxic amino acid in the cells is ensured by its remethylation to methionine, by its transulfonation to cysteine, or by the formation of its oxidized forms<sup>9</sup>.

Normally, the level of homocysteine in blood plasma is 5-15  $\mu\text{mol/l}$ . In children and adolescents, this indicator is approximately 5  $\mu\text{mol/l}$ . During life, the average level of homocysteine increases by 3-5

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micromol/l and it is slightly higher in men compared with women. Hyperhomocysteinemia is diagnosed if the level of homocysteine in the blood exceeds 15  $\mu\text{mol/l}$ . Its plasma concentration of 15-30  $\mu\text{mol/l}$  indicates moderate hyperhomocysteinemia, from 30 to 100  $\mu\text{mol/l}$  - intermediate, and more than 100  $\mu\text{mol/l}$  - heavy<sup>7,8</sup>.

Hyperhomocysteinemia negatively affects endothelial and smooth muscle cells of blood vessels, platelets, blood lipids, nitric oxide and coagulation factors<sup>9</sup>. This is manifested even with moderate hyperhomocysteinemia. In addition, it stimulates atherosclerosis, disrupts the vasomotor function and anticoagulant properties of endothelium<sup>10,11</sup>.

For patients with coronary heart disease, regardless of the clinical form, elevated plasma homocysteine levels and episodes of painless myocardial ischemia are very characteristic<sup>12,13</sup>. According to modern concepts, the phenomenon of painless myocardial ischemia is found in 2–5% of the healthy population, in 30% of patients with post-infarction cardiosclerosis, and 40–100% of patients with stable and unstable angina<sup>14</sup>. The proportion of episodes of painless myocardial ischemia reaches 75–89% of the total number of cases of myocardial ischemia in these patients<sup>15,16</sup>. The detection of painless myocardial ischemia in combination with other high-risk criteria in a patient with coronary heart disease and confirmed angina pectoris is an indication for surgical treatment, since it significantly increases the likelihood of fatal cardiac complications in the near future<sup>17,18</sup>.

Along with hyperhomocysteinemia, the presence of painless myocardial ischemia is now regarded as one of the risk factors for the development of complications of coronary heart disease, including myocardial infarction and prognostically unfavorable heart rhythm disturbances<sup>3,19</sup>. It is believed that the combination of hyperhomocysteinemia and episodes of painless myocardial ischemia worsens the course of coronary heart disease. A relationship was suggested between the level of homocysteine in blood plasma in patients with coronary heart disease and the incidence of episodes of painless myocardial ischemia due to the presence of moments in their pathogenesis and the point of application that damages the effects of hyperhomocysteinemia<sup>20,21</sup>.

It is believed that metabolic elimination of hyperhomocysteinemia is possible with the help of vitamins<sup>22,23</sup>. When they are prescribed, there is a

decrease in the initially elevated level of homocysteine in all cases<sup>24</sup>. Particularly effective injections of B vitamins<sup>25,26</sup>.

The purpose of the study was to analyze the severity of homocysteinemia in patients with coronary heart disease with episodes of painless myocardial ischemia and its correction with a combination of vitamins B<sub>1</sub>, B<sub>6</sub> and B<sub>12</sub>.

## Materials and Method

The research was approved by the local ethical committee of the Russian State Social University on September 9, 2018 (protocol №9).

84 patients (62 people – the main group and 22 – the control group) who had a diagnosis of coronary heart disease with functional angina pectoris I-III, were examined at a clinic in Kursk State Medical University. The average age of the patients was 53.8±1.45 years, of which 58 were men and 26 women. The study did not include patients with acute myocardial infarction, valve defects, and chronic heart failure stage III (according to the classification of Strazhesko-Vasilenko), cardiomyopathy and endocrine pathology, with any kidney pathology and oncology.

To study the frequency and characteristics of painless myocardial ischemia, electrocardiography was used according to the standard method, two-dimensional echocardiography, bicycle ergometry, electrocardiography with dosed physical activity after canceling antianginal therapy, except nitroglycerin, which was used in case of an angina attack.

All patients with coronary heart disease were determined the concentration of homocysteine in plasma on the first and on the fourteenth day of observation. Blood sampling was carried out on an empty stomach after 12-hour fasting from a cubital vein in an amount of 10 ml. For quantitative determination of total homocysteine in blood plasma by enzyme-linked immunosorbent assay, a test system from Axell Biochemicals (Oslo, Norway) was used.

In addition to standard antianginal therapy, for the correction of hyperhomocysteinemia, patients additionally received B vitamins: B<sub>1</sub> at a dose of 150 mg/day, B<sub>6</sub> - 150 mg/day and B<sub>12</sub> - 3 mg/day.

The effectiveness of treatment was evaluated by re-determining the concentration of homocysteine in

blood plasma on the 14 day, as well as the frequency and intensity of angina attacks and exercise tolerance.

Statistical processing of the data obtained in the studies was carried out using variation statistics based on the program Statistica 5.0 for Windows, including the determination of t-student criterion and correlation analysis. Differences starting from  $p < 0.05$  were considered statistically significant.

### Results and its Discussion

For the convenience of comparative characteristics of patients with coronary heart disease of the main group, they were divided into 3 groups, depending on the functional class of angina pectoris. The 1st group (n=20) included patients with the I functional class, the 2 group (n=21) - the patients with the II functional class and the 3rd group (n=21) were the patients with the III functional class. Patients of group 1 showed a milder course of coronary heart disease, fewer complications than in groups 2-3. The presence of postinfarction cardiosclerosis in the first group was noted in 11.5% of cases, and episodes of painless myocardial ischemia in 11.7% of cases; in patients of the 2nd group, postinfarction cardiosclerosis was in 32.6% of cases, episodes of painless myocardial ischemia in 38.4%, in patients of group 3 postinfarction cardiosclerosis was recorded in 69.6% of cases, and in 72.3% - episodes of painless myocardial ischemia. When analyzing homocysteinemia in patients with coronary heart disease, it was taken into account in combination with concomitant pathology, taking into account previous myocardial infarction. Thus, the highest concentration of homocysteine was observed in patients with coronary heart disease with post-infarction cardiosclerosis and averaged  $18.5 \pm 1.8 \mu\text{mol/l}$  compared with patients with coronary heart disease without complications -  $15.2 \pm 0.9 \mu\text{mol/l}$  ( $p < 0.05$ ). Patients with coronary heart disease, who also had hypertension —  $17.6 \pm 1.7 \mu\text{mol/l}$  — were distinguished by a rather high level of homocysteine compared with patients without arterial hypertension. With a combination of coronary heart disease with post-infarction cardiosclerosis and hypertension, the level of homocysteine remained elevated -  $16.8 \pm 1.4 \mu\text{mol/l}$ .

Among patients included in group 2 and 3, the highest percentage of concomitant pathologies, such as hypertension, was noted - 31.9% and 55.6%, respectively.

Painless myocardial ischemia was diagnosed in 28 patients (33.3%) of the total number examined with

coronary heart disease in the form of stable angina pectoris of functional class III, with a history of post-infarction cardiosclerosis in 30 (35.7%) cases (table 1).

**Table 1: The dynamics of the level of homocysteine in the plasma of patients with coronary heart disease while taking vitamins of group B**

Patient groups	The level of homocysteine, $\mu\text{mol/l}$ , $M \pm m$		p
	for 1 day	for 14 days	
1 group (n=20)	$11.9 \pm 1.3$	$9.1 \pm 0.8$	$< 0.05$
2 group (n=21)	$15.6 \pm 0.5$	$13.1 \pm 0.7$	$< 0.05$
3 group (n=21)	$19.5 \pm 0.6$	$15.0 \pm 1.2$	$< 0.05$
Control group (n=22)	$16.6 \pm 0.8$	$17.2 \pm 0.8$	

The duration and frequency of episodes of painless myocardial ischemia directly depended on the severity of the course of coronary pathology and occurs in patients with coronary heart disease with a high functional class of stable angina pectoris, that is, in the 2-3 group, as well as in people who have suffered myocardial infarction. After myocardial infarction, 44% of patients with coronary heart disease who had had angina attacks before, ceased to feel pain typical of angina pectoris, therefore, the study of the frequency of detection of painless myocardial ischemia in these patients is of no small importance. When conducting physical exercise tests in patients with coronary heart disease in the late post-infarction period, despite the absence of angina attacks in most patients, almost 45.2% of them revealed episodes of painless myocardial ischemia.

An analysis of homocysteinemia in patients with coronary heart disease revealed a tendency to significantly increase homocysteine levels as the functional class of exertional angina increases. So in patients of 1 group the average level of homocysteinemia was  $11.9 \pm 1.3 \mu\text{mol/l}$ , in 2 group the concentration of homocysteine reached  $15.6 \pm 0.5 \mu\text{mol/l}$ , in 3 group  $18.5 \pm 0.6 \mu\text{mol/l}$  ( $p < 0.05$ ). That is, in patients with tension angina of functional class III, the concentration of homocysteine was higher than in functional class I by 63.8%. When re-determining the concentration of homocysteine after taking B vitamins, a significant decrease in homocysteine was noted ( $p < 0.05$ ). So, its average level in group 1 after 14 days decreased to  $9.1 \pm 0.8 \mu\text{mol/l}$ . In 2 group after 14 days it decreased to  $13.1 \pm 0.7 \mu\text{mol/l}$  and in group 3 to  $15.0 \pm 1.2 \mu\text{mol/l}$  ( $p < 0.05$ ). In the control group homocysteine levels did not experience dynamics (table 1).

The results obtained indicate that with the additional intake of vitamins B1, B6 and B12 in combination with antianginal therapy, the level of homocysteine in plasma in patients with coronary heart disease significantly decreases. Moreover, in patients with initial hyperhomocysteinemia, the decrease is more pronounced.

Against the background of a decrease in the level of homocysteine in patients, the quality of life improved by reducing the number of angina attacks and thereby reducing the use of nitroglycerin per week, compared with the control group. So in the 2 group, the number of nitroglycerin tablets consumed by patients after 14 days decreased by 25.8%, in the 3rd group this amounted to 36.1%. In the control group, the dynamics of nitroglycerin consumption were not detected ( $p < 0.05$ ). Also, against the background of the treatment, all patients noted an improvement in overall health, a decrease in the frequency and intensity of angina attacks, as well as increased tolerance to physical activity. In this regard, the need for early diagnosis of painless myocardial ischemia and correction in such patients with hyperhomocysteinemia should be recognized. This will help to slow the progression of angina pectoris and reduce the number and duration of episodes of painless myocardial ischemia<sup>27</sup>.

### Conclusion

The level of plasma homocysteine is directly proportional to the functional class of angina pectoris. The more pronounced homocysteinemia, the more severe the clinical manifestations of stable exertional angina. An additional intake of B vitamins statistically significantly reduces the level of total homocysteine in blood plasma in most patients. This is accompanied by a decrease in the number and duration of episodes of painless myocardial ischemia. There is reason to hope that the optimization of homocysteine will inhibit the progression of coronary heart disease and lower the functional class of angina pectoris.

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# Functionally Determined Measures for the Rehabilitation of Adolescent School Children with Chronic Obstructive Bronchitis

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## Astract

**Context:** Currently, chronic obstructive bronchitis remains a very common disease in adolescence. The study involved 42 adolescents 13-14 years old suffering from at least 5 years of chronic obstructive bronchitis without signs of respiratory failure. At the time of the examination of adolescents, this disease was in a state of unstable remission. For adolescents with chronic obstructive bronchitis, a decrease in the vital capacity of the lungs and diameter of the bronchi of any caliber is characteristic. This quickly leads to a significant decrease in the functionality of the external respiration apparatus. With this disease, resistance of the respiratory center to hypoxia and a weakening of the adaptive capabilities of the respiratory system arise early. Regular performance of asanas in adolescents with chronic obstructive bronchitis leads to the restoration of the functional properties of their respiratory system and circulatory system, and optimizes their hypoxia resistance.

**Keywords:** Rehabilitation, respiratory system, lungs, chronic bronchitis, adolescents.

## Introduction

The life of each organism is associated with its continuous interaction with the environment, which often affects it negatively<sup>1,2</sup>. The total environmental effect on the body is formed in it by a whole series of

regular reactions<sup>3,4</sup>, contributing to its adaptation to the existing conditions of life<sup>5,6</sup>. Due to the severity of harmful environmental influences and sometimes due to the imperfection of adaptation processes in some cases, various dysfunctions and sometimes obvious pathology can develop in the body<sup>7,8</sup>.

Very often, pathological processes in the human body are noted in the cardiovascular system, blood system and respiratory system<sup>9</sup>. They are life support systems and, as a result, significantly support the overall viability of the mammalian organism<sup>10,11</sup>. Currently, the society has seen an increase in lung diseases, especially in childhood and adolescence<sup>12,13</sup>. A very common disease among them is obstructive bronchitis<sup>14</sup>.

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This disease is often accompanied by changes in the sensitivity of the walls of the bronchi and the development of their hyperreactivity. It manifests itself as a cough with sputum and frequent shortness of breath during physical exertion. The disease is aggravated by hypothermia or the ingress of industrial impurities into the air<sup>15</sup>.

The widespread prevalence of chronic obstructive bronchitis and its sometimes severe course currently creates an urgent need to improve approaches to the rehabilitation of this patient population using the entire available arsenal of healing effects<sup>16,17</sup>. The purpose of the study was to assess the state of the function of external respiration in adolescents with chronic obstructive bronchitis performing the asanas complex.

### Materials and Research Method

The study was approved by the local ethics committee of the Russian State Social University on September 15, 2017 (protocol №11). The study was performed on the basis of the Russian State Social University, Moscow, Russia. The study was conducted on 42 adolescents aged 13-14 years suffering from at least 5 years of chronic obstructive bronchitis without respiratory failure. At the time of the first examination, the disease was in all teenagers in a state of unstable remission. The control group consisted of 20 clinically healthy adolescents of a similar age.

All adolescents with bronchitis underwent rehabilitation for 3 months, including yoga system exercises aimed at diluting and removing sputum from the respiratory tract, eliminating bronchospasm, increasing the elasticity and lability of the chest and strengthening its muscles.

1. Asana "Onion". Starting position - lie on your stomach, raise your legs bent at the knees, hold your ankles with your hands. Take a deep breath and pull both legs up, arching your back. Remain in this position, hold your breath, then slowly lower your legs as you exhale. During the exercise, try to ensure that only the stomach touches the floor. First, knees apart, then raise your legs high, after finishing the deflection, knees, hips, ankles to connect. Repeat asana 10-12 times.

2. Asana "Blacksmithing Furs". Starting position - sitting in the "lotus" position. After a complete exhalation, quickly inhale and exhale through the nose - 10 times, then exhale, hold your breath for 7-10 seconds, inhale with a subsequent breath hold for 10-15 seconds. Repeat the same, but throwing his head back to the limit, and then lower the chin to the chest. Gradually bring the number of breaths in one cycle to 25-30. Repeat asana 5 times.

The study used the spiograph SMP-21/01- "R-D" produced by the scientific and production enterprise "Monitor" (Russia). With its help, a spiogram was recorded, which evaluated the minute volume of respiration, vital capacity of the lungs, maximum lung ventilation, reserve volume of inspiration, reserve volume of expiration, forced vital capacity of the lungs, volume of forced expiration in 1 second, peak volume velocity, maximum volume velocity at the level of 25%, 50% and 75% of the value of the forced vital capacity of the lungs.

In the work, all examined had a functional test of Stange, determining the maximum possible time of breath holding on inspiration<sup>18</sup>.

A functional test of Genchi was carried out for all those taken under observation, determining the maximum possible time for breath holding on exhalation<sup>18</sup>.

To assess the overall functional state of the cardiorespiratory system in the examined, the Skibinsky index was calculated. This indicator characterizes the overall functional state of the external respiration system and its resistance to hypoxia.

The magnitude of the excursion of the chest was measured with a centimeter tape which was placed at the back at the level of the angles of the shoulder blades, and at the front over the mammary glands (in girls), calculating the difference between the maximum inhalation and exhalation<sup>18</sup>.

To identify the statistical difference between the indicators in the group of patients and in the control group, t-student criterion was used.

## Research Results and Discussion

In sick adolescents, a significant violation of the indicators was noted (Table 1).

**Table 1: Indicators of external respiration function in adolescents with chronic obstructive bronchitis**

Estimated performance	Group of sick teenagers, n=42, M±m		Control group, n=20, M±m
	At the beginning of observation	At the end of the observation	
Vital lung capacity, l	1.9±0.11	2.4±0.22 p <sub>1</sub> <0.05	2.4±0.12 p<0.05
Forced vital capacity, l	1.7±0.09	2.2±0.16 p <sub>1</sub> <0.01	2.3±0.17 p<0.01
Forced expiratory volume in 1 second, l	1.6±0.12	2.1±0.12 p <sub>1</sub> <0.01	2.2±0.15 p<0.01
Minute breathing volume, l/min	12.3±0.43	10.6±0.30 p <sub>1</sub> <0.05	10.1±0.45 p<0.05
Maximum ventilation, l/min	47.7±0.36	56.4±0.42 p <sub>1</sub> <0.05	57.9±0.82 p<0.05
Peak space velocity, l/s	2.7±0.25	4.0±0.21 p <sub>1</sub> <0.01	4.2±0.32 p<0.01
Maximum space velocity <sub>25</sub> , l/s	3.2±0.24	4.2±0.18 p <sub>1</sub> <0.05	4.3±0.27 p<0.05
Maximum space velocity <sub>50</sub> , l/s	2.4±0.22	2.8±0.14 p <sub>1</sub> <0.05	3.0±0.20 p<0.05
Maximum space velocity <sub>75</sub> , l/s	1.6±0.10	1.7±0.12	1.8±0.16 p<0.05
Stange Result, s	41.8±0.41	59.2±0.27 p <sub>1</sub> <0.01	61.2±0.48 p<0.01
Gencha test result, s	24.9±0.52	31.2±0.32 p <sub>1</sub> <0.05	32.6±0.42 p<0.05
Chest excursion, sm	2.8±0.36	5.5±0.29 p <sub>1</sub> <0.01	5.8±0.39 p<0.01
Skibinsky index, conventional units	28.5±0.72	59.1±0.40 p <sub>1</sub> <0.01	61.3±0.71 p<0.01

Legend: p - reliability of differences in indicators between a group of patients and a control group, p<sub>1</sub> - reliability of dynamics of indicators against the background of recovery.

It was found that the values of lung vital capacity in sick adolescents were inferior to the level of the control group by 26.3%. The value of the forced vital capacity of the lungs was 35.3% lower than the control level. Moreover, in terms of forced expiratory volume for 1 second, the control group exceeded the same indicator in sick adolescents by 37.5%.

By comparing the values of the minute volume of breathing, it was possible to establish its increase in adolescents with chronic obstructive bronchitis compared with the control by 21.8%. In addition, in the group of patients, the maximum ventilation rate was reduced by 21.4%.

In the initial state in patients with adolescents, the peak volumetric rate was reduced by 55.5%. This was accompanied by a decrease of 34.4% in the average value of the maximum volumetric rate indicator at the level of 25% of the value of the forced vital capacity of the lungs. Their maximum volumetric rate, which is at the level of 50% and 75% of the value of the forced vital capacity, was reduced by 25.0% and 12.5%, respectively. In addition, when taking adolescents with chronic obstructive bronchitis in the study, the indicators of hypoxic tests and the level of chest excursion were significantly lower than those in the control group. Moreover, the average Skibinsky index in sick

adolescents in the outcome was significantly lower than in the control group (2.1 times).

As a result of conducting rehabilitation measures in adolescents with chronic obstructive bronchitis for 3 months, an increase in lung capacity was reached to the level of the control group (by 26.3%). At the same time, the magnitude of the forced vital capacity of the lungs also reached the control level, increasing by 29.4%. By the end of the observation, in terms of forced expiratory volume in 1 second, the control group equaled that of sick adolescents due to its growth of 31.2%.

During physical rehabilitation, sick adolescents achieved normalization of the minute respiratory volume due to its decrease by 16.0% and maximum lung ventilation as a result of its increase by 18.2%. In addition, they experienced an increase in peak volume velocity by 48.1%. This was accompanied by an increase of 31.2% in the average value of the maximum volumetric rate indicator at the level of 25% of the value of the forced vital capacity of the lungs. In these adolescents, by the end of the observation, the maximum volumetric velocity indicator, which was at the level of 50% and 75% of the value of the forced vital capacity, increased by 16.7% and 6.2%, respectively. In addition, in patients with bronchial asthma, against the background of the rehabilitation, the indicators of hypoxic tests and the level of chest excursion significantly increased and approached those in the control group. At the same time, the average Skibinsky index in sick adolescents significantly increased and by the end of the observation corresponded to the level of the control group.

## Discussion

In modern society, chronic obstructive bronchitis is a very common pathology in adolescents. Often, he manifests already in childhood and is rapidly progressing<sup>19</sup>.

The revealed initial decrease in patients with adolescents with a maximum volumetric rate of 25% of the level of forced vital capacity of the lungs indicated a progressive deterioration in their patency at the level of large bronchi<sup>20</sup>. The average value of the maximum volumetric velocity index found in patients at the level of 50% and 75% of the forced vital capacity of the lungs proved a decrease in the patency of the bronchi of medium and small caliber. The initial negative changes in the indicators of hypoxic tests and a decrease in the volume of chest excursion<sup>21</sup>. The initially low Skibinsky

index indicates the presence in the group of adolescents with chronic obstructive bronchitis of functional weakness of the respiratory and circulatory organs, and, consequently, the low resistance of their body to hypoxia<sup>22</sup>.

Rehabilitation had a pronounced positive effect on sick adolescents. It provided patients with a clear control of the respiratory act, restoration of full breathing, the correct ratio of the length of the inspiration and expiration, the necessary depth and frequency of respiration.

It was established that the complex of asanas ensured in patients an increase to the level of normal vital capacity of the lungs. The bronchial obstruction eliminated in them ensured an increase in their expiratory volume to a control level in 1 second. In sick adolescents there was an increase in the maximum ventilation rate. This should be considered as a normalization of the functional capabilities of the external respiration apparatus, as well as an increase in the reserves of respiratory function<sup>23</sup>.

The rehabilitation provided in adolescents increased functional capabilities of the respiratory muscles and optimized patency of large-caliber bronchi. Changes in the maximum volumetric rate index found at the level of 25% of the level of the forced vital capacity of the lungs found during rehabilitation indicated the development of a significant increase in patency of large bronchi in rehabilitated teens<sup>24</sup>. Achieved during recovery of adolescents with bronchitis, the growth of average values of the maximum volumetric rate indicator at the level of 50% and 75% of the forced vital capacity of the lungs proved the optimization of bronchial patency of medium and small caliber. Positive changes in them against the background of improvement in indicators of hypoxic tests and the volume of chest excursion proved the possibility of normalizing, with this pathology, the sensitivity of the respiratory center to hypoxia and the adaptive capabilities of the entire external respiration system. Normalization of the Skibinsky index can be regarded as an increase in patients with functional activation of the respiratory and circulatory organs and normalization of their body's resistance to hypoxia<sup>25</sup>.

## Conclusion

The development of chronic obstructive bronchitis changes the sensitivity of the walls of the bronchi to external influences and leads to their hyperreactivity. This leads to an increase in functional weakness of the respiratory system and circulatory system. Tested



in adolescents with chronic obstructive bronchitis, the asanas system gradually eliminated disturbances in the external respiration system, establishing normal relations between the cerebral cortex and internal organs. She optimized breathing, helped to eliminate the tendency to bronchial obstruction in patients, normalize the respiratory act and increase the general resistance of the body.

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# Predicting Behavioral Intentions to Control Type 2 Diabetes Mellitus from Social-Cognitive Variables at Haji Surabaya General Hospital, Indonesia

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## Abstract

**Context:** From 2015 through 2018, the number of visits of patients diagnosed with type 2 diabetes mellitus (DM), without complication, with an age range of 40-59 years, at the Internal Medicine section, Outpatient Installation of Haji Surabaya General Hospital (HSGH), has increased. It was an indicator that shows the non-optimal handling and control of DM in communities, and it needs to be followed by health efforts to restrain this non-communicable disease. Therefore, this study aims to analyze the factors that influence the control behavior of type 2 DM based on the concept of the Health Action Process Approach (HAPA). Respondents in this study were 120 patients that suffered type 2 DM, with no complication, who met the study inclusion criteria, who visit the Internal Medicine section, Outpatient Installation of HSGH. Primary data from the respondents included knowledge, risk perception, outcome expectancies, the action of self-efficacy, behavioral intention, planning, maintenance of self-efficacy, recovery of self-efficacy, and action, which collected through survey instruments in the form of adopted questionnaires with cross-sectional research design, and it analyzed statistically using the Path Analysis, through AMOS software, with a significance level ( $\alpha = 0.05$ ). During the motivational phase, social cognitive variables, namely the outcome expectancies and the action of self-efficacy, could predict an individual's behavioral intention to control type 2 DM ( $p < 0.05$ ). In contrast, risk perception variable did not affect behavioral intention to control the disease.

**Keywords:** Behavioral intention, outcome expectancies, risk perception, self-efficacy, diabetes

## Introduction

The era of globalization led to lifestyle and epidemiological transitions that marked by a shift in the pattern of diseases; from infectious to non-communicable diseases. A non-communicable disease that affects the morbidity, mortality, and health crisis in the world and ranked as the third highest in the world is type 2 diabetes

mellitus (DM). In 2017, the number of people with type 2 DM had reached 425 million in the world and was estimated to increase by 48% in 2045<sup>1</sup>. According to the results of the 2018 Basic Health Research<sup>2</sup>, in 2013, the prevalence of type 2 DM was 6.9% and increased to 10.9% in 2018. The Ministry of Health of the Republic of Indonesia<sup>3</sup> revealed that the prevalence of type 2 DM patients in East Java was 275,462 in 2007 and increased to 605,974 in 2013. Surabaya, as the capital of East Java province, is one of the cities with a high prevalence for cases of type 2 DM; the number of cases of type 2 DM was 15,961 in 2009 and increased to 21,729 in 2010, then rose again to 26,613 in 2013<sup>4</sup>.

The Hospital Information System notes that DM ranks 5th out of the top 10 non-communicable diseases

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causing outpatient in hospitals in Indonesia<sup>5</sup>. Besides, type 2 DM was ranked second out of five diseases with the majority of patients treated by outpatient installations in type B hospitals<sup>6</sup>. From 2015 to 2017, type 2 DM ranks first on the top 10 list of diseases in Outpatient Installation, HSGH, and experienced an upward trend<sup>7</sup>. From 2015 through 2018, type 2 DM was ranked first for the diagnosis of the top 5 most diseases in the Outpatient Installation of HSGH<sup>8</sup>. The increasing trend of the number of visits and diagnoses of type 2 DM indicates that efforts to control non-communicable diseases are needed by making changes in health behavior. However, it is certainly not easy to be implemented; therefore, a concept needed to motivate the patients to apply the control behavior.

The concept of Health Action Process Approach (HAPA) used to explain in detail the motivational phase or pre-intentional phase and focuses on the process of increasing motivation to build intention in behaving<sup>9</sup>. HAPA consists of social-cognitive aspects such as risk perception, outcome expectancies, and the action of self-efficacy that can influence the intention to behave to control type 2 DM. Therefore, the motivation of this study was to analyze social-cognitive variables in predicting behavioral intentions to control type 2 DM in the motivational phase.

### Materials and Method

This observational study uses a cross-sectional design which conducted from March to April 2019. Data collected through visiting the 120 respondents, based on a random sampling, who suffered type 2 DM, without complication, who treated as an outpatient at the Internal Medicine section, Outpatient Installation of the HSGH. All respondents met the research inclusion criteria, aged 40-59 years, able to communicate well and able to read and write, willing to be interviewed, and have failure in controlling the type 2 DM.

Data was collected through an adapted questionnaire which consists of five parts, namely demographic information, risk perception, outcome expectancies, the action of self-efficacy, and behavioral intention, which measured on a 4-point Likert scale<sup>10</sup>. The dependent variable is the intention to behave to control type 2 DM, while the independent variables are risk perception, outcome expectancies, and the action of self-efficacy. The validity and reliability of the questionnaire are

examined by collecting data from 20 respondents who had similar characteristics at another Health Center. Validity test uses Pearson Product-Moment correlation, while the reliability test uses alpha Cronbach coefficient with a significance level ( $\alpha = 5\%$ ). Data analyzed by Path Analysis that test the effect of risk perception, outcome expectancy, and action self-efficacy on behavioral intention to control type 2 DM.

### Results

Table 1 shows the characteristics of respondents. Based on the criteria of the dependent and independent variables, the majority of respondents felt “at risk” of suffering from complications of type 2 DM if they did not practice control behavior. Half of the respondents have high outcomes expectancies related to the control behavior of type 2 DM. Most of the respondents had confidence in their ability to carry out control behaviors of type 2 DM before starting action. The majority of respondents have the intention to control type 2 DM to maintain the quality of life that manifested by checking blood sugar levels regularly, eating healthy foods, and exercise regularly.

**Table 1: Characteristics of Respondents**

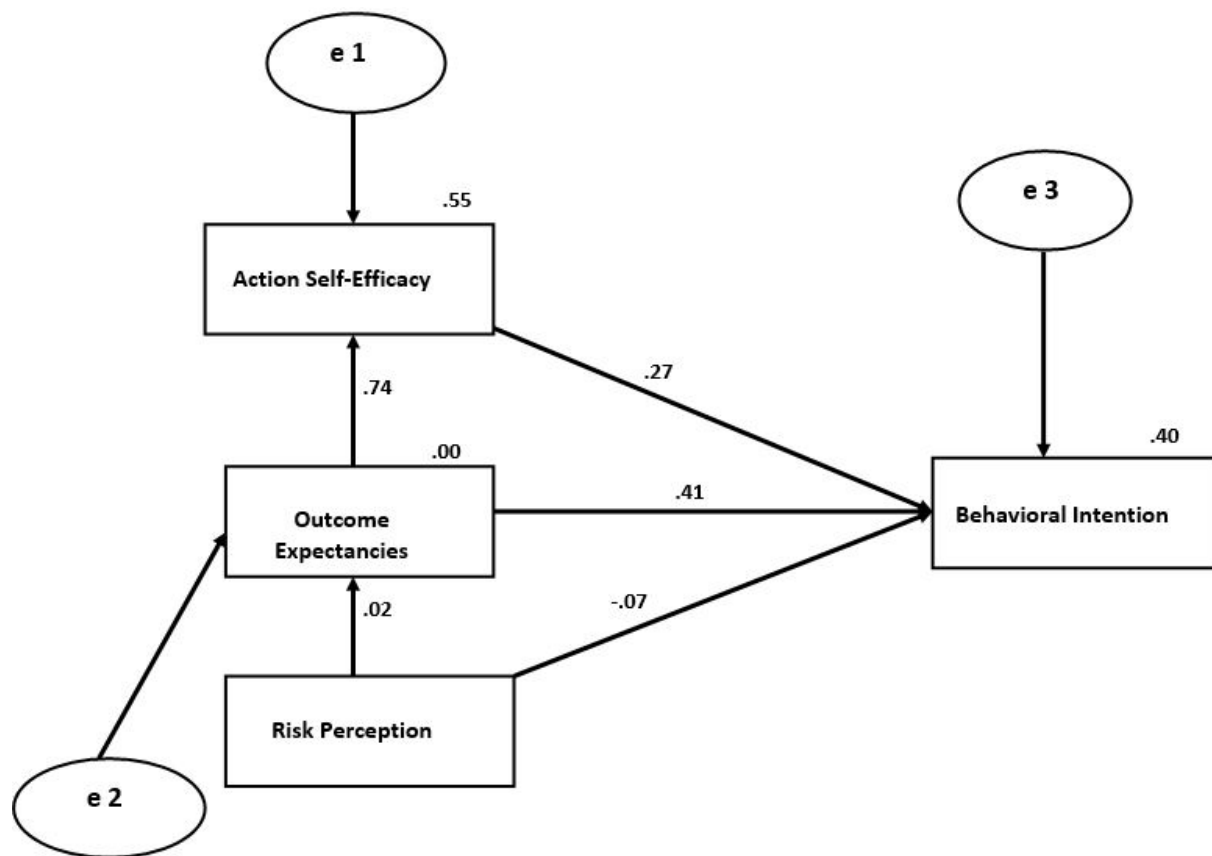
No.	Characteristics	Frequency	Percentage (%)
<b>1.</b>	<b>Age Group (Year)</b>		
	40-49	26	21.7
	50-59	94	78.3
<b>2.</b>	<b>Gender</b>		
	Male	28	23.3
	Female	92	76.7
<b>3.</b>	<b>Diabetes Family History</b>		
	Yes	63	52.5
	No	57	47.5
<b>4.</b>	<b>Risk Perception</b>		
	No risk	16	13.3
	At risk	104	86.7
<b>5.</b>	<b>Outcome Expectancies</b>		
	Not hope	60	50.0
	Hope	60	50.0
<b>6.</b>	<b>Action Self Efficacy</b>		
	Not confident	7	5.8
	Confident	113	94.2
<b>7.</b>	<b>Behavioral Intention</b>		
	No intention	9	7.5
	With intention	111	92.5

**Table 2: Result of Influence Analysis Risk Perception, Outcome Expectancies, and Action Self-Efficacy to The Behavioral Intention to Control Type 2 Diabetes Mellitus**

No.	Variable	B	P value	Description
1.	Risk Perception	-.066	0.35	Not significant
2.	Outcome Expectancies	0.408	<0.001	Significant
3.	The Action of Self-Efficacy	0.266	0.012	Significant

Table 2 shows that respondents' expectations for controlling this non-communicable disease and

avoiding future complications are contributing factors in determining the behavioral intention of respondents to control type 2 DM to prevent complications, which indicated by the lower value of p than 0.05 for the variable of the outcome expectancies. Respondents' self-confidence in practicing control behaviors of type 2 DM before starting action are an essential factor in developing respondents' behavioral intentions. In contrast, risk perception is not a factor that influences the intention to control type 2 DM. Figure 1 shows that the outcome of self-efficacy influences behavioral intention directly and indirectly through the action of self-efficacy.



**Figure 1: The final model of Path Analysis according to the theory of the Health Action Process Approach (HAPA)**

Based on the model criteria, the threshold of criteria's value, and model result, the model considered as good and fit to explain the direct and indirect effects of the independent variables on the dependent variable (Table 3). The HAPA model explained that behavioral

intentions could be predicted by risk perception<sup>11</sup>, since the risk perception is the main factor that triggers the formation of outcome expectancies and action self-efficacy at a later stage<sup>12</sup>.

**Table 3: The quality of the final model of the Path Analysis according to the theory of the Health Action Process Approach (HAPA).**

Model Criteria	Threshold Value	Model Result	Notes
Chisquare	Chisquare value expected to be low	2.98	Good/Fit
Probability	Probability more than 5%	0.084	Good/Fit
CMIN/DF	≤ 5	2.98	Good/Fit
GFI	≥ 0.90	0.987	Good/Fit
TLI	≥ 0.90	0.922	Good/Fit
NFI	≥ 0.90	0.98	Good/Fit

This study found that the high risk of complications of type 2 DM perceived by respondents did not affect their behavioral intentions. Fear and risk perception may stimulate respondents to make decisions to adapt to control behavior. However, it could be more efficient if combined with the intervention of the attitude transformation such as subjective attitudes and norms<sup>13</sup>. Parschau et al.<sup>14</sup> stating that there is no significant influence between risk perception and the intention to do physical activity on those who are suffering from obesity. Another study conducted by Rohani et al.<sup>15</sup> also in line with these findings that there was no relationship between risk perception and behavioral intention. Other studies show that perceptions of disease severity also play an essential role in the process of forming intentions to adopt healthy behaviors<sup>16</sup>.

The results of Path Analysis show that the respondents more intend to control type 2 DM if they have high outcomes expectancies. Schwarzer and Renner<sup>17</sup> also states that the outcome expectancies along with the action of self-efficacy significantly influence the formation of an intention to implement a healthy food diet. Other studies also show that the intention to exercise can be well predicted by the action of self-efficacy, outcome expectancies, and risk perception simultaneously<sup>18</sup>. There is a high level of confidence that obese people have that they will get a positive impact if they actively engage in physical activity both individually and in groups<sup>19</sup>.

The HAPA model explains that risk perception, outcome expectancies, and action self-efficacy are the best predictors of behavioral intention<sup>20</sup>. In the process of adopting the control behavior, people also need to understand the contingency between the type 2 DM

control behavior and the results or benefits that will be obtained in the future. Therefore, people need sufficient knowledge about the benefits that could be achieved from a series of actions that must be accomplished and how to regulate behavior<sup>21</sup>.

The results of the Path Analysis test show that the respondents' belief in their ability to control type 2 DM, before starting the action, is one of the crucial factors that determine whether the intention to control type 2 DM. This finding is in line with Renner et al.<sup>10</sup> which shows that the intention to apply a low-fat and high-vitamin diet predicted by action self-efficacy. Another study conducted by Renner and Schwarzer<sup>21</sup> showed that the behavior of a low-fat diet is influenced jointly by three social cognitive variables; risk perception, outcome expectancies, and self-efficacy actions.

The HAPA theory explains that the outcome of expectancies will stimulate someone to develop self-efficacy actions<sup>12</sup>. The study indicates that most of the respondents have confidence in their ability to control type 2 DM even though they must reconsider, find difficulties when applying it, motivate themselves, and make plans to control type 2 DM. Conversely, when someone feels unsure, then s/he will imagine failure, doubt, and tend not to have the intention to control type 2 DM.

The findings of this study have implications for health interventions. In the phase of intention formation (pre-intentional or motivational), research findings indicate that strategies are needed to improve the outcome of expectancies and action self-efficacy<sup>22</sup>. In this case, respondents can be given counseling to increase their self-confidence in anticipating various obstacles during the process of adopting the type 2 DM control behavior. Glanz et al.<sup>23</sup> explained that an effort to improve self-efficacy is to provide training skills in performing recommended behaviors. Thus, these results can be a basis for making a recommendation of a health promotion program, namely behavioral training in controlling type 2 DM by health workers, especially for DM health educators and hospital health promoters in the Hospital Health Promotion activities. The active role of trained DM health educator and collaboration with hospital health promoters is needed and synergized with nutritionists to provide healthy diet counseling for patients with type 2 DM so that they will have the ability to control and avoid complications.

## Conclusion

The majority of respondents are aged between 50-59 years, women, feel at risk of suffering from complications of type 2 diabetes mellitus, have hopes to avoid complications due to their illness, feel confident in their ability to make control behaviors, and have the intention to control this non-communicable disease. Behavioral intention to control type 2 DM can be predicted well by the outcome expectancies and the action of self-efficacy, but it could not be predicted by risk perception. Outcome expectancies and the action of self-efficacy play an essential role in the process of forming behavioral intention to control type 2 DM in the motivational phase. In contrast, risk perception does not contribute to determining whether the respondent will intend to control type 2 DM or not.

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# Relationship Between Mother's Knowledge of Rubella with Measles Rubella (MR) Immunization Status in Children Age 9-59 Months at MR Campaign, Java Island - Indonesia 2017

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## Abstract

**Background:** MR (Measles Rubella) campaign is one of Indonesia's efforts to achieve the world target without measles, rubella, and Congenital Rubella Syndrome (CRS) in 2020. However, the results show that MR campaign immunization coverage is not optimal. This study aims to determine whether the knowledge of mothers about rubella is related to MR immunization status in MR campaign at Java Island.

**Method:** This cross-sectional study used secondary data from the survey of Independent Evaluation of MR Immunization in 6 provinces at Java Island in 2017. There were 5,971 samples of mothers who had children aged 9-59 months were obtained based on cluster sampling technique. Bivariate and multivariate analysis were used to see the relationship between mother's knowledge of rubella and MR immunization status.

**Result:** Mother's knowledge about rubella interacted with belief (POR 1,899 95% CI 1,267-2,848) and interacted with education (POR 1,675 95% CI 1,086-2,583) to form a statistically significant relationship with MR immunization status.

**Conclusion:** Mother's knowledge of rubella is very important in increasing MR immunization coverage. Therefore, the government is expected to cooperate with active stakeholders to provide information on MR immunization.

**Keywords:** *Mother's knowledge, MR campaign.*

## Introduction

Immunization is one of the best efforts in global health and has an important role in achieving 14 out of 17 SDGs<sup>(1)</sup>. In the Global Vaccine Action Plan (GVAP), endorsed by the 194 Member States of the World Health Assembly in May 2012<sup>(2)</sup>, measles and rubella are targeted to be eliminated in 5 WHO regions by 2020.

In line with GVAP, the 2012-2020 Global Measles & Rubella Strategic Plan maps out the strategies needed to reach the world target without measles, rubella, and Congenital Rubella Syndrome (CRS). One of the efforts made by Indonesia to achieve this target is to carry out the MR campaign in children aged 9 months to less than 15 years in 2 phases; phase 1 in August-September 2017 in 6 provinces on Java Island and phase 2 in August-September 2018 in 28 other provinces outside Java Island. The MR campaign is the first step to introduce MR vaccines, replacing the measles vaccine, into the immunization program<sup>(3)(4)</sup>.

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The MR campaign is informed massively through all media (newspapers, flyer, booklet, banner, television ads, and social media) which aims to increase public

knowledge, especially mothers, about the importance of MR immunization. But the results of the MR campaign immunization coverage is not optimal, which is below the target of 95% coverage<sup>(5)</sup>. This unoptimal coverage can be influenced by several factors, the lack of the knowledge of the mother<sup>(6)(7)</sup> especially the knowledge of rubella, negative beliefs about immunization (the implementation of the MR campaign is enlivened by polemic on haram MR vaccine)<sup>(8)</sup>, and lack of support from health workers. This study aims to determine whether the knowledge of mothers about rubella is related to the MR immunization status in the MR Campaign at Java Island.

**Material and Method**

This study uses secondary data from a survey of Independent Evaluation of MR Immunization (MR Campaign) in 6 provinces at Java Island in 2017. There were 5.971 mother who had children aged 9 - 59 months who were willing to fill out the questionnaire in the survey, which was obtained based on cluster techniques sampling<sup>(9)</sup>. The dependent variable is the status of MR immunization based on a yes / no answer to the question of whether the child received MR immunization in the MR campaign. The independent variable is the mother’s knowledge of rubella based on the answer to the question of whether the mother knows that rubella disease can be prevented by immunization. The covariate variable is the education of mothers who were categorized as low if the last education is junior high school, and high if the last education is high school and above; attitude measured by questions related to comfort when immunizing; belief measured by questions related to vaccine issues and believe that children are entitled and obliged to receive immunizations; information access measured by asking where did the mother get information about

the MR campaign; and the support of health workers as measured by the opinions of mothers about the support of health workers to carry out MR immunization in the MR campaign. The answers to these questions are scored and measured mean values to see the cut-off-point to determine for good or less good criteria.

This study used a cross sectional study design with risk measures using prevalence odds ratio (POR). Data were analyzed by logistic regression test with 95% confidence interval through several stages; (1) Bivariate analysis, to see POR crude, (2) Interaction test to see whether there was an interaction between mother’s knowledge about rubella and MR immunization status, (3) Confounding test was carried out by comparing POR crude with adjusted POR, if the difference between the two PORs is more than 10% then the variable is considered as a confounder and included into multivariate analysis, and (4) Multivariate analysis.

**Results**

The proportion of children whosenot immunized in the MR campaign at Java Island is 11.8%. The proportion of MR immunized children is 88.2% or still below the target of immunization coverage, which is 95%. Table 1 shows that mothers who have lack of knowledge about rubella have a higher proportion (81.1%) compared to those with good knowledge. The children who were not immunized had a higher proportion in mothers’ negative beliefs about immunization (68%) and the lack of support from health workers (82.1%). Bivariate analysis shows that variables which have significant relationship with MR immunization status are mother’s knowledge of rubella, attitude, informationaccess, and support of health workers.

**Table 1: MR Immunization Status Based on Independent and Covariate Variables**

Variables	MR Immunization Status				POR (95% CI)	p-value
	No		Yes			
	n=703	%	n=5.268	%		
<b>Independent Variable</b>						
<b>Mother’s Knowledge of Rubella</b>						
Less Good	570	81,1	3410	64,7	2,335 (1,918-2,844)	0,000
Good	133	18,9	1858	35,3		
<b>Covariate Variables</b>						
<b>Mother’s Education</b>						
Low	311	44,2	2220	42,1	1,089 (0,930-1,276)	0,290
High	392	55,8	3048	57,9		

Variables	MR Immunization Status				POR (95% CI)	p-value
	No		Yes			
	n=703	%	n=5.268	%		
<b>Attitude Towards Immunization</b>						
Less Good	243	34,6	830	15,8	2,825 (2,378-3,355)	0,000
Good	460	65,4	4438	84,2		
<b>Belief</b>						
Negative	478	68	3499	66,4	1,074 (0,908-1,271)	0,406
Positive	225	32	1769	33,6		
<b>Information Access</b>						
No	139	19,8	60	1,1	21,392 (15,612-29,312)	0,000
Yes	564	80,2	5208	98,9		
<b>Support of Health Workers</b>						
No	577	82,1	3477	66	2,359 (1,929-2,884)	0,000
Yes	126	17,9	1791	34		

After analyzing the interaction test and confounding test, the final model of multivariate analysis was obtained (Table 2). The final model shows that mother's

knowledge of rubella interacts with mother's education and belief in order to form a significant relationship with MR immunization status and there is no confounder.

**Table 2: Final Model on The Relationship Between Mother's Knowledge of Rubella With MR Immunization Status**

Variables	B	p-value	POR	95% CI	
				Lower	Upper
Mother's Knowledge of Rubella	0,270	0,111	1,310	0,940	1,827
Mother's Education	-0,409	0,043	0,664	0,448	0,986
Belief	-0,456	0,012	0,634	0,444	0,903
Mother's Knowledge of Rubella by Mother's Education	0,516	0,020	1,675	1,086	2,583
Mother's Knowledge of Rubella by Belief	0,642	0,002	1,899	1,267	2,848

### Discussion

This study shows that the relationship between mother's knowledge about rubella interacts with education and belief. Regarding belief, Indonesia is the country with the largest Muslim population, so the issue related to haram vaccine was greatly influences the low coverage during the MR campaign. Although The Council of Indonesian Ulama(MUI) has issued a fatwa which states that MR vaccine is permissible (mubah) because there is an emergency and compulsion condition and has not found a halal vaccine<sup>(10)</sup>, but this still keeps people, especially mothers, from moving and does not immunize their children<sup>(11)</sup>.

One of the factors that influence a mother's knowledge, in this case knowledge of rubella, is the

level of education.<sup>(12)</sup> However, even though mother's education is low, knowledge can be obtained by seeking information through various media regarding rubella disease and MR immunization itself. In this era of high connectivity, it is hoped that a mother will be able to gather information about MR immunization from trusted sources, for example from official government websites or social media of a community leader who has the knowledge about immunization.

The limitations in this study is because this study uses a cross sectional study design, so it cannot see the temporal relationship and also cannot be ascertained the causality relationship between them. Another limitation in this study is not examining the potential confounders that may have potential relation to immunization status

such as mother's occupation, family economic status (because the MR campaign is free of charge), family and community support, and the quality of immunization services. In this study, selection bias can be minimized by using a total sampling of mothers who have children aged 9-59 months. Information bias regarding outcome variables on the survey is very minimal because immunization status although it was being asked directly to respondents, it is also compared with immunization status lists in Primary Health Center (Puskesmas) (9), while for knowledge of rubella, attitudes, and beliefs may have the potential to cause non-differential information bias. The results of this study have a narrow 95% confidence interval, so the role of chance is quite small. And this study is also consistent with other studies which state that mother's knowledge is related to immunization, in this case knowledge of rubella, related to immunization status of children<sup>(13)(14)(15)</sup>.

### **Conclusion and Recommendation**

A positive relationship between mother's knowledge about immunization, in this case the knowledge of rubella, with the the status of immunization of children in the MR Campaign at Java Island shows that knowledge is needed to provide an understanding of the importance of immunization. Belief that interacts with knowledge (POR 1,899 95% CI 1,267-2,848) proves that the mother's behavior to bring their children immunized is strongly influenced by beliefs (in this case because the MR vaccine has not been declared halal and most of the population is Muslim). Education that interacts with knowledge (POR 1.675 95% CI 1,086-2,583) proves that education and knowledge have a very close relationship, although knowledge can still be obtained from reliable sources of information, but an understanding of immunization in a mother with higher education will have an impact on the high coverage of immunization. Therefore the government is expected to cooperate with relevant stakeholders to actively provide socialization through various media and dialogue with religious / community leaders about the importance of MR immunization in order to achieve high MR immunization coverage, so that the chain of transmission of measles and rubella diseases can be stopped.

**Ethical Considerations**| This study uses data from the survey of Independent Evaluation of MR Immunization (MR Campaign) in 6 provinces at Java Island in 2017 which have received permission from the principal researcher of the survey and the Ethics

Committee of the University. The confidentiality of the data collected in the survey and used in this study is very well maintained.

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**Conflict of Interest:** Both author declared that no conflict of interest

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# Impact of Drug Abuse among Students: A Case Study of the School of Health Technology, Jega, Kebbi State, Nigeria

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## Abstract

**Objectives:** To determine the prevalence and pattern of drug abuse, and also explore the health and socio-economic impact of drug abuse among the students of the School of Health Technology (SHT), Jega Local Government Area (LGA), Kebbi State, Nigeria.

**Method:** This study was a survey of 254 students of SHT, Jega LGA. Study tool was a questionnaire. Collected data was analyzed using the SPSS Version 20 software.

**Results:** The mean age ( $\pm$ SD) of the respondents was 22.9 ( $\pm$ 3.7) years and 54.3% were males. About one-fifth (17.8%) of the respondents had used drugs other than those required for medical reasons, 14.2% had history of abuse of prescription drugs, 17.7% abused drugs that were not prescribed for medical reasons, and 19.3% abused more than one drug at a time. Furthermore, >four-tenth of those respondents who were abusers of drugs had developed medical problems as a result of its use. More than 1/3 of those respondents who gave a positive history of drug abuse had in one way or the other suffered from the socio-economic and health consequences of drug abuse, some of these include strained relationships with close persons and employers, loss of job, involvement in crime, and arrest.

**Conclusion:** The above findings recommend the need for an urgent social intervention targeted at curbing the menace of drug abuse in the surveyed institution.

**Keywords:** Drug abuse, substance use, students, mental health, addiction, socio-economic, impact, burden, Nigeria.

## Introduction

Drug can be defined as a medicine or other substance which has a physiological effect when

ingested or otherwise introduced into the body<sup>1</sup>. This term is used, generally, to refer to a substance taken for therapeutic purposes and/or for abuse<sup>2</sup>. The abusive use of drugs is known as “drug abuse”. Drug abuse can be elaborately defined as the use of illegal drugs or the use of prescription or over-the-counter drugs for purposes other than those for which they are meant to be used, or in large amounts<sup>3</sup>. Over the years, there has been a growing data base indicating that drugs are being abused among young people (4,5). In 2010, the United Nations Office on Drugs and Crime (UNODC) reported that about 27 million people in the world are problem drug users<sup>6</sup>. Globally, and even locally, drug abuse is

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a serious public health and social problem which has associated effects on people's health, cultural welfare, socio-economic welfare, and security<sup>7-15</sup>.

Abused drugs can generally be categorized into three groups: hallucinogens (such as marijuana, ecstasy); depressants (such as heroin, barbiturates); and stimulants (such as cocaine, crack, amphetamines)<sup>5,16</sup>. The use of these drugs does not only affect the individual user, but also their families, friends, neighbors, co-workers, and communities as well<sup>5</sup>.

In Nigeria, it has been consistently reported that drug abuse is a popular social practice among tertiary school students<sup>17,18</sup>. Many factors have been found to influence tertiary school students to indulge in drug abuse. These factors include family factors (e.g. lack of parental care, poor family background), school factors (e.g. educational stress, poor teacher-student relationships, nature of extra-curricular activities), economic factors (e.g. unemployment) psychological factors (e.g. frustration and emotional stress), and others<sup>12,19-22</sup>.

Unfortunately, drug abuse is becoming a monstrous problem in the Nigerian society<sup>9</sup>. Despite the various measures taken by the government and other agencies at curbing the abuse of drugs in Nigeria, yet many people are still indulging its use; hence reducing them to puppets and zombies due to the addictive effect following its use<sup>9,12,19-22</sup>.

Different literatures had reported the prevalence of drug abuse in Nigerian tertiary schools. The prevalence of drug abuse was: 69.2% among tertiary school students in Abeokuta, 27.5% among University of Uyo students, 46.6% among university students in Benin City, and 55.4% (stimulant drink use) among university students in Sokoto<sup>17,24-26</sup>. However, after extensive online literature search, no study was found exploring the prevalence rate of drug abuse among tertiary school students in Kebbi State.

From our experience as scientific researchers, clinicians, and teachers, practicing in Kebbi State, Nigeria, we have come in contact with drug abusers living in Kebbi State, either on the street, motor parks, clinics, schools or somewhere else. Based on this, coupled with absence of published studies on drug abuse in Kebbi State, we aim to conduct this study to determine the prevalence of drug abuse and also explore the health and socio-economic consequences of drug abuse among students of the SHT, Jega LGA, Kebbi

State, Nigeria. The findings made from the study will definitely help the stakeholders in the Nigerian socio-economic, educational, and health sectors in their strategic planning.

## Method

The study was a cross-sectional study conducted among students of the SHT, Jega LGA, Kebbi State, Nigeria. The school is a mono-technic with over 2,500 students in enrolment. A convenience sample of 300 students was used for the study. Simple random sampling technique was used in the recruitment of participants for the study. The study instrument was a paper questionnaire on drug abuse developed by the Addiction Research Foundation Inc, Canada<sup>23</sup>. The questionnaire obtained information on the participants': socio-demographic characteristics; history of drug use; history of drug dependence; and experience on the negative socio-economic and health consequences of drug abuse.

The students of the surveyed school were implored to gather themselves in one of the large halls in the school premises for a survey. They were informed about the purpose of the survey, and that their participation in this survey will be duly appreciated. They were also informed that their participation is completely voluntary and confidential. Out of all the students that volunteered to participate in the study, only 300 were selected and their selection was done using simple random sampling technique. Verbal informed consent was obtained from all the participants, before they were interviewed using the study questionnaire. All questionnaires were self-administered. Out of the 300 participants given questionnaires to fill, only 254 had their questionnaires properly filled and returned.

Collected data was computed into the SPSS version 20 software, for analysis. The frequency distribution of all variables was determined; test of associations between variables were done using Chi square test with a  $p$ -value  $< 0.05$  considered to be statistically significant.

## Results

The response rate for this study was 85% (254/300). The majority (54.3%) of the respondents were males, 51.6% were in 100 level, 80.7% were not married, 87.0% were Hausas, and 94.5% were Muslims. Also, their mean age ( $\pm$ SD) was 22.9 ( $\pm$ 3.7) years.

A total of 45 (29 males, 16 females) respondents had used drugs other than those required for medical reasons. Thirty six (22 males, 14 females) respondents had abused prescription drugs; 49 (27 males, 22 females) respondents had abused more than one drug at a time.

After grouping those respondents with positive history of drug abuse into 3 categories: category A– those respondents that used drugs other than the drugs required for medical reasons; category B– those respondents that abused prescription drugs; and category C – those respondents that abused more than one drug at a time, we observed that: 39.1%, 27.8%, and 42.9% of those respondents in categories A, B, and C, respectively, reported that they could not get through the week without using drugs; 41.3%, 63.9%, and 49.0% of those respondents in categories A, B, and C, respectively, reported that they developed medical problems as a result of their abuse of drugs; 39.1%, 61.1%, and 53.1% of those respondents in category A, B, and C, respectively, reported that they have been involved in a treatment program specifically related to drug use; 32.6%, 61.1%, and 51.0% of those respondents in categories A, B, and C, respectively, reported that drug abuse created problems between them and their spouse/parents; 34.7%, 44.4%, and 42.9% of those respondents in categories A, B, and C, respectively, reported that drug abuse made them lose friends; 39.1%, 47.2%, and 40.8% of those respondents in categories A, B, and C, respectively, reported that they have engaged in illegal activities in order to obtain drugs; 39.1%, 55.6%, and 44.9% of those respondents in categories A, B, and C, respectively, reported that drug abuse made them lost a job; and 43.5%, 50.0%, and 49.0% of those respondents in category A, B, and C, respectively, reported that they have being into trouble at work as a result of drug abuse.

## Discussion

The findings made in this study shows that drug abuse has a very high negative health and socio-economic impact among those who engage in such behavior. Although relatively lower than that reported in some Nigerian studies<sup>24-26</sup>, the prevalence of drug abuse among the students surveyed in this present study poses a big threat of serious concern, as roughly 1 out of every 5 of the surveyed students had engaged in drug abuse in one way or the other.

Furthermore, the population surveyed in this study is health professions trainees. Despite their supposed

awareness of the detrimental effects of drug abuse on human body, yet some of them still got engaged in such unhealthy behavior. However, this is not very surprising, as a similar finding had also been reported even among health professionals in Nigeria<sup>11</sup>. These findings just conclude that drug abuse is not only being practiced among the lay population, but also among health professionals and trainees as well<sup>13-15,27</sup>.

It is also noteworthy that drug abuse had a heavy negative impact on the health of those respondents with history of drug abuse as more than two-tenth of those respondents that were abusers of drug could not live a week without abusing drugs and roughly. Also, a third of these respondents reported that they do not always have the will power to avoid abuse of drugs; this concludes that they are dependent of these drugs. This is a serious problem that requires urgent attention. Sadly, many (>four-tenth) of those respondents who reported themselves of be abusers of drugs had at one time developed some medical problems as a result of its use. Similar finding had also been reported even among health professionals in Nigeria<sup>11</sup>.

The medical consequence of drug abuse is huge. Drug abuse can result into kidney problems, intestinal problems, mental illness, and even death<sup>28-32</sup>. It is so unfortunate that many abusers of drugs are dependent on such drugs and they will at one point develop medical problems as a result of its chronic use<sup>28-30,32,33</sup>.

In this study, it was also found that drug abuse have a heavy negative social impact on those respondents with history of such. It is so alarming that more than a third of those respondents that gave a positive history of drug abuse: felt guilty for their engagement in drug abuse practices; had experienced problems with their spouses, friends, and parents; had engaged in a fight and/or illegal activity as a result of drugs; and had got arrested as a result of drug abuse. These findings obviously show that many of these drug abusers are living in poor social quality of life. Losing loved ones (spouse, parents, and friends) as a result of drug abuse could even worsen the social health and wellbeing of this category of respondents (i.e. drug abusers), therefore increasing their risks of developing mental illnesses like depression, aggression, etc.

Furthermore, there was a record of heavy negative economic impact among those respondents with history of drug abuse. Roughly half of those who respondents who engaged in drug abuse had at one time entered into



trouble at work as a result of drug abuse. Also, many of them had lost a job as a result of drug abuse. By implication, many of these category of respondents may end up engaging in organized crimes if they have no economic capacity to acquire these drugs.

However, this study has its limitations. First, this study was a single-institution study conducted in just one local government area, out of the 21 LGAs in Kebbi State<sup>34</sup>; hence it is difficult to make generalizations on the drug abuse profile of tertiary school students in this State, based on the data obtained from this study. Second, the study sample size was determined based on the convenience of the authors, as the study was self-funded. Therefore, the study data may not be fully representative of the school.

### Conclusion

The prevalence and pattern of drug abuse among the students of the SHT, Jega LGA, is fairly significant. Unfortunately, those among them that were drug abusers had suffered huge consequences associated with drug abuse. There is a need for urgent social intervention programs to curb the problem of drug abuse in this surveyed tertiary academic institution.

**Ethical Clearance:** Approval to conduct the study was obtained from the Office of the Director, Kebbi State Study Centre, National Open University of Nigeria, Kebbi State, Nigeria.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Saturated Fat Acid Food Consumption Correlation with Hypertension in Elderly Woman

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## Abstract

**Context:** Hypertension is a disease often encountered in the elderly. This occurs due to physiological and lifestyle changes including eating habits. Food consumption habits of high cholesterol sources can result in the accumulate of fat in blood vessels and forming plaque. It result in an increase in blood pressure that leads to hypertension. The purpose of this research is to analyze the correlation of food consumption habits saturated fat sources with hypertension in elderly woman.

This study uses case control design with sample of elderly female in Health Centre Gunung Anyar Surabaya. Subject consisting of 28 cases and 28 controls. Data food consumption of saturated fat obtain through recall method Semi Quantitative Food Frequency Questionnaire (SQ-FFQ). Blood pressure is measured using sphygmomanometer. The statistical test performed is the chi square test.

The result showed that there was a significant relationship between food consumption saturated fat acid sources with hypertension among elderly woman ( $p = 0,01$ ).

The conclusion of this study is that there is a significant relationship between the food consumption of saturated fat acid with hypertension in elderly women.

**Keyword:** *Hypertension, saturated fat acid, elderly woman*

## Introduction

The elderly are a group of population aged 60 years or more. The increase number of elderly people is followed by the increase in diseases faced by the elderly population especially the degenerative disease. <sup>(1)</sup>This process occurs at age decreased the ability of networks to improve and maintain the normal functions of the body one is on cardiovascular. Changes in the

structure of the arteries thicken and become increasingly rigid causes the onset of arteriosclerosis. This condition forces the blood flowing through the blood vessels to narrow, so that an increase in blood pressure and leads to hypertension. Hypertension experienced by particularly vulnerable age group. An increase in blood pressure is more prone to occur in the elderly women. <sup>(2)</sup> This occurs due to hormonal changes and a decline in estrogen produced by elderly women who have undergone the process of menopause, so vasoconstriction blood vessels and result in an increase in blood pressure. <sup>(2)</sup>

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Hypertension is one of the diseases with a high incidence in the developing world middle income down. The disease is influenced by a variety of risk factors, grouped into two, namely the risk factors can be modified and cannot be changed. Risk factors can be modified, among others, eating habits and lifestyle, while

risk factors cannot be changed include age, gender, and history of family hypertension.<sup>(3)</sup> High blood pressure is to be one of the risk factors to the emergence of other health problems such as heart disease, stroke, kidney and may cause death of.<sup>(4)</sup>

Hypertension in the elderly regard very closely with changes in physiological condition and lifestyle changes such as eating habits. Dietary intake and foods high in saturated fatty acid can cause the occurrence of elevated levels of LDL cholesterol in the blood is saturated fat and cholesterol may trigger someone experiencing high blood pressure and heart problems. High cholesterol in the blood can stimulate the formation of plaque in the arteries and cause constriction of the arteries and decrease the rate of elasticity of blood vessels.<sup>(5)</sup>

Prevalence of hypertension in Indonesia experiencing an increase from 25,8% in 2013 to 34,1% in 2018. East Java was ranked the sixth highest Indonesia hypertension cases.<sup>(6)</sup> Gunung Anyar subdistrict which is in Surabaya. The subdistrict has a Clinic with five elderly Posyandu units. The disease has become the number one ranking among the top ten trends of other health problems that occur on the elderly as Diabetes Mellitus (DM), tuberculosis, coronary artery disease, and others. The number of hypertension in Gunung Anyar Surabaya enough experience increased dramatically more than doubled in the year 2016-2017.<sup>(7)</sup>

Based on the result of observation of the eating habits of the community showed that the rate of consumption of food sources of fat high enough, frequent consumption of food ingredients such as coconut milk, duck meat, organ meats, chicken skin and other as well as the confusion of ways of processing food such as fried oil that its use is already more than twice. Based on the above discussion, the author would like to examine the relationship between consumption pattern food sources of saturated fat with incident hypertension in elderly women in Gunung Anyar Surabaya.

## Material and Method

This research is observational analytic research because researchers only make observations without giving treatment or intervention to the respondents and aim to determine the effect of the variables to be studied. The design of this study uses quantitative design case control study.

The research was carried out in March and April 2019. The population used in this study was all members of the clinic group in Health Centre Gunung Anyar Surabaya with total population of 210 elderly people. Entirely divided into five clinic group. The total population, sample taken using a purposive sampling method taking into account the criteria already defined by the researchers. Sample calculation using the formula with a large proportion of Kuntoro exposure control group 0,82. Based on the results of the calculation, obtained the number of samples as many as with division 28 cases and 28 control group.

The sample was chosen following a predetermined inclusion criteria according to their respective group that is listed as a member of the clinic group elderly Health Centers Gunung Anyar that attend activities in age range 60-70 years, measured hypertension systolic  $\geq 130$  mmHg and diastolic  $\geq 80$  mmHg or when the research process is underway for the case group, and not hypertension with measurement result systolic  $< 130$  mmHg and or diastolic  $< 80$  mmHg when research underway for the control group. Blood pressure measurement are conducted by doctor of clinic group. As for the criteria of exclusion among others are currently taking any medication-related hypertension while research progresses, and not willing to research respondents. After selected using these criteria, the respondent provided an explanation of the information research that will be done and signed a research agreement if the sheet was prepared following a series of research. The collected data on food consumption level source of saturated fatty acid via questionnaire sheet Semi Quantitative Questionnaire (SQFFQ) that contain food sources of saturated fat. Next, measurement of blood pressure using Sphygmomanometer. Assessment of SQFFQ through multiplication between the frequency of consumption, and serving of food consumed of 1 month. It also carried out related data collection characteristics of the respondents include age, family history of hypertension, level of education and employment of the respondent through the questionnaire sheet characteristics of respondent. The data already collected and the processed by computer software programs and use statistical analysis univariate and bivariate. Data characteristics of respondents subject presented in the form of frequency distribution, then to consumption patterns of food sources of saturated fatty acid are analyzed with the application NutriSurvey and compared with the percentage of

recommended consumption is then grouped into two categories namely enough if  $\leq 10\%$  in a day, and more if  $> 10\%$  in a day.<sup>(8)</sup> dyslipidemia, elevated blood pressure and insulin resistance. Metabolic syndrome affected by changes in lifestyle and unhealthy dietary patterns with high cholesterol, saturated fatty acid and trans fatty acid. Objective. The study conducted to know relationship between fat consumption with metabolic syndrome among adult people in Denpasar city. Method: The case control study designed was applied. The cases were adult people who had metabolic syndrome, and the control was healthy people from the case-neighboring household. Total subject were 130, taken by consecutive sampling: 65 cases and 65 controls. The subject identity, fat intake, waist circumference, blood pressure and fasting blood sugar were collected. The food frequency questionnaire (FFQ) analysis using correlation chi-square test with application of SPSS v20 done to analyse the relationship between the consumption patterns of food sources of saturated fatty acid with incident hypertension. Analysis of the Odd ratio (OR) was conducted to access the relationship or the magnitude of the risk factors of consumption patterns of food sources of saturated fatty acid with incident hypertension.

**Findings:**

**A. Characteristics of Respondents:** The characteristics of respondents who examined in this research include age, family history of hypertension, the final level of education and employment of the respondent. The number of the subject involved in research is as much as 56 respondents with division 28 respondents cases group and 28 respondents controls group.

Respondent characteristics included age, education level, family history of hypertension and work. data on the distribution of respondents characteristics are presented in Table 1.

Based on Table 1, it can be seen that the majority of control group respondents aged 60-65 years, then case group respondent aged 66-70<sup>th</sup>. Majority of case group have nota family hypertensive historyan, and majority of control group have not to. Education level graduated from elementary school for cases group, then senior high school for control group. While the economic factors of the majority of respondents case and controlare housewife.

**Table 1. Distribution of Characteristics of Respondent**

No	Characteristics of Respondent	Cases	Control	
		n		
1.	Age	60- 65 years	12	21
		66- 70 years	16	7
2.	Family history of hypertension	Yes	11	10
		No	17	18
3.	Educational Level	Not School	0	0
		Elementary School	9	2
		Junior High School	8	3
		Senior High School	7	15
		College	4	8
4.	Job	Employe	0	0
		Entrepreneur	5	2
		Farm Workers	0	0
		Housewife	15	15
		Others	8	11

**B. Consumption patterns of food sources saturated fat:** Consumption patterns of food sources of saturated fat acid in this study measured by interview Semi Quantitative Food Frequency Questionnaire (SQ-FFQ) include the number, type and frequency. Each individual consumes food sources of fat with the type, amount and frequency. The consumption of saturated fat are categorized either when the maximum consumption of total energy consumed in a day. Dietary saturated fats include saturated fat percentage compared to the total energy consumed in a day and categorized into enough if  $\leq 10\%$  and more if  $> 10\%$ .<sup>(9)</sup>

Sources of saturated fats are most often consumed by respondents is coconut oil, butter and margarine. In addition, the source of the saturated fat that comes from animal is like chicken with its skin, beef and duck meat, petrol, goat meat, offal, and others. The majority of respondents to the foodstuffs processing by way of a fried in cooking oil that its use exceeded the recommendations  $> 2x$ .

**D. Distribution of fre quency food source saturated fatty acid in Health center Gunung Anyar Surabaya:** Each individual consumes food sources of fat. So did the frequency of consuming foods. Frequency is measured in units of time : day, week, month, and never.

**Table 2: Distribution frequency of food sources of saturated fat in a group of cases.**

Food source SFA	Day (often)	Week (sometimes)	Month (rarely)	Never
	N	N	n	N
Cooking oil (>2x)	28	0	0	0
Margarine	2	8	4	14
Coconut milk	0	3	22	3
Egg Chicken	5	23	0	0
Chicken meat	0	25	2	1
Chicken skin	0	20	8	0
Beef	0	12	16	0
Duck meat	0	5	16	7

Based on Table 2, it can be noted that most of the respondents case consumed cooking oil on a daily basis with the use of more than twice the number of 28 respondent. Average use oil for frying until the color turn black. As for the food the most often consumed on a weekly basis are egg, chicken, chicken skin. Next, food ingredients consumed monthly us coconut milk as much as 22 respondents.

**Table 3: Distribution frequency of food sources of saturated fat in a group of controls.**

Food source SFA	Day (often)	Week (sometimes)	Month (rarely)	Never
	n	N	n	N
Cooking oil (>2x)	28	0	0	0
Margarine	0	5	9	14
Coconut milk	0	2	15	11
Egg chicken	3	25	0	0
Chicken meat	0	20	8	0
Chicken skin	0	15	10	3
Beef	0	5	15	3
Duck meat	0	3	18	7

Based on table 3, it can be noted that most of the respondents case consumed cooking oil on a daily basis with the use of more than twice the number of 28 respondent. On this, control group respondents have started to reduce the use of oil. They prefer to use the oil as necessary, so that no oil left jelantah. So that the oil used is not to change the color to black. As for the food the most often consumed on a weekly basis is egg chicken, chicken, chicken skin cooked way fried. Next, food ingredients consumed monthly us coconut milk as much as 15 respondents.

**C. Correlation food source saturated fat with hypertension elderly woman at Health Centre Gunung Anyar Surabaya:** The result was be represented in Table 4.

**Table 4. Correlation food consumption saturated fat with hypertension**

Categorie	Case	Control	OR	95% CI	P value
	n	n			
Cukup	4	12	8	2.18-29.24	0,01
Lebih	24	16			
Total	28	28			

**Discussion**

Based on the results of research that has been done, it can be seen that the age of respondents who suffer from hypertension is mostly in the age range of 65-70 years. While respondents who did not have hypertension were in the age range of 60-65 years. This shows that the more age increases, the greater the risk of hypertension. In line with the results of Riskesdas (2013) which stated that the prevalence of hypertension will increase along with increasing age, this is in line with research conducted by Sringoringo (2013) and Pramana (2016) who found an association of age with the incidence of hypertension.<sup>(10)</sup>

Based on the result, level of education affects the level of knowledge person. In the results of the study it was found that hypertensive respondents mostly had a history of elementary education. As for the respondents who are not hypertensive, most of them have a history of high school education. This is in line with the research conducted by Fitriyani (2012) in several health centers in Cilegon City, which also stated the same thing that the education of respondents with hypertension was mostly graduated from elementary school.

Based on the results of the study it can be seen that there was no significant difference between the types of work of respondents with the incidence of hypertension. This is in line with research conducted by Iskandar et al. (2012) which shows that there is no significant relationship between work and the degree of hypertension. Although work does not have a direct effect on the incidence of hypertension, but the type of work a person is very influential on income, the selection of food ingredients, and the ability to get the type of food someone consumes. (Purnama and Prihartono, 2013).<sup>(11)</sup>

There is not much history of hypertension found in

respondents who suffer from hypertension. This is in line with the research of Yeni et al. (2010) which states that there is no relationship between hypertension and a history of hypertension. This can be due to the risk factors for hypertension not only from hereditary factors, but also other risk factors such as smoking habits, improper diets, erroneous eating patterns such as high sodium and fat, obesity and metabolic syndrome which can cause hypertension (Kementerian Kesehatan RI, 2017).<sup>(12)</sup>

Chi-Square analysis results at shows that there is a significant relationship between the consumption of saturated fats with the genesis of hypertension on respondent cases and controls with the results of the p value = 0,01 (<0,05). Respondents who consume saturated fat that exceeds the recommendations of more than 10% total energy a day can increase the risk of incident hypertension eight times more likely than respondents who consume saturated fat enough  $\leq$  10% total energy a day. This is in line with the research ever undertaken by Salsabila in 2014 of the relationship between central obesity, fat energy intake with hypertension and sodium with the genesis of hypertension suggest that there is a meaningful relationship between fat intake with incidence of hypertension with a value of statistical test p value = 0,03.

### ConclusionS

Consumption of saturated fat sources has a significant relationship with the incidence of hypertension in elderly women at the Gunung Anyar Health Center Surabaya. Respondents who had more than 10% saturated fat consumption had a risk of hypertension occurring 8.0 times than respondents who had a saturated fat consumption level of  $\leq$  10%.

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# Relationship Energy and Protein Intake with the Incidence of Stunting among Toddler Aged (25-60 Months) in Mangkung Village, District of Central Lombok

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## Abstract

**Background:** Stunting is a linear growth disorder that is indicated by Body Height according to the Age less than -2 Standard Deviation (short) and less than -3 Standard Deviation (very short). Lack of energy in a child over a long period of time can result in a hampered bone growth process that causes problems with height. Protein deficiency causes retardation of bone growth and maturity, because protein has a function that cannot be replaced by other nutrients, namely building and maintaining body cells and tissues. The purpose of this study was to determine the relationship between energy intake and protein intake with the incidence of stunting among toddler aged (25-60 months) in Mangkung village. Multivariate analysis using logistic regression analysis. Data was analyzed using STATA software version 13.0 for Windows.

**Results:** The energy intake variable has a p-value of 0,000 (p-value <0.05) with a POR value of 9.9 (95% CI: 6.39-15.23). The protein intake variable has a p-value of 0,000 (p-value <0.05) with a POR value of 9.1 (95% CI: 5.96-13.89). History of childbirth birth weight, history of exclusive breastfeeding, providing complementary food for breast milk, basic immunization status, history of infectious diseases, level of mother's knowledge, and family income have a test of homogeneity (p value <0.05) which means the variable has a modification effect/interaction with the relationship between energy intake and the incidence of stunting. Whereas, the variables that have modification/interaction effects (test of homogeneity <0.05) on the relationship of protein intake with the incidence of stunting are variable age of toddler, history of childbirth birth weight, history of exclusive breastfeeding, providing complementary food for breast milk, basic immunization status, history infectious diseases, level of mother's education, level of knowledge, and family income. The results of the final stage of multivariate analysis showed that the variable energy intake had a POR value of 7.7 (95% CI: 4.83 - 9.47).

**Conclusion:** Energy intake and protein intake have a significant relationship with the incidence of stunting among toddler aged (25-60 months) in Mangkung Village. Energy intake is the most dominant variable influencing the incidence of stunting among toddler in Mangkung Village after controlled for variables of childbirth birth weight, basic immunization status, history of infectious diseases, and family income.

**Keywords:** *Energy intake, protein intake, stunting, toddlers 25-60 months*

## Introduction

Malnutrition is a condition that occurs when food ingredients that enter the body do not contain enough nutrients in accordance with what is needed by the body. One assessment of poor nutritional status based on Minister of Health Decree No. 1995/MENKES/SK/

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XII/2010 concerning Anthropometric Standards for Assessment of Child Nutrition Status is an indicator of Body Length by Age or Body Height according to Age. The term malnutrition by using BL/A or BH/A indicators is known as stunting (short and very short).<sup>(1)</sup>

The adverse effects that can be caused by stunting problems in the short term are disruption of brain development, intelligence, impaired physical growth, and metabolic disorders in the body. Whereas in the long term it is decreasing cognitive abilities and learning achievement, decreasing immunity so that it is easily sick, and high risk for the emergence of diabetes, obesity, heart and blood vessel disease, cancer, stroke, and disability in old age, and the quality of work that results on low economic productivity.<sup>(1)</sup>

Lack of consumption of energy and protein will cause the body to lack nutrients, so to overcome these deficiencies, the body will use energy and protein deposits. If this condition lasts for a long time, then the energy and protein deposits will run out so that tissue damage occurs which causes a child to experience stunting.<sup>(2)</sup>

Lack of energy in a child is an indication of lack of other nutrients. If this condition is left for a long time, it will result in the inhibition of the process of bone growth which causes problems with stunting in toddlers. Protein deficiency causes retardation of bone growth and maturity, because protein has a function that cannot be replaced by other nutrients, namely building and maintaining body cells and tissues.<sup>(3)</sup>

Data from Basic Health Research in 2018 shows the prevalence of stunting in children under five in 2013 was 37.2% and a decline in 2018 was 30.8%.<sup>(4)</sup> Even though there was a decrease in the prevalence of stunting nationally, in some provinces Indonesia was wrong the province of West Nusa Tenggara shows that the prevalence of stunting is still in the high category in 2017 at 37.30%.<sup>(5)</sup> The results of the Weighing Week Report in the Mangkung Community Health Center area in November 2018 showed a tendency to increase the prevalence of stunting from 2016 by 15.13%, in 2017 as much as 28.34%, and in 2018 as much as 30.18%.

Various efforts have been made to overcome stunting problems starting from providing adequate food intake, and improving health status. However, stunting is still a public health problem that needs to be prevented and addressed.

## Research Method

**Study Design:** This study is an analytical study using a cross-sectional study design to determine the relationship between energy intake and protein intake with the incidence of stunting among toddler aged (25-60 months) in Mangkung Village.

**Population and Samples:** The source population in this study was all toddlers aged (25-60 months) who lived in Mangkung Village and conducted weighing in each Integrated Health Post in Mangkung Village. The study population was all toddlers aged (25-60 months) who lived in Mangkung Village and weighed in each Mangkung village Integrated Health Post and fulfilled the inclusion and exclusion criteria. Inclusion criteria include toddlers aged (25-60 months) at the time of measurement, staying in the research area. Exclusion criteria include toddlers who are ill when doing research, have physical disabilities (such as deafness, mute) and mental disorders, do not have a Child health record. The number of toddlers in Mangkung village was 622 toddlers and the number of respondents in this study was 372 respondents taken by random sampling from each Integrated Health Post.

**Variable:** The independent variables in this study were energy intake and protein intake, while the dependent variable was the incidence of stunting among toddler aged (25-60 months). The covariate variables in this study were toddler age, gender, history of childbirth birth weight, history of exclusive breastfeeding, administration of breastfeeding, basic immunization status, history of infectious diseases, level of mother's education, level of mother's knowledge and family income.

**Data Collection:** This study uses primary data by conducting anthropometric measurements based on Height According to Age in infants to obtain nutritional status data and conducting interviews with respondents to obtain information on toddler feeding. Anthropometric measurements were carried out by enumerators from the field of public health nutrition as many as 3 people. Data on consumption of energy and protein intake of respondents was obtained through interviews using 1 x 24 hour food recall sheets. Other data regarding the covariate variables were obtained through interviews with the respondent's mother using a questionnaire adopted from the public health nutrition department of the Indonesian university's public health faculty.

**Data Analysis:** Bivariate analysis was conducted to determine the relationship between variable energy intake and protein intake with the incidence of stunting. The statistical test used is the chi square test. Multivariate analysis using logistic regression by including all variable candidates who have p-value <0.25 so that

the relationship between energy intake and protein intake can be seen with the incidence of stunting among toddler aged (25-60 months) after covariate variables are controlled. Data analysis using STATA version 13 software for Windows.

## Result

**Table 1: Results of Bivariate Analysis**

Variable	Nutritional Status Of Toddlers				Total		p-value	POR (95 % CI)
	Stunting		Normal					
	N	%	n	%	n	%		
<b>Energy Intake</b>								
Less	134	87,6	21	9,6	155	41,7	0,000	9,9 (6,39-15,23)
Enough	19	12,4	198	90,4	217	58,3		
<b>Protein Intake</b>								
Less	133	86,9	24	11,0	157	42,2	0,000	9,1 (5,96-13,89)
Enough	20	13,1	195	89,0	215	57,8		

The results of statistical tests on the relationship of energy intake with the incidence of stunting showed a p-value of 0,000 (p-value <0.05) which means that there was a significant relationship between energy intake and the incidence of stunting among toddler aged (25-60 months) in the village Mangkung. The Prevalence Odds Ratio (POR) is 9.9 with a range (95% CI 6.397-15.239) which means that toddlers with less energy intake will have 9.9 times the odds for stunting compared to toddlers who have enough energy intake. The results

of statistical tests on the relationship of protein intake with the incidence of stunting showed a p value of 0,000 (p-value <0.05) which means that there was a significant relationship between protein intake and the incidence of stunting among toddler in Mangkung Village. POR value is 9.1 with range (95% CI 5.968-13,897) which means that toddlers with less protein intake will have a tendency of 9.1 times to experience stunting compared with toddlers who have sufficient protein intake.

**Table 2: Analysis of Stratification on the Relationship between Energy Intake and Stunting in Mangkung Village**

Variable	POR Adjusted		Test of Homogeneity	Information
	POR	95% CI		
Toddler Age (Month)	9,4	6,10 – 14,31	0,387	not the effect of modification/interaction
25-36	7,2	4,01 – 12,98		
37-48	11,3	5,52 – 23,30		
49-60	17,9	4,58 – 70,16		
Gender	9,8	6,35 – 15,05	0,251	not the effect of modification/interaction
Male	12,6	6,68 – 23,67		
Female	7,56	4,17 – 13,72		
History of Childbirth Birth Weight	3,9	2,96 – 5,29	0,000	effect of modification/interaction
LBW	1,6	1,14 – 2,24		
Normal	21,8	9,71 – 48,85		

Variable	POR Adjusted		Test of Homogeneity	Information
	POR	95% CI		
History of Exclusive Breastfeeding	3,9	2,72 – 5,74		
No	2,7	1,72 – 4,29	0,000	effect of modification/ interaction
Yes	14,2	6,46 – 31,19		
Providing Complementary Food for Breast Milk	3,2	2,30 – 4,41		
No	1,9	1,28 – 2,86	0,000	effect of modification/ interaction
Yes	15,0	6,80 – 32,92		
Basic Immunization Status	5,1	3,78 – 6,96		
Incomplete	1,2	0,91 – 1,66	0,000	effect of modification/ interaction
Complete	18,0	9,40 – 34,36		
History of Infectious Diseases	7,3	4,89 – 10,85		
Ever	2,6	1,17 - 5,61	0,002	effect of modification/ interaction
Never	11,1	6,73 - 18,25		
Level of Mother's Education	6,1	3,51 – 10,46		
Low	6,1	2,74 - 13,14	0,981	not the effect of modification/interaction
High	6,0	3,20 - 11,49		
Level of Mother's Knowledge	5,3	3,39 – 8,34		
Less	4,2	2,37 - 7,52	0,049	effect of modification/ interaction
Well	9,9	5,05 - 19,37		
Family Income	3,8	2,61 – 5,57		
Low	2,8	1,81 - 4,43	0,000	effect of modification/ interaction
High	15,3	6,48 - 36,32		

**Table 3: Analysis of Stratification on the Relationship of Protein Intake to the incidence of Stunting in Mangkung Village**

Variable	POR Adjusted		Test of Homogeneity	Information
	POR	95% CI		
Toddler Age (Month)	8,4	5,58 – 12,58		
25-36	5,4	3,28 – 9,06	0,044	effect of modification/ interaction
37-48	20,6	7,88 – 53,96		
49-60	10,0	3,28 – 30,43		
Gender	9,2	5,99 – 14,02		
Male	7,7	4,59 – 13,05	0,365	not the effect of modification/interaction
Female	11,6	5,66 – 23,82		
History of Childbirth Birth Weight	3,9	2,86 – 5,19		
LBW	1,7	1,20 – 2,40	0,000	effect of modification/ interaction
Normal	17,1	8,04 – 36,23		
History of Exclusive Breastfeeding	3,6	2,56 – 4,99		
No	2,4	1,60 – 3,50	0,000	effect of modification/ interaction
Yes	18,7	7,50 – 46,57		
Providing Complementary Food for Breast Milk	3,1	2,27 – 4,16		
No	1,9	1,32 – 2,68	0,000	effect of modification/ interaction
Yes	18,6	7,44 – 46,49		
Basic Immunization Status	5,0	3,68 – 6,91		
Incomplete	1,5	1,07 – 2,17	0,000	effect of modification/ interaction
Complete	16,3	8,48 – 31,14		

Variable	POR Adjusted		Test of Homogeneity	Information
	POR	95% CI		
History of Infectious Diseases	5,6	4,02 – 7,73		
Ever	1,7	1,15 – 2,42	0,000	effect of modification/ interaction
Never	18,9	9,50 – 37,54		
Level of Mother’s Education	4,3	2,96 – 6,26		
Low	3,4	2,23 – 5,18	0,002	effect of modification/ interaction
High	20,1	7,20 – 56,46		
Level of Mother’s Knowledge	4,3	3,05 – 6,09		
Less	2,9	1,92 – 4,29	0,000	effect of modification / interaction
Well	23,7	8,71 – 64,60		
Family Income	3,7	2,61 – 5,22		
Low	2,7	1,83 – 4,03	0,000	effect of modification / interaction
High	19,5	6,98 – 54,67		

The results of stratification analysis on the relationship of energy intake with stunting events show a variable history of childbirth birth weight, history of exclusive breastfeeding, providing complementary food for breast milk, basic immunization status, history of infectious diseases, level of knowledge, and family income have a test of homogeneity (p-value<0.05) which means that the variable is the effect of modification/ interaction. The variable level of mother’s education is a confounder variable on the relationship of energy intake with the incidence of stunting, because the Crude

POR value of 9.9 and Adjusted POR of 6.1 have a considerable difference of 62% (> 10%). The results of the stratification analysis on the relationship of protein intake with stunting events showed variable toddler age, history of childbirth birth weight, history of exclusive breastfeeding, providing complementary food for breast milk, basic immunization status, history of infectious diseases, level of mother’s education, level of knowledge, and family income values test of homogeneity (p value <0.05) which means it has the effect of modification/ interaction.

**Table 4: Final Model Multivariate Analysis**

Variable	p-value	POR	95% CI
Energy Intake	0,036	7,7	4,83 – 9,47
Protein Intake	0,000	6,9	3,74 – 8,43
History of Childbirth Birth Weight	0,000	3,4	1,08 – 6,31
Basic Immunization Status	0,000	1,8	0,18 – 3,72
History of Infectious Diseases	0,004	2,3	0,35 – 5,51
Family Income	0,000	6,2	4,27 – 9,05

The results of multivariate analysis in the final model showed that the variable energy intake has a p-value of 0.036 (p-value <0.25) which means there is a significant relationship between energy intake and the incidence of stunting among toddlers aged (25-60 months) in the village Mangkung after being controlled by variables of underweight birth weight, basic immunization status, infectious disease history, and family income.

**Discussion**

The results of this study show that variable energy intake and protein intake variables have a significantly significant relationship with the incidence of stunting in children aged (25-60 months) in Mangkung Village. Research conducted in Sumatra regarding birth weight as the dominant factor in stunting in infants (12-59 months) showed the same results, namely there was a

significant relationship between energy consumption and the incidence of stunting with a p-value of 0.01 (<0.05) and an OR value of 1.2. <sup>(6)</sup> Low energy intake is influenced by the mother's ignorance of nutrients in food, so mothers do not have a special effort in increasing energy intake for their children, for example making food creations that can make children interested in eating it. The low energy intake in stunting toddlers can be caused by several factors including the frequency and amount of feeding, low energy density, reduced appetite and infectious diseases. <sup>(7)</sup>

Protein deficiency causes retardation of bone growth and maturity, because protein is an essential nutrient in growth. If this condition is left for a long time, it will result in the inhibition of the process of bone growth which causes problems with stunting in toddlers. <sup>(4)</sup> Below median protein intake was significantly associated with stunting (OR 1.59; 95% CI: 1.02-2.48). <sup>(8)</sup> Increased energy intake and protein intake is needed for stunting babies and children who need to grow in order to catch up. Increasing the need for protein to pursue growth is proportionally greater than the increase in energy, and depends also on age and speed of growth. <sup>(9)</sup>

### Conclusion

Energy intake and protein intake have a significant relationship with the incidence of stunting among toddlers aged (25-60 months) in Mangkung Village. Energy intake is the most dominant variable influencing the incidence of stunting in toddlers in Mangkung Village after controlled for variables history of childbirth birth weight, basic immunization status, history of infectious diseases, and family income.

**Limitation of Study:** This study uses a cross sectional study design, namely research that measures variables only once at a time so that they can lead to the emergence of temporal ambiguity. However, in this study there are several variables that have occurred before stunting, such as variable energy intake, protein intake, history of infectious diseases, history of childbirth birth weight, so that the impact of design weakness is not very influential. Information bias that is differential misclassification can also occur in this study because enumerators already know the exposure status when abstracting information from the research questionnaire. In the respondent's mother, blinding was done as much as possible so that she did not know the exposure status and disease status to be studied.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

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**Ethical Clearance:** This research has received an ethics pass letter from the Research Ethics Commission for Public Health Services at the University of Indonesia Faculty of Public Health with letter number 47/UN2.F10/PPM.00.02/2019.

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# The Same Risk Factors of Hypertension in Women in Rural and Urban Areas (Following Analysis of Data Indonesia Family Life Survey 5 in 2014)

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## Abstract

**Background & Objective:** Hypertension is one of the non-communicable diseases that causes other non-communicable diseases such as cardiovascular diseases and other complications which are the most common causes of death in the world. Hypertension in women must get serious attention because it increases over time and can cause further complications. The prevalence of hypertension in urban areas is greater than in rural areas. The aim of this study was to find out the risk factors for hypertension in women in rural and urban areas in Indonesia.

**Method:** Across sectional study. Women with age  $\geq 18$  years old were included in this study. The sample of this study consist of 6.503 women. The strength of the relationship between the independent and dependent variables in this study can be determined by PR association.

**Result:** In rural area, the risk factors of hypertension in women are age PR=3,60, obesity PR=2,10, education PR=2,06, and diabetes mellitus PR=2,64. In urban area, the risk factors of hypertension in women are age PR=3,69, obesity PR=2,08, education PR=2,15, smoking=1,91 and occupation PR=1,50.

**Conclusion:** The same variable associated to hypertension in women in rural and urban area are age, obesity and education.

**Keyword:** Risk factors, hypertension, women, rural, urban.

## Introduction

Hypertension is one of the non-communicable diseases that causes other non-communicable diseases such as cardiovascular diseases and other complications which are the most common causes of death in the world<sup>1</sup>. Hypertension is a condition where systolic blood pressure  $\geq 140$  mmHg and / or diastolic  $\geq 90$  mmHg at least 2 measurements with an interval of 5 minutes

in a state of adequate rest<sup>2</sup>. Based on the results of the RISKESDAS in 2013, the prevalence of hypertension in urban areas (26.1%) was greater than in rural areas (25.5%)<sup>3</sup>.

Hypertension in women must get serious attention because it increases over time and can cause further complications<sup>4</sup>. Most women die in developed and developing countries caused by cardiovascular disease especially hypertension. In America, about 85.7 million adults consisting of 44.9 million women and 40.8 million men experience hypertension<sup>5</sup>. The Indonesian Ministry of Health in the RISKESDAS (*Riset Kesehatan Dasar*) in 2013 report stated that women were more prone to suffer from hypertension than men, where the prevalence of hypertension in women was 28.8% while in men it was 22.8%<sup>3</sup>.

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## Method

Across sectional study. Women with age  $\geq 18$  years old were included in this study. The sample of this study consist of 6.503 women. The strength of the relationship between the independent and dependent variables in this study can be determined by PR association. Indonesia Family Life Survey's data was used in this study.

## Result

There were 6.503 women included in this study. Of them, 3.765 were in rural area and 2.828 were in urban area. Table 1 shows characteristic of hypertension in women; age, obesity, education, physical activity,

smoking, fruit and vegetable intake, stress, alcohol intake, diabetes mellitus, and occupation.

**Table 1: Prevalence Of Hyperetension In Women In Rural And Urban Area**

Variable	Rural Area		Urban Area	
	n	%	n	%
<b>Hypertension in woman</b>				
No	3.027	82,36	2.315	81,85
Yes	648	17,63	513	18,14
<b>Total</b>	<b>3.675</b>	<b>100</b>	<b>2.828</b>	<b>100</b>

The prevalence of hypertension in women in rural area is 17,63% and in urban area is 18,14%.

**Table 2: Characteristic Of Hypertension In Women**

Characteristic	Rural Area		Urban Area	
	n=3.675	%	n=2.828	%
<b>Age (Years)</b>				
< 36	2.050	55,78	1.602	56,65
$\geq 36$	1.625	44,22	1.226	43,35
<b>Obesity</b>				
No	1.988	54,10	1.756	62,09
Yes	1.687	45,90	1.072	37,91
<b>Education</b>				
Higher education	581	15,81	209	7,39
Middle education	1.257	34,20	552	19,52
Low education	1.837	49,99	2.067	73,09
<b>Physical Activity</b>				
Enough	2.307	62,78	1.778	62,87
Less	1.368	37,22	1.050	37,13
<b>Smoking</b>				
No	3.582	97,47	2.757	97,49
Yes	93	2,53	71	2,51
<b>Fruit and Vegetable Intake</b>				
Enough	1.410	38,37	878	31,05
Less	2.265	61,63	1.950	68,95
<b>Stress</b>				
No	2.228	60,63	1.780	62,94
Yess	1.447	39,37	1.048	37,06
<b>Alcohol consumption</b>				
No	3.653	99,40	2.791	98,69
Yes	22	0,60	37	1,31
<b>Diabetes Mellitus</b>				
No	3.611	98,25	2.803	99,12
Yes	64	1,74	25	0,88
<b>Occupation</b>				
No	1.505	40,95	1.051	37,16
Yes	2.170	59,05	1.777	62,84

Among 6.503 responden, women in rural area (45.90%) are more obese than respondents in urban area (37.91%). Women with lower education levels were more in urban area (73.09%) compared to rural area(49.99%). Women who consumed less fruit and vegetables were more in urban area (68.95%) than in

rural area (61.63%). Women who work more in urban area (62.4%) compared to rural area (59.05%). Based on variables of age, physical activity, smoking, stress, alcohol consumption, and history of diabetes mellitus, the characteristics of respondents in rural and urban areas are almost the same.

**Table 3: Risk Factors Of Hypertension In Women In Rural Area**

Variable	Hypertension				Total	p- value	PR	95% CI
	Hypertension		Not Hypertension					
	n	%	n	%				
<b>Age (Years)</b>								
<36	168	8,18	1.882	91,80	2.050		1	
≥36	480	29,54	1.145	70,46	1.625	0,000	3,60	3,023-4,296
<b>Obesity</b>								
No	233	11,72	1.755	88,28	1.988		1	
Yes	415	24,60	1.272	75,40	1.687	0,000	2,10	1,787-2,464
<b>Education</b>								
Higher education	66	11,40	515	88,60	581		1	
Middle education	151	12,01	1.106	87,99	1.257	0,705	1,06	0,791-1,412
Low education	431	23,46	1.406	76,54	1.837	0,000	2,06	1,593-2,676
<b>Physical Activity</b>								
Enough	395	17,12	1.914	82,96	2.307		1	
Less	255	18,64	1.113	81,36	1.368	0,263	1,09	0,934-1,281
<b>Smoking</b>								
No	635	17,73	2.947	82,27	3.582		1	
Yes	13	13,98	80	86,02	93	0,396	0,80	0,455-1,365
<b>Fruit and Vegetable Intake</b>								
Enough	243	17,23	1.167	82,77	1.410		1	
Less	405	17,88	1.860	82,12	2.265	0,650	1,04	0,8841,216
<b>Stress</b>								
No	447	20,06	1.781	79,94	2.228		1	
Yes	201	13,90	1.246	86,11	1.447	0,000	0,69	0,586-0,817
<b>Alcohol Consumption</b>								
No	646	17,68	3.007	82,32	3.653		1	
Yes	2	9,10	20	90,90	22	0,347	0,51	0,128-2,059
<b>Diabetes Mellitus</b>								
No	619	17,14	2.992	82,86	3.611		1	
Yes	29	45,31	35	54,69	64	0,000	2,64	1,821-3,836
<b>Occupation</b>								
No	243	16,15	1.262	83,85	1.505		1	
Yes	405	18,66	1.765	81,34	2.170	0,074	1,15	0,985-1,355

In rural area, the risk factors of hypertension in women are age PR=3,60,  $p$ -value<0,05 ( $p=0,000$ ) (95%CI, 3,023-4,296), obesity PR=2,10,  $p$ -value<0,05 ( $p=0,000$ ) (95%CI, 1,787-2,464), education PR=2,06,  $p$ -value<0,05 ( $p=0,000$ ) (95%CI, 1,593-2,676)and diabetes mellitus PR=2,64,  $p$ -value<0,05 ( $p=0,000$ ) (95% CI, 1,821-3,836).



**Table 4: Risk Factors Of Hypertension In Women In Urban Area**

Variabel	Hypertension				Total	p- value	PR	95% CI
	Hypertension		Not Hypertension					
	n	%	n	%				
<b>Age (years)</b>								
< 36	134	8,36	1.468	91,63	1.602		1	3,034- 4,500
≥ 36	379	30,91	847	69,08	1.226	0,000	3,69	
<b>Obesity</b>								
No	226	12,87	1.530	87,12	1.756		1	1,747- 2,476
Yes	287	26,77	785	73,22	1.072	0,000	2,08	
<b>Education</b>								
Higher Education	20	9,56	189	90,43	209		1	0,757-2,060
Middle Education	66	11,95	486	88,04	552	0,383	1,25	
Low Education	427	20,66	1.640	79,34	2.067	0,001	2,15	
<b>Physical Activity</b>								
Enough	304	17,10	1.474	82,90	1.778		1	0,976-1,388
Less	209	19,90	841	80,10	1.050	0,091	1,16	
<b>Smoking</b>								
No	489	17,74	2.268	82,26	2.757		1	1,265-2,871
Yes	24	33,80	47	66,20	71	0,002	1,91	
<b>Fruit and Vegetable Intake</b>								
Enough	167	19,02	711	80,98	878		1	0,775-1,122
Less	346	17,74	1.604	82,25	1.950	0,461	0,91	
<b>Stress</b>								
No	337	18,93	1.443	81,07	1.780		1	0,739-1,064
Yes	176	16,79	872	83,20	1.048	0,197	0,89	
<b>Alcohol Consumption</b>								
No	506	18,13	2.285	81,87	2.791		1	0,494-2,200
Yes	7	18,92	30	81,08	37	0,911	1,04	
<b>Diabetes Mellitus</b>								
No	506	18,05	2.297	81,95	2.803		1	0,735-3,270
Yes	7	28,00	18	72,00	25	0,249	1,55	
<b>Occupation</b>								
No	145	13,80	906	86,20	1.051		1	1,238-1,819
Yes	368	20,71	1.409	79,29	1.777	0,000	1,50	

In urban area, the risk factors of hypertension in women are age PR= 3,69, *p*-value<0,05 (p=0,000) (95%CI 3,034-4,500), obesity PR=2,08 *p*-value<0,05 (p=0,000) (95%CI 1,747- 2,476), education PR=2,15, *p*-value<0,05 (p=0,001)

(95%CI 1,378-3,380), smoking PR=1,91, *p*-value<0,05 (p=0,002) (95%CI 1,265-2,871) and occupation PR=1,50, *p*-value<0,05 (p=0,000) (95% CI 1,238-1,819).

**Table 5. Risk Factor of Hypertension In Woman In Rural And Rural Area**

Rural Area		Urban Area	
Variable	PR	Variable	PR
Age	3,60	Age	3,69
Obesity	2,10	Obesity	2,08
Education	2,06	Education	2,15

In rural and urban area, the risk factors of hypertension in women are age, obesity and education.

**Discussion**

We identified 6.503 women as respondent in Indonesian Family Life Survey 5 in 2014. Of those, 3.675 women were in rural area and 2.828 women were

in urban area. The prevalence of hypertension in rural area is 17,63% and in urban area is 18,14%.

In our study found the risk factors of hypertension in rural and urban areas are age, obesity and education. In rural area we found age PR= 3,60, which means the women aged > 36 years more at risk of hypertension of 3,60 times compared with women aged ≤ 36 years old. In urban area we found age PR= 3,69, which means women aged > 36 years more at risk of hypertension of 3,69 times compared with women aged ≤ 36 years old. In developing countries, cardiovascular disease is no longer a disease of the elderly but has also become a disease of women, young adults and even children<sup>6</sup>. The prevalence of hypertension in women is directly proportional to increasing age. According to the National Health and Examination Survey, 67% of 60-year-old adult women suffer from hypertension and the risk of death from cardiovascular disease increases<sup>7</sup>.

In rural area we found obesity PR= 2,10, which means the women with obesity more at risk of hypertension of 2,10 times compared with women who are not obese. In urban area we found obesity PR= 2,08, which means women with obesity more at risk of hypertension of 2,08 times compared with women who are not obese. Overweight is a condition where a person has a body weight above the threshold of BMI that affects the composition of the body so that it can cause damage to other organs such as the heart, liver, kidney, lungs, large intestine, skin, blood vessels and brain<sup>8</sup>. The relative risk of suffering from hypertension in people who are obese is 5 times greater than someone with a normal body weight<sup>9</sup>.

In rural area we found low education PR= 2,06, which means the woman with low education more at risk of hypertension of 2,06 times compared with women with higher education. In urban area we found low education PR= 2,15, which means the women with low education more at risk of hypertension of 2,15 times compared with women with higher education. Education is a marker of socio-economic status that is valid and easily measured and has been used in studies of relationships with adverse health effects. Low education has been reported as a predictor of hypertension<sup>10</sup>.

### Conclusion

The same variable associated to hypertension in women in rural and urban areas are age, obesity and education based on following analysis data Indonesia

Family Life Survey 5 in 2014.

**Ethical Considerations:** This study was approved by Faculty of Public Health Universitas Indonesia Ethics Committee (No.534/UN2.F.10/PPM.00.02/2019).

**Competing Interests:** The authors declared that no competing interests exist.

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# The Phenomenon of Patient Health Education by Nurses in Hospital

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## Abstract

**Context:** The National health problem in Indonesia from year to year tends to increase. The data from *riset kesehatan dasar* during 2007-2018 has shown that the trend of most diseases is increased. The increase of health problem in Indonesia mostly is caused by the lack of health education provided by hospital health worker to patient. Dealing with these challenges, a qualitative research was conducted whose aim to describe and explore the practice of patient health education done by nurses. The research method is qualitative descriptive with phenomenology study. The technique used to select the informant is purposive sampling, while the data collection done via depth interviews with 15 nurses. The research is implemented in one of the hospitals in East Java, Indonesia. The Source triangulation is done with patients and the data were analyzed using content analysis. The results of the study were that the health education was carried out in a treatment room with a small number of patients. Nurses knew that patient health education was the primary task of nurses, yet they consider it was not a priority. Health education was only provided if the patient raised questions to the nurse. Most nurses did not carry out the stage of patient health education correctly. Therefore, the hospital should make policies and regulations, develop planning, monitoring and evaluation on a regular basis so that patient health education can run optimally.

**Keyword:** Health Education, Nurse, Hospital.

## Introduction

The national health problem in Indonesia from year to year tends to increase. The data from *riset kesehatan dasar* during 2007-2018 has shown that the trend of most diseases is increasing. The increase occurred in obesity by 6%, mental disorders by 2.6%, stroke 2.4%, hypertension 9.5%, diabetes mellitus by 1% cancer and TB increased by 0.7% [1,2,3]. The Increasing health problems in Indonesia are caused by a lack of patient health education provided by hospital health care workers. Health education must be provided by all health professional workers in the hospital. Among healthcare professionals in hospitals, nurses are the front-line health workers who spend most of their time with patients and family members of patients so that they have many opportunities to provide patient health education<sup>[4]</sup> According to Kozier and Erbs (2010) health education is a major aspect in nursing practice and an important part of nurse's role and function. Health education is an interactive process between health care provider and

patient, family to improve knowledge, attitude, and skill via practice and experience [5]. Patient's education is the most interesting topic in the world [4]. The problem currently faced is that health workers mostly use a disease-centered approach rather than a patient-centered approach [6] thus even though patient health education is considered important [7] but it was neglected [8].

The patient's health education technique is a method used to implement health education in order to achieve the expected goal. Health education technique according to [8] include collecting data from the patient's family related to the education they have, analyzing the patient's education needs, planning the site and time and method of education, implementing health education, evaluating the improvement.

The benefit of health education is to increase the patient's capacity in hand hygiene to prevent nosocomial infection in hospital<sup>[9]</sup>, to overcome mental disorder, to improve symptom of illness, to increase adherence to

the treatment, to plan and support selected treatment to improve quality of life and social function<sup>[10]</sup> to reduce patient anxiety<sup>[11]</sup>, and to contribute to the prevention of relapsing patient<sup>[12]</sup>.

### Material and Method

This research is a descriptive study with a qualitative approach. Qualitative approach is chosen since it produces description of a rich phenomena and helps to investigate complex problem<sup>[13]</sup>. The qualitative approach in this study aims to explore the phenomenon of patient health education in one of the hospitals in East Java.

The selection of informants was done by purposive sampling stating that the researcher was a key instrument<sup>[14]</sup>. Purposive sampling means determining the informant who is considered to know the best related to what the researchers expect. In order to determine the number of informants, the researchers consider it to be sufficient if it reaches the level of “redundancy” (data is saturated and there are no more informants who provide new information). The research informants were 15 nurses with inclusion criteria, such as nurses who have worked for > 2 years. Triangulation of sources is patient. The initials used for nurse informants are “N” and the initial source of triangulation is “P”.

Triangulation of sources was done to keep the Source triangulation is applied to maintain the quality of data provided by informants in order to keep it valid. The analysis of research data is based on content analysis. Qualitative data collection is done via in-depth interviews. Data was collected in April-May 2019. Before the interview was conducted, informants were asked for their willingness to sign an informed consent form. Interviews were conducted using semi-structured interview guidelines with open questions. During the interview process, notebooks and recorders were employed. Researchers transcribed the information from the audio

**Findings:** Patient health education is one of the main tasks of nurse but it is still not optimally implemented. The informant said that the patient’s health education was the duty of the nurse, but it was considered unimportant so that the nurse preferred another action. This can be seen from the following statement.

“Health education is the duty of nurses but we consider health education is not emerging stuff so we

consider it unimportant. We prioritize another other nursing actions” (N4)

The similar information was also conveyed by informant N6 who stated that nurses did not always provide health education to patients. If the patient arrives at night, they will not give health education. The informant’s statement is written below

“Nurses do not provide patient health education when patients come at night. A lazy nurses also do not carry out health education, they only record on the medical record form only “(N6)

Other information revealed that patient health education was given only if the patient or family of the patient asked for it, otherwise nurses assumed that the patient was considered to understand. The quotation information supporting that statement is stated below.

“The patient’s family is not actively asking for it, if they are actively asking for it, we will definitely explain, if they don’t ask, we think that they have already understood!”(N7)

The uneffectiveness of the patient health education is also showed via informant N3 interview stating that patient health education done by the nurses so far has covered only general information such as handwashing, doctor’s schedule.

*“The health education given by the nurse only covers general information such as handwashing, doctor’s schedule. Thus, the health education is not optimum” (N3)*

Other Information found that nurses always provided health education as needed to each patient treated. The informant said that patients were given health education starting from basic human needs until further care at home. Informant N1 delivered the following statement

“The health education is provided to all patients as needed. The health education includes the function of medical devices and how long they are installed, the risk of fall, pain management, respiratory problem if a breathing disorder found, the cause of the disease and how to minimize it so that it is not infected. Discharge planning is also given to supervise of taking medication so that patients do not drop medication(N1)”

The next interview was conducted with other informants providing care for internal patient. The

informant claimed health education was given to all patients treated in the treatment room. Their statement can be seen below

*“all nurses provided health education and they were recorded on the health education form in the medical record” (N8)*

Next, the researchers triangulated with P7 patient. The patient was not cooperative because he was around 65 years old, so an interview was conducted with the patient’s family stating that he really wanted to know when the nurse entered and injected the type of drug but it was not delivered. Health education for hand washing and pain management is also not explained. So there is an inconsistency between the answers given by nurses and triangulation from source P7.

Then, an interview was conducted in the first class patient treatment room hoping that health education would be provided as needed. The interview produced satisfying answers from nurses and patients at once. The nurses gave a statement that the health education was always given. That statement was justified by the patient’s answer.

The description of health education by nurses varies, some claimed to do health education when they are on shift, and it was validated. There were also those considering that health education was not important, so it was better to take another nursing actions, there were also those stating to do it to patients, but after being validated, there was no significant effect to the patients. The conclusion of the description of patient health education is that health education is not given to all patients according to their needs.

The health education given by nurses had some stages that must be done. Most of the informants’ answers were that they immediately carried out health education to patients without following the procedures.

The informant admitted that he directly carried out the health education without analyzing first and did not evaluate the patient then. The informant admitted that if he had done health education to the patient, meaning that the task had been completed, later if they were confused they would come to the office to ask.

*“we immediately carried out health education without conducting assessment and evaluation. We prioritized to nursing care not to health education(N9)”*

Another informant stated that patient health education was only carried out in general, the more important thing was to record on the available patient health education sheet, meaning that the patient’s health education assignment has been carried out.

“We completed the health education sheet first, then we gave the education when we remembered (N3)”

Nevertheless, there was other information conveying that they did all stages correctly in health education such as data collection, needs analysis, planning, implementation, documentation, and evaluation.

## Conclusion

The implementation of patient health education by nurses varies. In the treatment room with a small number of patients, the health education is given. Meanwhile, in the treatment room whose many patients, not all health education is implemented and given to patients. There were also informants who said that the patient’s education had been given but the patient felt that he had not been given. The gap occurs as informants do not evaluate patients after conducting health education so that information is not obtained well. Another reason is that the low level of patient’s education and psychology condition. This is in line with what was conveyed by [6] health workers mostly used a disease-centered approach rather than a patient-centered approach. There are even some nurses whose perception is that nursing action is more important than health education. Research [15] showed that patient education was often given a lower priority than other nursing tasks. [16] reported that although the majority of nurses in their study believed that patient education was an important part, they ranked lower than other tasks such as physical care, medical treatment, and writing report. [17] in his study also stated that low priority and low responsibility hindered patient health education activities.

Other information obtained was that the nurse conducted health education to the patient when the patient asked for it, this indicates that the patient does not understand. They assume that patients already have and receive enough information if questions are not raised. So, nurses tend to provide information only when patients ask question. Similar research showed that nurses rarely provided information to patients. Professionals only care about their own choice of routines and problems [18]. In addition, during the education process, patients don’t have a confidence to ask questions, and nurses also

rarely provide feedback or show concern for patients' non-verbal expressions.

In addition, most of informants did not complete all the process of health education starting from the assessment of patient needs, planning, implementation, documentation and evaluation. This is consistent with the research of the Health Service Medical Corporation, Inc. which states that only one-fifth of the 1500 nurses prepare to provide health education. The result of the study <sup>[19]</sup> also showed that in the management of cancer patient, nurse did not have a strategic plan for health education, even though they all had well-structured activities and health education media.

Nurses are in a key position to carry out health education, as they are health care providers making continuous contact with patients and families and they are usually the most accessible source of information for them. If the data collection stage is carried out effectively it will be a strong foundation to determine needs in implementing health education. Evaluation is also needed so that nurses know whether health education is acceptable to patients or not. Therefore education in patients and families becomes a more important function in the scope of nursing practice <sup>[20]</sup>. The nurse motivates patients to recover by providing support. One of them is emotional support. Emotional support consists of empathy, attention given by others in the form of trust and concern <sup>[21]</sup>. If individuals get intensive support, then individual will feel cared for and also valued <sup>[22]</sup> so that they can change the lives of patients via improving quality of life and recognizing the causes of disease suffered by patient and helping to reduce stress and returning hospitalization<sup>[23]</sup>.

This finding has some implications toward policy and regulation regarding patient health education and then incorporated into hospital accreditation standard for nursing practice. In addition, the organization must formulate regular planning, monitoring and evaluation and assistance so that health education with the concept of empowerment can run optimally. The hospital provides a media for patient health education so that it could be a tool to facilitate nurses in conducting health education

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# Does Recovery Prevent Myocardial Damage Due to Overtraining?

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## Abstract

**Context:** The current study aims to analyze the effect of recovery in the duration of three and seven days to prevent myocardial damage due to overtraining. The research method was used through experiment only with posttest group control design on 32 rats divided into 4 groups namely 1) proportional sport, 2) overtraining, 3) overtraining with the recovery of 3 days and 4) overtraining with the recovery of 7 days. As the result, the current study proves that there is no effect from three and seven days recovery in myocardial damage in overtraining, although recovery decreases MDA myocardium concentrations, increases SOD myocardium concentrations, it does not prevent left ventricular hypertrophy, necrosis, and chromatin condensation.

**Keywords:** *Biomolecular, Pathobiology, Myocardial, Overtraining*

## Introduction

Overloading exercises are often given on the athlete's preparation for a competition. Overloading exercises that are not accompanied by adequate recovery periods would cause athletes to fall under overtraining conditions. The athlete's body condition is very vulnerable if faced with an overload dose of exercise.

On the other hand, during the period of overtraining, training also released Reactive Oxygen Species (ROS) that exceeds the protective capacity of the endogenous antioxidant system and causes deregulations in the inflammatory system, oxidative phosphorylation and neuroendocrine<sup>[1]</sup>. Increased exercise intensity has been proven through several studies to increase oxidative stress and free radical production in cells <sup>[1][2]</sup>.

Overtraining is a condition of oxidative stress that affects various organs of the body <sup>[2]</sup>. The study of the effects of overtraining on the cardiac organ is debatable, but in some studies in cardiac myositis, allegedly overtraining has led to pathological changes in the heart. Animal test studies try to start to examine with the sudden death of cardiac death in athletes, which is caused by hypertrophy of cardiomyopathy.

Hypertrophy of cardiomyopathy is a congenital

aberration which, through autopsy results in some cases of sudden cardiac death, is summed up as the cause of death in athletes <sup>[3]</sup>. A phenomenon of sudden cardiac death on the athletes is another side of a sport that has not been well documented. Athletes for the community are individuals with the image of someone with higher health status than non-athletes. The presence of sudden cardiac death cases that occurred in athletes seized public attention because it is a paradoxical case with the public's assumption about the health status of the athlete <sup>[3]</sup>. Through autopsies performed in some cases of sudden cardiac death in athletes, cardiomyopathy hypertrophy is reported to be the cause of death in cases of sudden cardiac death of young athletes <sup>[4][13]</sup>.

In other cases that are not autopsied then the cause of death in young athletes cannot be described with certainty. However, it is found that there is a tendency of incorrect training such as overtraining training, through several studies of experimental animals has proven changes in heart rate and stroke volume of the heart. In this study, myocardium damage to histologic overtraining will be demonstrated on the basis of pathomechanism that begins with the formation of excessive ROS <sup>[5]</sup>. Damage to myocardium occurring in overtraining is suspected to result in an increased risk of cardiovascular incidence.

Management of overtraining is done by detraining by decreased training load and recovery. Based on previous research, it is evident that ROS is an underlying etiology in the process of body system adaptation in sport, but its major failure adaptation is pathomechanism in cardiac organ, as well as the effectiveness of the recovery period, cannot be explained through some previous studies [5]. Recovery will induce the body's hormonal ability to decrease the amount of ROS and meet the production capacity of endogenous antioxidants, one of which is Superoxide Dismutase (SOD). SOD is an endogenous antioxidant formed by mitochondria. Detraining or recovery is management that can be given in overtraining conditions [6][11].

Furthermore, recovery will restore the cell's exhaustive condition so that it can return to its homeostatic conditions [7]. The basic principle in recovery is the recovery process whose duration depends on the type and duration of physical stress within the given training period. The duration of recovery required by body cells is explained through several studies of recovery mechanisms that occur in skeletal muscle. It is intended to restore phosphor creating reserves, glycogen and increase blood flow for oxygen consumption (reperfusion) [8][12].

The time required for the recovery process is depending on the intensity, type, and frequency of the exercise. In a study conducted on the mouse- animals - to assess phosphocreatine reserves in proportional aerobic exercise, proving that there was a significant difference between 24 hours and 72 hours recovery. In the study, it was mentioned that phosphocreatine reserves were higher in recovery with a duration of 72 hours [9]. This study analyzes the effect of recovery in protecting heart organ in overtraining conditions that have never been reviewed in previous relevant studies. The duration of recovery used in this study refers to previous relevant studies (72 hours or 3 days) and modification of extension of 7 (seven) days.

The tendency of not well documented overtraining, the complexity of overtraining pathomechanism that cannot be clearly explained, the limited research that examines the damage of myocardium in overtraining, and the limited research that examines the proper effect of recovery in the exercise program, making this study aims to analyze the effect of recovery on myocardial damage that occurs in overtraining exercise. Later results from this study can give birth to a first step in

the preparation of new protocols in the management of training programs that are cardioprotective for athletes and individuals that are not athletes.

## Method

The research method used is the true experimental method by using "randomized post-test only control group design". Data were collected only at the end of the study after treatment by comparing outcomes in overtraining treated groups, overtraining with 3 (three) days' recovery and 7 (seven) days recovery with the untreated group (proportional exercise as the control group). Randomly allocated 4 (four) treatment groups were 1 (one) control group (proportional sport), 1 (one) group without recovery treatment overtraining, 1 (one) group overtraining treatment with recovery for 3 days and 1 (one) others group were given the overtraining treatment a recovery period of 7 days.

The samples of the study used white rat type Wistar Ratus Norwegicus, male sex, aged 3-4 months, and weigh between 180-220 grams. This research has obtained ethical approval from the Research Ethics Commission of Faculty of Medicine, of Sebelas Maret University No: 717 / VIII / HREC / 2016. The treatment given to mice was reinforced in a swimming pool of 50x20x60 cm [10]. In the control group: proportional training where one hour after eating and drinking, in the afternoon the mice swam for 15 minutes, once a day, was swum on day 1,2,4,5,7 every week, and on the day-3 and 6 are periods of rest. The treatments were carried out for 8 weeks. At the end of the treatment, the mice were immediately autopsied for the blood and the heart organs.

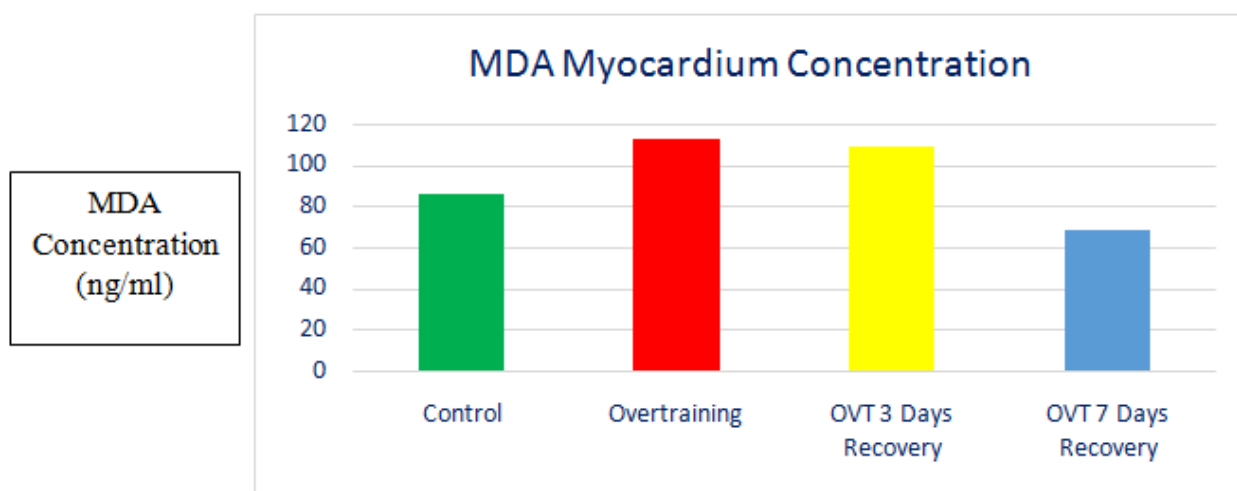
The overtraining treatment group was swum 2 (two) times daily (except on the 7th day) until fatigue occurred and could not swim again and the treatment was administered for 8 weeks. At the end of the treatment, the mice were immediately autopsied for the blood and the heart organs. The overtraining treatment group with 3 (three) recovery experienced the same treatment with the overtraining group and was given a rest period of 3 (three) days at the end of the treatment period. The overtraining treatment group with recovery 7 (seven) days, experienced the same treatment with the overtraining group and given a rest period of 7 (seven) days at the end of the treatment period then immediately autopsy for the heart organ to be taken.

Histologic preparations were conducted by making

incisions in the heart muscle by using microtome. Then the preparations were stained with a Hematoxylin-Eosin (HE) staining technique to facilitate observation using a light microscope with 40 times magnification to assess hypertrophy, necrosis and increased chromatin activity occurring in the myocardium. To detect protein concentration in this examination which is MDA and SOD of mitochondria, hence used ELISA technique with the precipitate antibody at the well plate. The data obtained were analyzed by one way ANOVA parametric test method followed by a Post Hoc Least Significant Difference (LSD) test.

### Results and Discussion

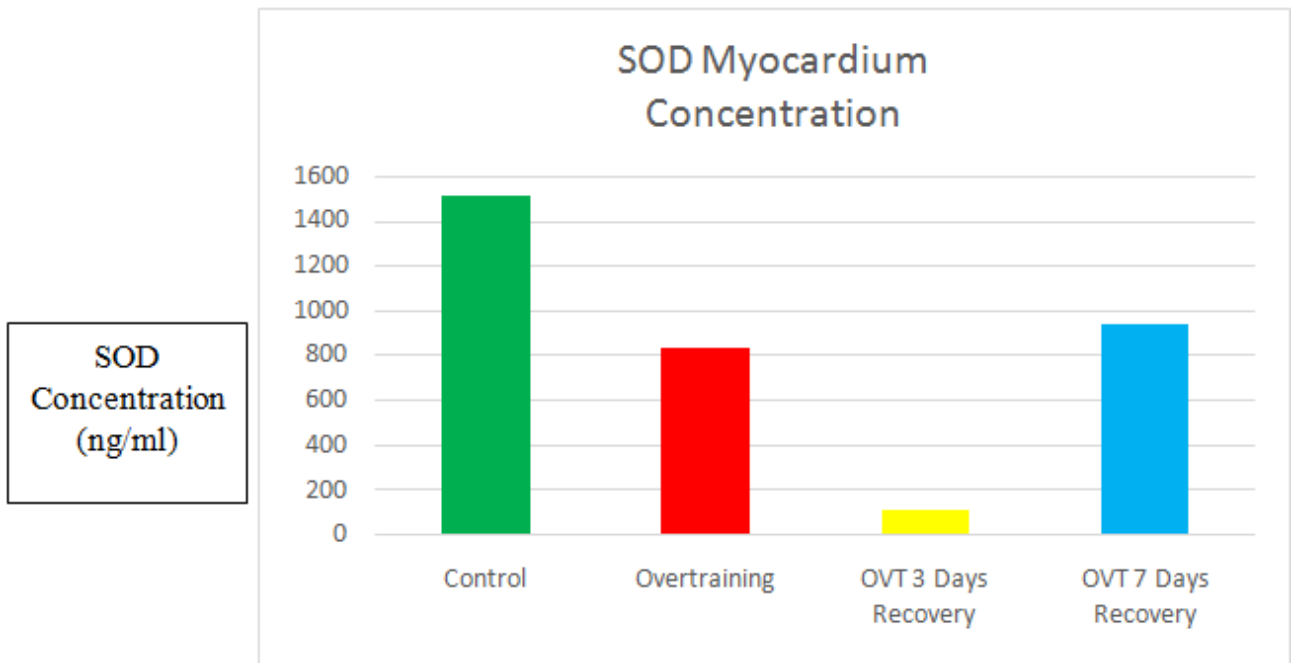
Based on the results of the study, it was found that the mean MDA concentration of myocardium in the overtraining exercise group with recovery of seven days was lower than the control group (proportional sport) and the other two treatment groups, where the control group mean MDA was 86.45 ng/ml, the overtraining group was 112.90 ng/ml, the overtraining exercise group with a three-day recovery was 109.53 ng/ml and the seven-day overtraining exercise group was 69.27 ng/ml. Mean concentrations of MDA myocardium were presented in Graph 1.



Graph 1: Mean MDA Myocardium Concentration

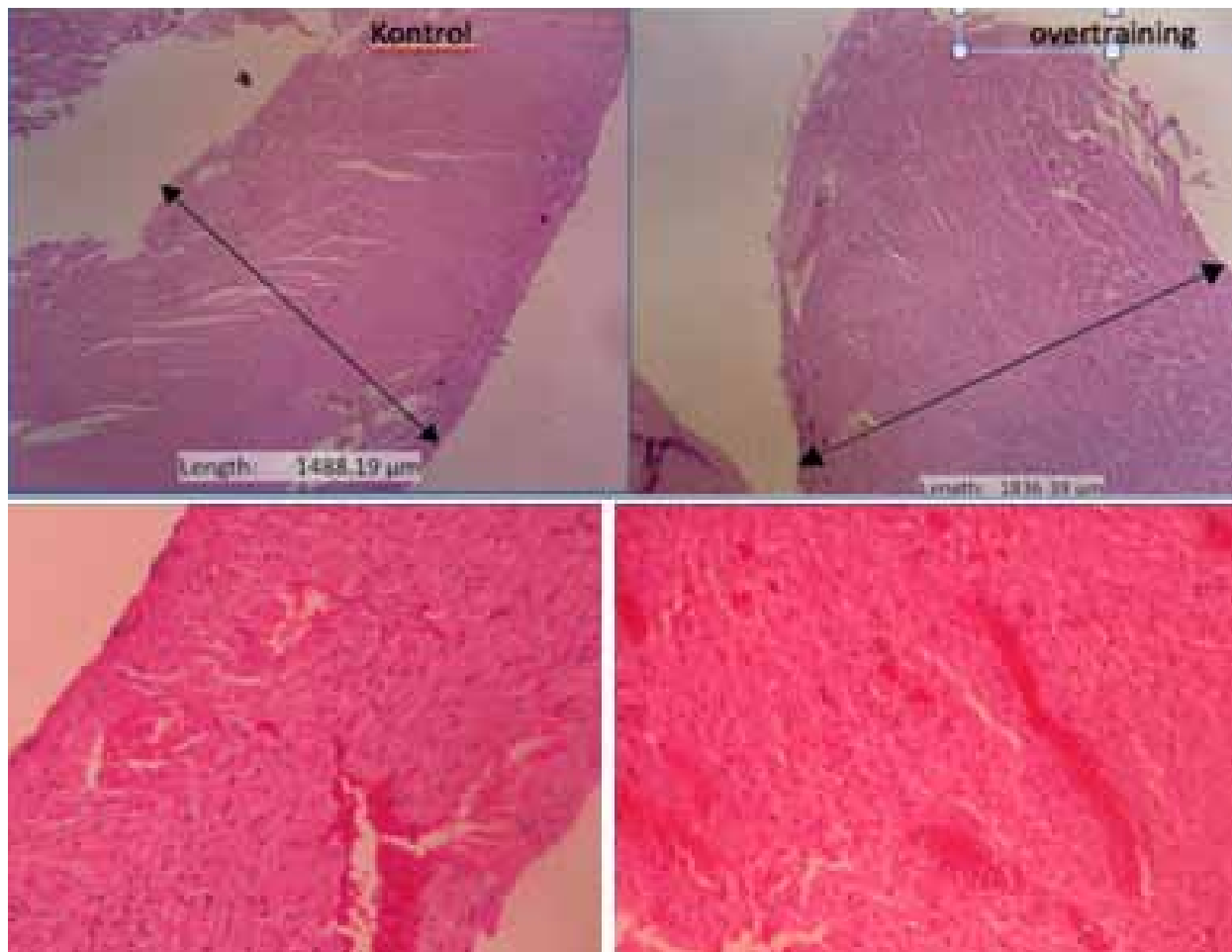
The measurement result of SOD Myocardium concentration in this study showed that the mean SOD myocardium concentration in the control group (sport proportional) was higher than the other three treatment groups, where the mean SOD myocardium control group was 1516.05 ng/ml, the overtraining exercise group was

829.94 ng/ml, overtraining exercise with 3 (three) days recovery was 115,09 ng/ml and group of overtraining exercise with 7 (seven) days recovery was 939,44 ng/ml. Mean SOD myocardium concentrations are presented in Graph 2.



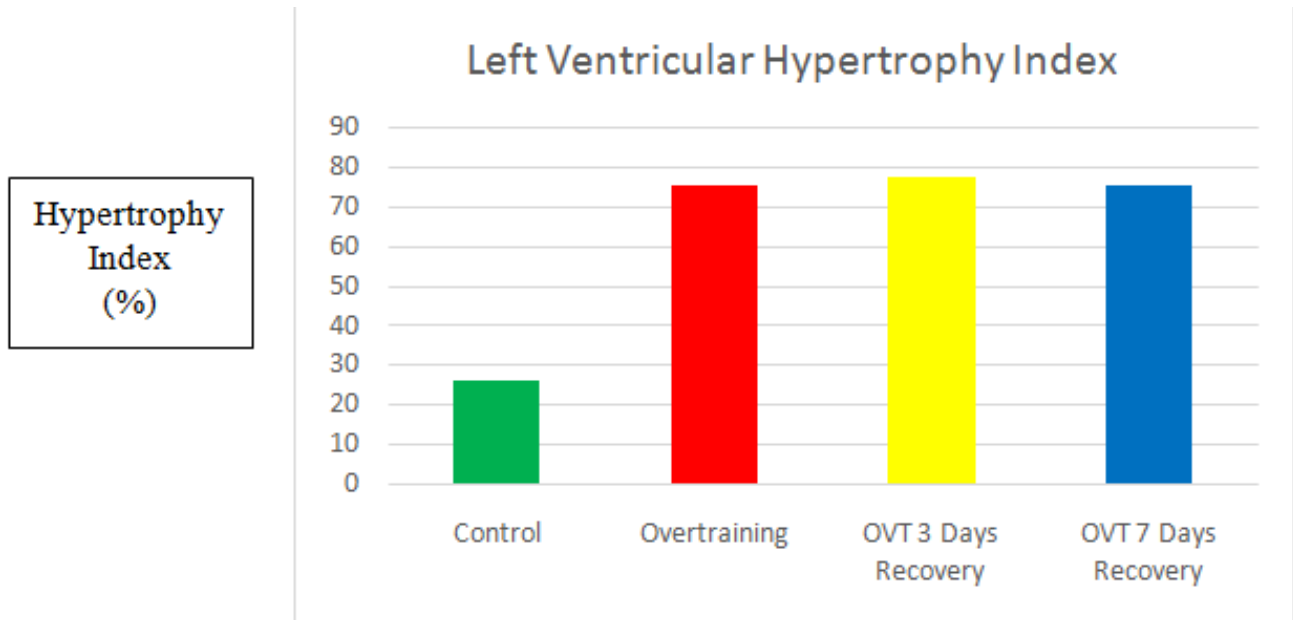
**Graph 2: Mean SOD Myocardium Concentration**

The histopathologic picture of the hypertrophy sample in each group is presented in Figure 1.



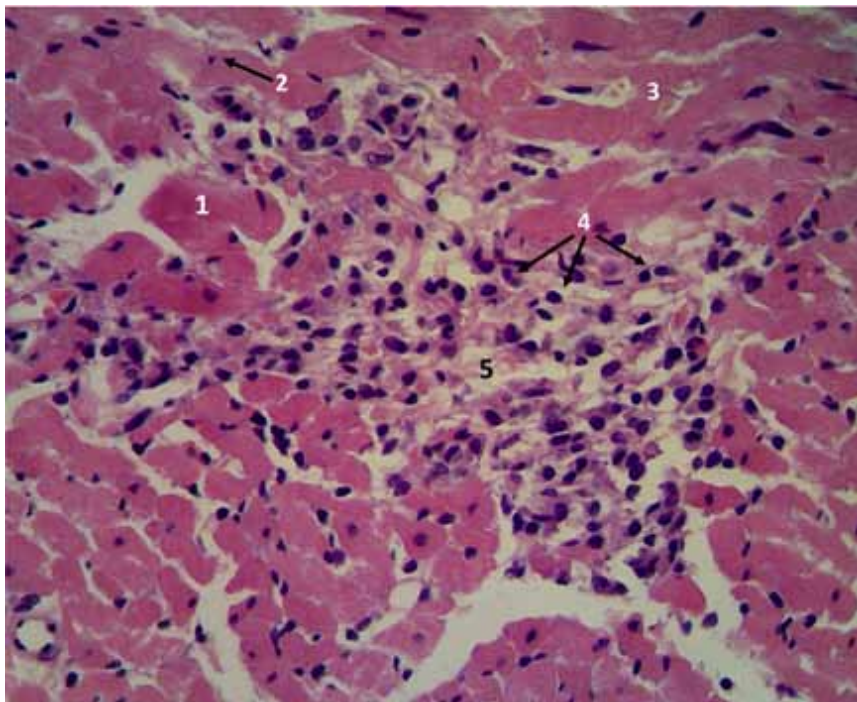
**Figure 1: Histological picture of left ventricular hypertrophy of the treatment group**

Description of observation and measurement result with microscope showed the overtraining exercise group with 3 (three) days recovery showed the largest index of cardiomyocyte hypertrophy was 77,625% compared with mean of hypertrophy index of control group was 26,5%, overtraining exercise group was 75,5 % and the overtraining group with 7 (seven) days recovery was 75.125%. The mean index of the cardiomyocyte hypertrophy is presented in Graph 3.



**Graph 3. Mean of Left Ventricular Hypertrophy Index**

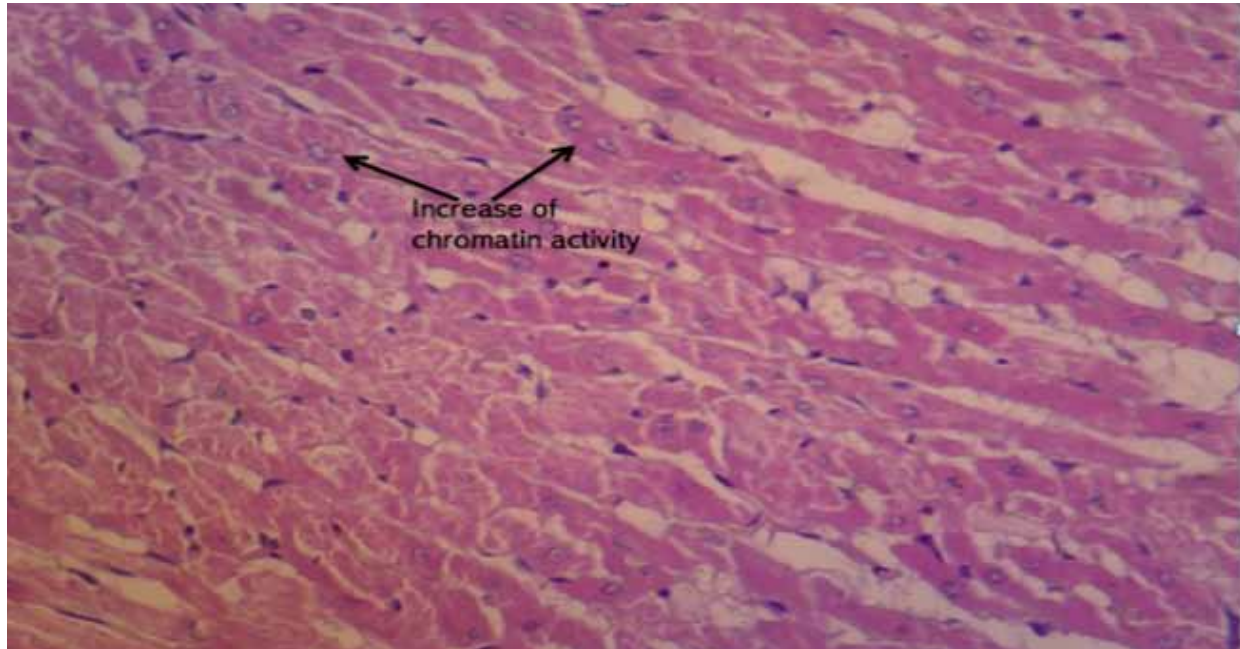
Based on the observation of anatomical pathology experts showed that in the control group the index of myocardium necrosis was lower than the other three treatment groups. Signs of necrosis in the form of hypereosinophilic and crisis, picnosis, colitis, inflammatory cells, and remnants cell. The histopathological features of the necrosis are presented in Fig. 2.



**Figure 2: Myocardium necrosis**

Visible signs of necrosis are: hypereosinophilic and curolisis (1), picnosis 2), curolisis (3), inflammatory cells (4), remnants cell (5). The area of necrosis is characterized by a hypereosinophilic area (more pale color) with condensed, picnotic or cariorecsys nuclei. Description observation results at the nuclei by anatomical pathologist showed that in the group

of overtraining exercise with 7 (seven) days recovery obtained the largest chromatin condensation index that is 83.8% compared with chromatin condensation index rate of control group is 3.31%, overtraining exercise group was 76.6% and the overtraining exercise group with 3 (three) days recovery was 78.7%.



**Figure 3. Chromatin Condensation. A chromatin image agglomerates in the nucleus cell.**

Comparative analysis was done on the post-test mean for each group. For the concentration of MDA myocardium, the results of Analysis Of Variance (ANOVA) showed  $F = 6,248$  with  $p = 0,002$ , this made  $p$  smaller than  $\alpha = 0,05$ , so it can be concluded that there was an effect of overtraining exercise with three and seven days recovery on myocardium damage (MDA Myocardium levels). The result of Analysis of Variance (ANOVA) at mean of SOD Myocardium concentration with  $F = 19,519$  and  $p = 0.0001$  so it can be concluded that there is an impact of overtraining exercise with 7 (seven) day recovery to myocardium damage (SOD Myocardium levels). The result of Analysis of Variance (ANOVA) on the mean of Left Ventricular Hypertrophy Index was  $F = 140,732$  with  $p = .0.0001$ , so it was concluded that there was an effect of overtraining exercise with three and seven days recovery on Myocardium damage (Left Ventricular Hypertrophy Index).

The result of Analysis of Variance (ANOVA) on the mean of Necrosis Index of Myocardium between groups,

with  $F = 201,911$  with  $p = 0.0001$  so it is concluded that there is the influence of overtraining exercise with of three and seven days recovery to the Myocardium Necrosis Index. The result of Analysis of Variance (ANOVA) on mean chromatin condensation index on cardiomyocyte between group shows  $F = 524,466$  with  $p = 0.0001$  so concluded there is influence overtraining exercise with the recovery of three and seven days to damage of myocardium (chromatin condensation index of cardiomyocyte).

Through One Way ANOVA (Analysis Of Variance) test, it found differences between groups. Then it was followed by LSD (Least Significant Difference) test which presented some of the following as a result:

1. The condition of myocardium damage in proportional exercise is better than in the overtraining exercise though it has been given recovery because it resulted in lower MDA myocardium concentrations.
2. The condition of myocardium damage in

proportional exercise is better than in the overtraining exercise despite given recovery since it shows the concentration of endogenous antioxidants (SOD) in the myocardium is higher.

3. The condition of myocardium damage in proportional exercise is better than the overtraining exercise load though it has been given recovery because it resulted in a lower left ventricular myocardium hypertrophy index.
4. The condition of myocardium damage in proportional exercise is better than the overtraining exercise although it has been given recovery because it results in a lower Myocardium Necrosis Index.
5. Myocardium damage in proportional exercise is better than the overtraining exercise despite recovery because it resulted in a lower cardiomyocyte chromatin condensation index.

### Conclusion

The results of the current study prove that there is no effect of three and seven-day recovery on myocardial damage in overtraining. Although recovery decreases MDA myocardium concentrations, increases SOD myocardium concentrations, it does not prevent left ventricular hypertrophy, necrosis, and chromatin condensation.

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# Study Analysis of Oral Tuberculosis Patients in South Kalimantan, Indonesia

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## Abstract

**Background:** Tuberculosis is an infectious disease which is the second largest cause of death in the world after HIV / AIDS. Tuberculosis caused by Mycobacterium tuberculosis that usually attacks the lungs but can manifest in the oral mucosa. Clinical manifestations of oral tuberculosis related to age, sex, duration of treatment, systemic disease and Multi Drug Resistant therapy. There is no research on descriptive studies of oral manifestations of tuberculosis patients in South Kalimantan specifically in Banjarmasin.

**Purpose:** To analyze descriptively the clinical manifestations of oral tuberculosis in South Kalimantan, Indonesia.

**Method:** This was a descriptive analysis with a cross sectional study design, based on history and clinical oral examination. It was used 30 respondents by purposive sampling method. Data was analyzed by Chi square ( $p < 0.05$ ).

**Results:** During treatment it showed the correlation between xerostomia and systemic disease ( $p = 0.007$ ) and correlation between xerostomia and duration of treatment ( $p = 0.024$ ). The correlation between candidiasis and systemic disease ( $p = 0.024$ ). The correlation between angular cheilitis and age, sex, duration of treatment, systemic disease and Multi Drug Resistant therapy ( $p > 0.05$ ).

**Conclusion:** The clinical manifestations of oral tuberculosis are xerostomia, candidiasis and angular cheilitis. The duration of treatment and the systemic diseases are associated with xerostomia and candidiasis in the oral cavity of TB patients.

**Keywords:** Clinical manifestations, descriptive analyze, Multi Drug Resistant, oral tuberculosis, systemic disease

## Introduction

Tuberculosis is a contagious disease that is still a global concern. Tuberculosis (TB) is the second

largest cause of death in the world after HIV/AIDS<sup>1</sup>. The prevalence of the disease is increasing especially in developing countries because it is supported by several factors such as poverty, humid environment, population density, and increasing cases of resistance to antituberculosis drugs<sup>2</sup>.

Indonesia is a country with the second largest number of new cases in the world after India. In 2016 it was estimated that there were 10.4 million new cases of tuberculosis with 6.2 million cases in men, 3.2 million cases in women and 1 million cases in children. In

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2016, an estimated 1.7 million deaths from tuberculosis included 0.4 million tuberculosis deaths in people with HIV. The number of deaths from tuberculosis decreased 37% between 2000 and 2016, but tuberculosis remains the 10th highest cause of death in the world in 2015<sup>3</sup>.

South Kalimantan is a province that has a high prevalence of tuberculosis, where the prevalence is the same as the average prevalence in Indonesia. The prevalence of pulmonary TB in South Kalimantan based on a doctor's diagnosis in 2013 was 0.3% and in 2018 it increased to 0.4%.<sup>4</sup>

Tuberculosis is an infectious disease caused by the *Mycobacterium tuberculosis* (MTB) which generally attacks the lungs, but in 10-15% of cases can affect other organs including the oral cavity. Tuberculosis can manifest in the oral cavity in primary or secondary. It can spread through blood flow and lymphatic tract. The circumstances of individuals with productive age, smoking habits, are in a humid environment and lack of circulation, as well as a lack of knowledge will increase the risk of a person suffering from tuberculosis<sup>5,6,7</sup>.

Dentists must know orofacial TB lesions and consider them as differential diagnoses of oral lesions in order to ensure early diagnosis of TB and its treatment. This is very important because there is often a misdiagnosis. There is no descriptive studies of clinical manifestations of oral Tuberculosis patients in South Kalimantan specifically in Banjarmasin. Based on the above, it is necessary to conduct a study of descriptive studies of clinical manifestations of oral Tuberculosis that used data on patients treated at Ulin Banjarmasin Hospital. The purpose of this study was to analyze descriptively the clinical manifestations of oral Tuberculosis in South Kalimantan, Indonesia.

### **Material and Method**

This research is an analysis descriptive. It been approved by ethical clearance from the Ethics Research Committee of Dentistry Faculty of University Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia (No.100/KEPKG-FKGULM/EC/XII/2018). It was taken place at Poli TB RSUD Ulin Banjarmasin in January-March 2019. The sampling techniques on this study were taken by purposive sampling method. All data was analyzed by chi square non-parametric test ( $p < 0,05$ ).

### **Result**

Based on the results of research that had been done in RSUD Ulin Banjarmasin obtained sociodemographic characteristics of respondents which include age, sex, duration of treatment, systemic disease and MDR (Multi Drug Resistant) status in pulmonary TB disease patients can be seen in table 1. Based on table 1 can be known characteristics of TB patients aged  $\leq 45$  years are 16 people (53.3%) which are more than the age group  $> 45$  years which is 14 people (46.7%). Based on gender the number of men is more than women, the number of men is 17 people (56.7%) and women are 13 people (43.3%). TB patients in this study had a longer duration of treatment in the span of 6 months, namely 16 people (53.3%) compared to the span of more than 6 months, namely 14 people (46.7%). Tuberculosis patients accompanied by systemic diseases were 17 people (56.7%) and patients without systemic disease were 13 people (43.3%) whereas there were 14 people based on MDR (Multi Drug Resistant) status (46.7%) and without MDR, there were 16 people (53.3%).

The results of the data were analyzed using the Chi Square Test, to determine the relationship of clinical manifestations of the oral cavity with age, sex, duration of treatment, systemic disease and Multi Drug Resistant (MDR) status in Tuberculosis patients at RSUD Ulin Banjarmasin. This analysis used by the Fisher's exact test with a significance limit ( $p < 0.05$ ).

Table 2 show that there is a significant correlation between xerostomia that manifests in the oral cavity of Tuberculosis patients in RSUD Ulin Banjarmasin January-March 2019 with duration of treatment and systemic disease ( $p < 0.05$ ). Table 3. show that there are a significant correlation between candidiasis that manifests in the oral mucosa of Tuberculosis patients in RSUD Ulin Banjarmasin January-March 2019 with systemic diseases ( $p < 0.05$ ). Based on the table, it is known that there are no significant correlation between candidiasis and age, gender, duration of treatment and MDR (Multi Drug Resistant) status in Tuberculosis patients. Based on Table 4. show that there is no significant correlation between angular cheilitis with age, sex, duration of treatment, systemic disease and MDR status ( $p > 0.05$ ).

**Table 1: Sociodemographic characteristics of patients**

Variable	n	%
Age		
≤45 years	16	53,3
>45 years	14	46,7
Gender		
Man	17	56,7
Women	13	43,3
Duration of treatment		
6 month	16	53,3
>6 month	14	46,7
Systemic Disease		
Yes	17	56,7
No	13	43,3
MDR		
Yes	14	46,7
No	16	53,3

**Table 2: Relation between Xerostomia and related factors**

	Xerostomia		Sig
	Yes N=17	No N=13	
Age			
≤45 years	41,2%	69,2%	0,127
> 45 years	58,8%	30,8%	
Gender			
Man	41,2%	76,9%	0,050
Women	58,8%	23,1%	
Duration of treatment			
6 months	35,3%	76,9%	0,024*
> 6 months	64,7%	23,1%	
Systemic Disease			
Yes	35,3%	84,6%	0,007*
No	64,7%	15,4%	
MDR			
Yes	52,9%	38,5%	0,431
No	47,1%	61,5%	

**Table 3: Relation between Candida and related factors**

	Candidiasis		Sig
	Yes N=14	No N=16	
Age			
≤45 years	71,4%	37,5%	0,063
> 45 years	28,6%	62,5%	
Gender			
Man	57,1%	56,3%	0,961
Women	42,9%	43,7%	

	Candidiasis		Sig
	Yes N=14	No N=16	
Duration of treatment			
6 months	71,4%	37,5%	0,063
> 6 months	28,6%	62,5%	
Systemic Disease			
Yes	78,6%	37,5%	0,024*
No	21,4%	62,5%	
MDR			
Yes	42,9%	50,0%	0,696
No	57,1%	50,0%	

**Table 4: Relation between Angular Cheilitis and related factors**

	Angular Cheilitis		Sig
	Yes N=12	No N=18	
Age			
≤45 years	66,7%	44,4%	0,232
> 45 years	33,3%	55,6%	
Gender			
Man	58,3%	55,6%	0,880
Women	41,7%	44,4%	
Duration of treatment			
6 months	66,7%	44,4%	0,232
> 6 months	33,3%	55,6%	
Systemic Disease			
Yes	50,0%	61,1%	0,547
No	50,0%	38,9%	
MDR			
Yes	41,7%	50,0%	0,654
No	58,3%	50,0%	

**Discussion**

**Relationship between Age and Clinical Manifestations of the Oral Cavity in Tuberculosis Patients:** In this research there was no significant relation between age with xerostomia, candidiasis and angular cheillitis in the oraltuberculosis. The age group of TB patients in Indonesia of 75% are a productive age population of between 15-50 years.<sup>8</sup>This is in accordance with this study showed more TB patients are ≤45 years. Increasing productive activities and smoking habits at a young age in developing countries is one of the factors increasing the incidence of TB. Xerostomia can also be increased in elderly oral TB patients. In elderly xerostomia patients are often associated with degeneration due to the aging process. This causes a decline in salivary gland function where the loss of

the parenchymal gland is replaced by fat tissue and connective tissue and the lining of intermediate duct cells that experience atrophy.<sup>9</sup>

#### **Relationship between Gender and Clinical Manifestations of the Oral Cavity in Tuberculosis Patients:**

The results of this study also showed no significant correlation between sex with xerostomia, candidiasis and angular cheilitis in oral Tuberculosis patients. The male group is the group with the most tuberculosis in this study. This is also the same in the studies of Novita and Ismah (2017), the male sex group is the most suffering from TB (70%) compared to women (30%). Men have the risk condition than women.<sup>10</sup> Smoking and drinking alcohol habits in men can reduce the body's defense system. Chronic effects of nicotine can cause changes in the composition of saliva. Smokers will also experience a decrease in the velocity of saliva due to atrophic acini cells in the salivary glands. When entering the elderly group, a woman will experience the aging process. This natural process is called menopause, if a woman has entered the process, estrogen production will stop. This will affect the condition of the oral cavity so that it is vulnerable to dry mouth.<sup>11</sup>

#### **Relationship between Duration of Treatment with Xerostomia in Tuberculosis Patients:**

In this study shows the significant correlation between the duration of treatment with xerostomia in Tuberculosis patients in RSUD Ulin Banjarmasin in January-March 2019. This can be related to the level of stress experienced by patients. emotional can affect the autonomic nervous system, thus blocking the sympathetic nervous system from producing saliva. This is also related to the side effects of OAT where one of the antituberculosis drugs, Isoniazid, has side effects such as xerostomia or dry mouth.<sup>12,13</sup>

Therapy for tuberculosis is one of the long-term therapies. Prolonged treatment with a large amount of medication often makes TB sufferers complain like, dizziness, decreased appetite, anxiety, disturbed sleep patterns and dry mouth. This situation is a symptom of stress. The study explains the longer TB treatment will be more severe the stress level of TB patients.<sup>13</sup> The study shows there are the significant effect of stress and anxiety on saliva volume.<sup>12</sup> Some literature suggests that saliva volume is affected by stress and psychological conditions. Anxiety and depression can cause a decrease in salivary and xerostomia production. If someone has a chronic disease including pulmonary TB, it will tend

to experience depression because of decreased levels of monoamine in the brain. This decline in neurotransmitters in the brain can make pulmonary TB patients very susceptible to depression because neurotransmitters do not function according to their functions.<sup>14,15</sup>

#### **Relationship Between Systemic Disease and Clinical Manifestations of the Oral Cavity in Tuberculosis Patients:**

In this study there is a significant correlation between xerostomia and systemic disease. Systemic diseases that accompany respondents are Diabetes Mellitus and HIV/AIDS. DM patients increase the risk of 1.5 times the TB disease compared with respondents who do not have DM disease.<sup>16</sup> The longer a person has DM, the more complications in the oral cavity such as hyposalivation and xerostomia will appear. This is due to the relationship of blood glucose level levels of DM patients associated with the incidence of decreased salivary flow. Microvascular and neuropathic changes will affect the ability of the salivary gland to respond to neural or hormonal stimulation in TB patients<sup>17</sup>.

In this study showed the significant correlation between candidiasis and systemic disease in Tuberculosis patients. Oral candidiasis is commonly found in TB patients with HIV/AIDS co-infection. Immunocompromised conditions generally accompany HIV/AIDS patients, making them vulnerable to oral infections. These conditions produce immune deficiency and disruption of cytokine production which causes disruption of phagocytic function of PMN and macrophages. The changes in oral epithelial cells cause changes in mucosal CD4 T cells and reduction of Th1 cytokines in the saliva of chronic HIV patients. Antibiotics also can change the balance of commensal microorganisms in oral cavity and inhibit the growth of antagonistic commensal bacteria against Candida, thereby increasing the population of Candida<sup>18</sup>.

#### **Relationship Between Patient Therapy MDR (Multi Drug Resistant) Status and Clinical Manifestations of the Oral Cavity in Tuberculosis Patients:**

In this study there are no significant correlation between the treatment of Multi Drug Resistant (MDR) patients with xerostomia, candidiasis and angular cheilitis. Some drugs that are thought to cause side effects of nausea and vomiting are etionamide, para-aminosalicylic acid, and pyrazinamide. The study showed that patient with TB treatment has a significant association with renal disorders. This situation is probably caused by long-term use aminoglycoside drugs. Hearing

disorder was found to be 59.6%. Ototoxicity as well as nephrotoxicity have also been reported as side effects of aminoglycosides associated with large doses. Drug accumulation, duration of therapy, bacteremia, kidney or hepatic impairment, and also the use of MDR TB drugs with diuretics that have otocytosis effects are risk factors for ototoxicity<sup>19</sup>. This study shows that angular cheilitis did not have the correlation with all related factor. The previous study showed that angular cheilitis was the third largest prevalence of oral mucosa disease of Gusti Hasan Aman Dental Hospital in Banjarmasin.<sup>16</sup> Based on Pemantauan Status Gizi (PSG) in 2016, South Kalimantan had 21,8% of malnutrition cases. The malnutrition condition caused by folic acid, iron and vitamin B12 deficiency which tend to increase the incidence of anemia. Pathophysiology of anemia which cause angular cheilitis due to decrease the mitochondria enzymes activity in cell resulted in the disturbance of oxygen and nutrition transport.<sup>20</sup>

### Conclusion

It can be concluded that clinical manifestations of oral tuberculosis are xerostomia, candidiasis and angular cheilitis. The duration of treatment and the systemic diseases are associated with xerostomia and candidiasis in the oral cavity of TB patients.

### Declarations:

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**Conflict of Interest:** No conflict of interest is associated with this work.

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# Herbal Dental Products: The Impact of Social Media on Consumers' Behaviour

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## Abstract

**Context:** The increasing demand for having an attractive smile becomes one of the life essentials. Oral hygiene maintenance plays a key role in maintaining oral health (healthy teeth and gum) and as a result, having an attractive smile. Thus, using routine dental cleansing through brushing, flossing and mouth rinses is mandatory.

This study aims to evaluate the role played by social media on consumers' behaviour to use dental products manufactured essentially from herbal products rather than the well-known chemical formula. The analyzed data were collected by using a face-to-face approach (unstructured interviews). At first, dentists and pharmacists were asked about their opinion regarding using herbal products and their response to social media campaigns. Then, a random sample of the audience was interviewed.

Results showed that most of the Iraqi peoples are familiar with herbal products (68.6 %) of them indicated social media has an impact on individuals.

The awareness of the importance of using toothpaste and mouth rinses made from herbal products can be increased through introducing their effectiveness, reduced side effect and their importance as green substrates...etc. This can be done by organized campaigns by a pharmaceutical company or nonprofit organization.

**Keywords:** Herbal, dental products, social media, behaviour, influencers.

## Introduction

Potent therapeutic agents may be developed from medicinal plants through its active substances<sup>(1)</sup>. Ancient

civilizations have used plants to cure a variety of human ailments<sup>(2)</sup>. Nowadays, over 50% of the modern drugs industry focuses on natural products which play an important role in drug development<sup>(3,4)</sup>.

Many of these plants have dental care properties like *Azadirachta indica* (Neem), *Melaleuca alternifolia* (Tea Tree Oil), *Gritta Kumari* (Aloe Vera)...etc<sup>(5,6)</sup>

Historically, herbal products have been used as an oral hygiene maintenance routine. The chewing stick (Miswak or Siwak) is a tradition inherited from prophetic medicine<sup>(7)</sup>.

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Furthermore, in Asia, Africa, the Middle East, and the Americas, for thousands of years, chewing sticks prepared from twigs, stems or roots of a variety of plant species have been practiced despite the widespread use of toothbrushes and toothpaste<sup>(8)</sup>.

As the side effect of allopathic medicines has increased, studying medicinal plants is also increased in different parts of the globe. Health professionals are often challenged to explore relevant information to advise their patients about using these over-the-counter products safely. The use of herbal extracts in various forms is entirely consistent with the primary health-care principles because these ingredients work more in harmony with the body instead of fighting against it as seen in other conventional versions of the same herbal products<sup>(9)</sup>.

Consumer behavior defined as a sequence of physical, mental and emotional activities done by humans during selecting, purchasing, using, deciding and disposing of goods and services to satisfy their needs<sup>(10)</sup>. Marketing campaigns can be considered as leading factors affecting consumer behavior which helps companies and nonprofit organizations to predict consumer personal preferences and purchasing power<sup>(11)</sup>.

Social media nowadays play an essential role in improving consumers' satisfaction starting with the initial stages of information search, alternative evaluation, purchase decisions and ending with changing consumers' opinions and interest<sup>(12)</sup>. Thus, understanding the impact of social media in clarifying the benefit of herbal dental products over the chemical formula will help in increasing awareness of the people about the importance of using these products. This knowledge may end with reducing side effects that came

from chemical products and substantially saving more money.

## Methodology

**Study Design:** This study based on individuals' opinions obtained from face to face interviews with a random sample of dentists, pharmacists, and consumers to draw an image of their opinion about herbal dental products and to identify the role played by the advertising campaigns on social media to affect their purchasing behavior.

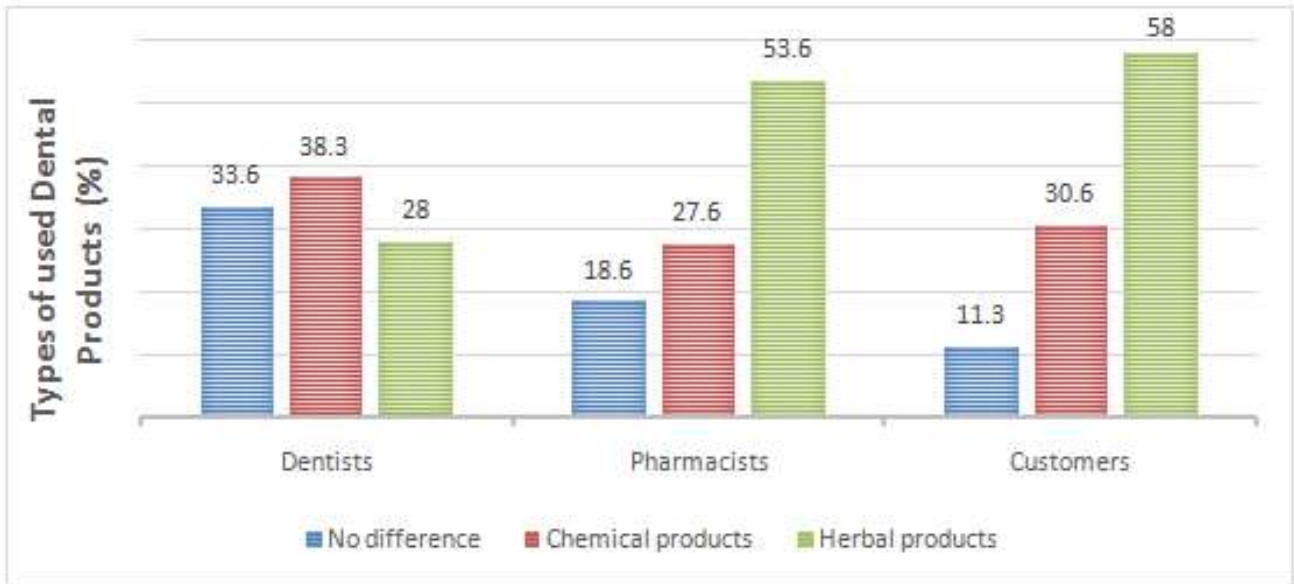
20 questions with 'yes' or 'no' closed-ended responses were designed and asked three hundred peoples; these questions were build based on literature review.

**Study Samples:** Face to face interview was conducted from February 2019 to May 2019 in Baghdad/ Iraq at two stages; the first stage included 100 dentists and 100 pharmacists. While the second stage was with 100 consumers asking them about their opinion about herbal dental products.

## Results

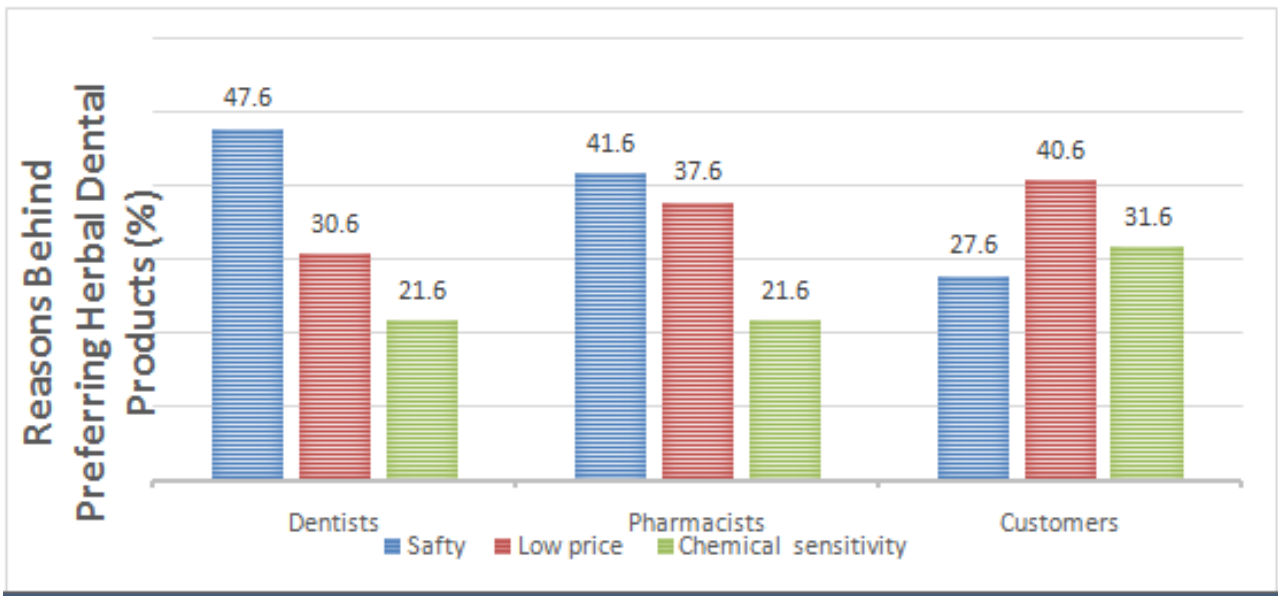
Descriptive statistics were used to analyze the results of this study using Version 21, SPSS software.

The chemical dental products show the highest rate of use among dentists (38.3%), while the herbal products used more by the other customers (58%) (Fig.1).



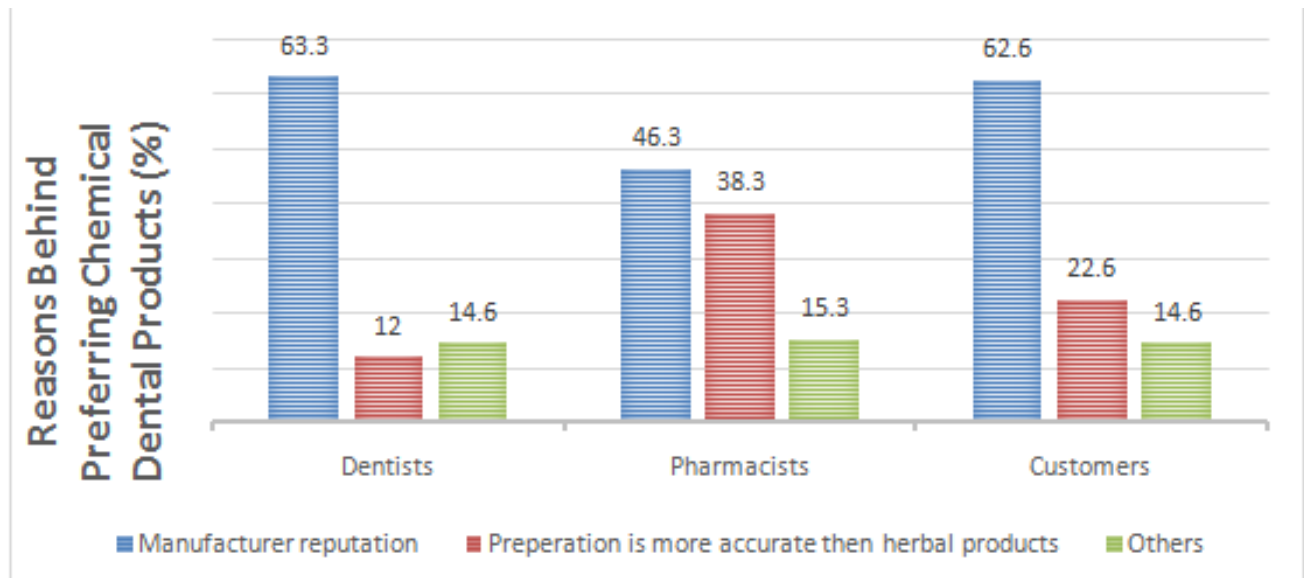
**Figure 1: Types of used dental products**

In (Fig. 2 and 3), reasons behind preferring herbal products over the chemical product and vice versa. Safety (47.6%) was the major reason behind using herbal dental care by the dentists. Whereas manufacturer reputation (brand) (63.3%) reported being the reason behind using chemical dental care products.



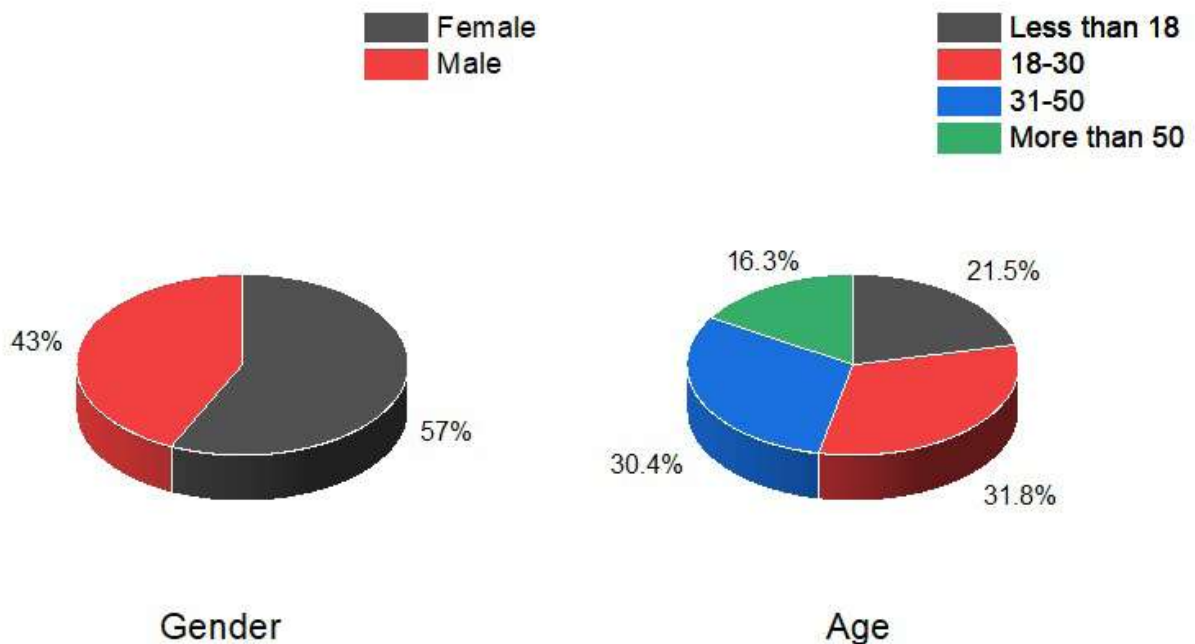
**Figure 2: Reasons behind preferring herbal dental products**





**Figure 3: Reasons behind preferring chemical dental products**

The majority of the sample were females (57%). The age of the majority of the sample was between 18-30years old (28.6%) (Fig. 4).



**Figure 4: Gender and age of the study sample**

Results reported that social messages via social media have played an essential role in changing the consumers' thoughts to use the herbal products by (68.6%) mostly via Facebook (31.6%) Where Twitter

reported to be the least social media visited by people in Baghdad-Iraq (8.6%). These social sites were viewed daily by the majority of the study sample (58.6%) (Fig. 5 and 6).

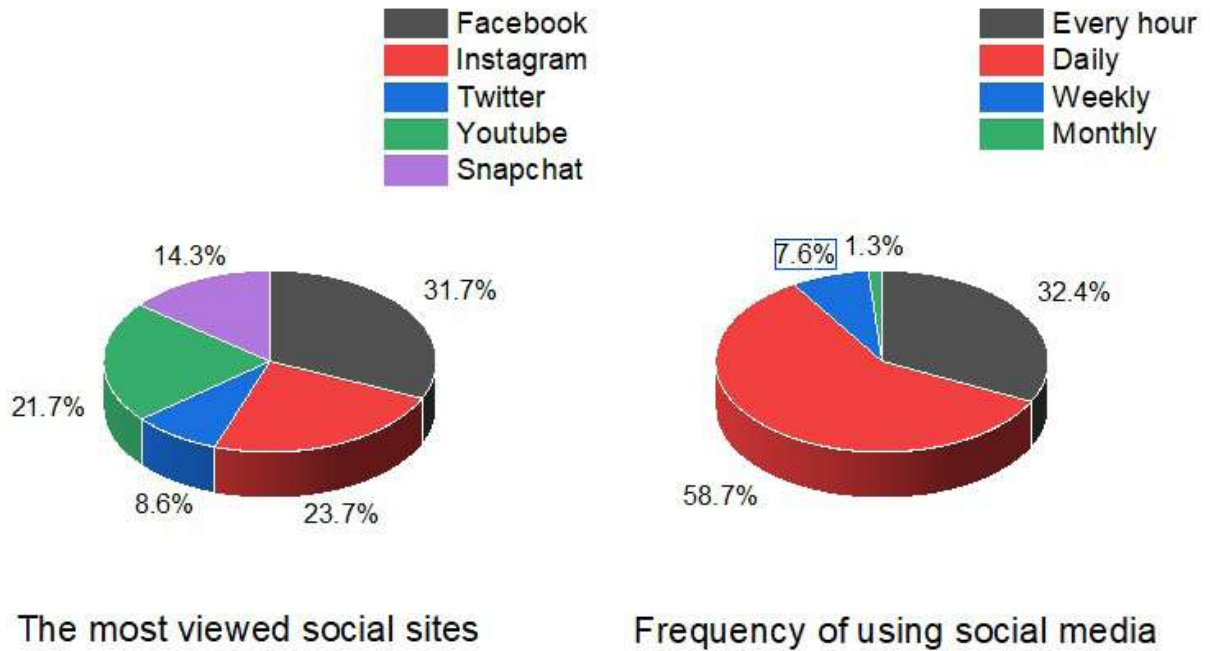


Figure 5: Most vied social media and the frequency of usage

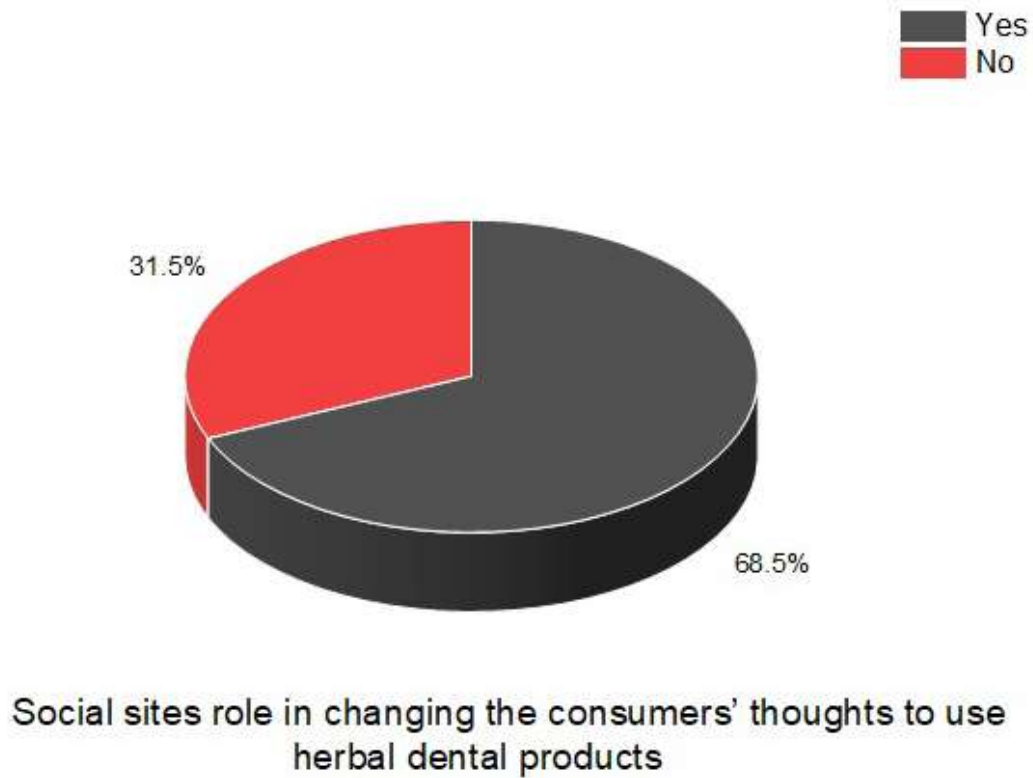


Figure 6: Social sites role in changing the consumers' thoughts to use herbal dental products

## Discussion

As stated in the literature, medicinal herbs are a potential source of therapeutics aids in health systems all over the world in the diseased condition or as potential material for maintaining proper health. Therefore, the herbal product's popularity has increased<sup>(5)</sup>.

This research focused on understanding the general orientation of people in Baghdad-Iraq toward herbal dental products and the reasons behind these beliefs. The collected data from dentists, pharmacists, and other consumers reported that herbal dental products are used frequently mainly because of its safety, low price and finally as a substitute to the chemical products as there is an idea that chemical compounds may be cause sensitivity. Furthermore, the data reveals a percentage of people that use both chemical and herbal products. While some peoples use the chemical formula as a result of the manufacturer's reputation. (Fig. 1,2 and 3)

Generally, women are more interested in their appearance than men, that is why most of the study sample were females between 18-30 years old(Fig. 4).

The second aspect of this study deals with the impact of social media on consumers' behavior toward herbal dental products; therefore, the frequency of using social media and which media is most visited is important. Data regarding these questions revealed the majority of the study sample used social media on a daily basis. Facebook and Instagram reported being the most visited social sites (Fig. 5 and 6).

Recent studies mentioned social media as a vital tool for people between 18 to 40, as they enter young adulthood, focus on the future and aware of how others see them. They feel more pressure to be "the best", are more worried about what others think about them, and are more concerned about what making their family and friends proud, as known up to 91% of social media account are in this age group with the most social media connections. These groups are the most affected by social media's on their lives<sup>(13)</sup>.

## Conclusions

1. Herbal dental products used widely by peoples regardless of their levels of education.
2. Social media can direct the audience toward a specific product when used correctly towards the targeted audience via the proper social site.

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**Ethical Clearance:** Not required

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# The Difference Effect of Adolescent and Adult Pregnancy on Apoptosis Index of Neuron Cells

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## Abstract

**Context:** Adolescent who are pregnant will experience depression due to physical and mental unpreparedness that affects cortisol which will reduce the secretion of Brain Derived Neurotrophic Factor, so that it will increase the index of apoptosis of brain neuron cells. This study aims to determine differences in the influence of adolescent and adult pregnancy on the index of apoptosis of brain neuron cells. The study used true laboratory experimental design with post test only control group design using animals tried to mice *Mus musculus*. The experimental group was divided into two groups: the control group or the adult pregnancy, and the treatment group or the teenage pregnancy group. The brain dissection of the newborn *Musculus* mice was taken and calculated the number of neuron cell apoptosis index using Immunohistochemical Tunnel. There were significant differences in the brain neuron cells apoptosis index with a value of  $p = 0.01$  (mean  $4.13 + 2.52$  in the treatment group,  $2.81 + 1.43$  in the control group). There were significant differences in apoptosis index of brain neuron cells in the newborn *Mus musculus* mice in teenage pregnancy and the control group.

**Keywords:** *Difference, adolescent pregnancy, adult pregnancy, apoptosis index, neuron cell.*

## Introduction

Pregnancy is a period starting from conception to the birth of the fetus and is a natural and physiological process, the pregnancy process is a unified chain of conception, oxidation, mother's adaptation to liquidation, maintenance of pregnancy, and hormonal changes as preparation for the baby's birth<sup>1</sup>. World Health Organization (WHO) defines pregnancy in a girl between the ages of 10-19 years referred to as teenage pregnancy<sup>2</sup>. Teenager is a period where the transition from childhood to adulthood. In adolescents who are pregnant there are complications of pregnancy that cause twice as many deaths compared with pregnancy in adult women. In addition to the causes of teen pregnancy increasing maternal mortality, pregnancy in adolescents can also cause tremendous psychological stress in these adolescents, especially in unwanted pregnancies.<sup>3</sup> which is detrimental to the health of mother and child, is a common public health problem worldwide. It is one of

the key issues concerning reproductive health of women not only in developing countries but also in developed countries. There is growing awareness that early child bearing has multiple consequences in terms of maternal health, child health and over all well-being of the society. The purpose of the article is to review current trends and issues on adolescent pregnancy to update the practitioners. The readers are provided with more recent data on adolescent sexuality, child bearing as well as suggestions for addressing the challenges of teenage pregnancy. & lt;p & gt; & lt;p & gt; Chatt Shi Hosp Med Coll J; Vol.15 (1 World Health Organization, recorded as many as 16 million adolescents aged between 15-19 years giving birth each year, equivalent to 11% of the total number of births in the world. As many as 59% of the total teenagers who give birth come from poor and developing countries. Pregnancy rates among adolescents in the United States are 67,8 pregnancies per 1000 women aged 15-19 years.<sup>4</sup> Setting, Participants,

Interventions, and Main Outcome Measures: We used records of 38,646 women who gave birth at our hospital, between January 2008 and December 2009. Five hundred eighty-two randomly selected pregnant adolescents and 2,920 healthy parity and body mass index matched pregnant women 20-34 years of age were included the study. Perinatal outcomes were compared between the groups. Results: The mean gestational ages of the adolescent and control groups at the first prenatal visit were 11.2 (range, 8-31)<sup>5</sup>

Factors affecting pregnancy such as stress can affect the growth and development of the hypothalamic Pituitary Adrenal. Maternal prenatal stress is the initial environmental factor that affects cortisol reactivity in humans <sup>6,7</sup>. Unwanted pregnancies and physical and mental unpreparedness in pregnant teenage women will have an impact on mothers who will experience depression and ultimately affect fetal growth and development during pregnancy, where one of them is maternal depression which can affect the increase in neuronal cell death in the fetal brain.<sup>5</sup> In the stressful condition of pregnancy, spurring an increase in the hormone cortisol through the placenta and an increase in glucocorticoids will inhibit the expression of Brain Derived Neutrotrophic Factor resulting in an increase in the number of neuron cells undergoing apoptosis in the hypothalamic paraventricular nucleus <sup>8</sup>. The process of apoptosis can play a role in the development of the nervous system and the final structure of brain function. Apoptosis occurs during the growth period, as a homeostatic mechanism to maintain cell populations in tissues, in reaction to cell damage.<sup>5</sup>

The purpose of this study was to analyze differences in the apoptotic index in adolescent and adult pregnancy in brain neuron cells.

## Method

This research was experimental true laboratory research with a post test only control group design study design. The subjects of this study used experimental animals, Musculus juvenile mice aged ± 1.5 months and adult mice 3 months old obtained from the Integrated Research and Testing Laboratory (LPPT) Gajah Madah University of Yogyakarta. Mothers of adolescents and adults are given the hormone Pregnant Mare Serum Gonadotropin (PMSG) and Human Chorionic Gonadotropin (Hcg), after which mice are carried out by mating female and male mice. Pregnancy age is examined based on copulatory plug. The subjects were sacrificed and followed by sectio caesarea to give birth to Mus musculus mice and decapitation of the head and brain to dissection. The neuron cell apoptosis index is the number of neuron cells that experience apoptosis or cell death in 10 visual fields stained in the cell nucleus in the cortex area. The apoptosis index interval measurement scale was seen with a microscope 400 times magnification and calculated per 100 cells divided by the total cell number, multiplied by 1000. Using the Tunnel assay method using immunohistochemical staining examination will be stained dark brown to blackish. Apoptotic kit with the brand Santa Cruse. Data analysis using the Shapiro Wilk normality test was conducted to examine data distribution, followed by T-Test and Mann-Whitney as alternatives. Probabilities are considered statistically significant when p <0.05 is obtained with a 95% confidence interval. The data obtained is displayed in graphical form. Data analysis was processed using the SPSS version 25 (SPSS, Inc., Chicago, IL).

## Results

### Subjects Characteristics:

**Table 1: Characteristics of Mus musculus mother based on body weight**

Body weight (gram)	Control		Treatment	
	N	%	n	%
15-20	-	-	16	100
21-25	3	18,75	-	-
26-30	10	62,5	-	-
31-35	3	-	-	-
Total	16	100	16	100

The characteristics of the parent Mus musculus based on the highest body weight ranged from 15-20 grams in the treatment group (Table 5.2), ie 100% and 26-30 grams in the control group and 62.5%.

**Table 2: Characteristics of Mus musculus newborn based number of children**

Number of children	Control		Treatment	
	N	%	n	%
0-2	-	-	4	25
3-4	6	37,5	4	25
5-6	10	62,5	6	37,5
Total	16	100	16	100

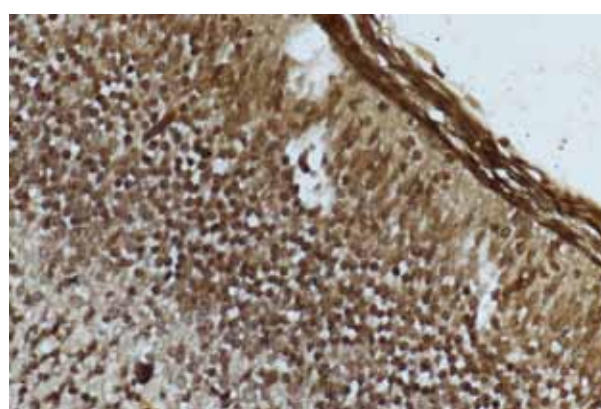
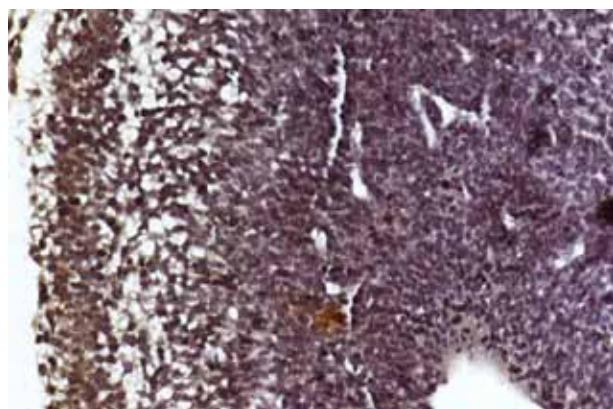
The characteristics of the parent Mus musculus are based on the number of children. The majority ranged from 5-6 children in the control group (Table 5.2), which was 62.5%. All Mus musculus children born to the mother Mus musculus were weighed, then three weights were chosen, the most severe, medium, and light to be sacrificed and cut to the brain. Three brains of Mus musculus children were made into one preparation and immunohistochemical staining was performed and apoptosis index was calculated.

Comparison of apoptotic index in adolescent pregnancy and control group

**Table 3: Mann Whitney Test Results on Apoptosis Index of brain neuron cells**

Group	Apoptosis index	Mean ± S/D	Nilai p
Treatment	132,3	4,13±2,52	0,001
Control	76	2,37±1,43	

The results of the average apoptosis index in the control group were  $2.37 \pm 1.43$  and the treatment group was  $4.13 \pm 2.52$ . Mann whitney test Apoptosis Index of brain neuronal apoptosis index with a value of  $p = 0.001$  ( $p < 0.05$ ) which means that there is a significant difference between the control group and the treatment.



**Figure 1. Microscopic test of Apoptotic Expressions. The description of expressing apoptosis in the brain is characterized by chromogen brown color (arrow) in almost all brain cells. Figure A. (Control) shows the presence of weak Apoptotic expression in the brain neuron cells of Mus musculus children and in Figure B. The expression of Apoptosis in brain cells is stronger than the control. 400x.**

**Discussion**

Adolescents who are pregnant due to physical and mental unpreparedness will experience depression in these adolescents.<sup>3</sup> which is detrimental to the health of mother and child, is a common public health problem

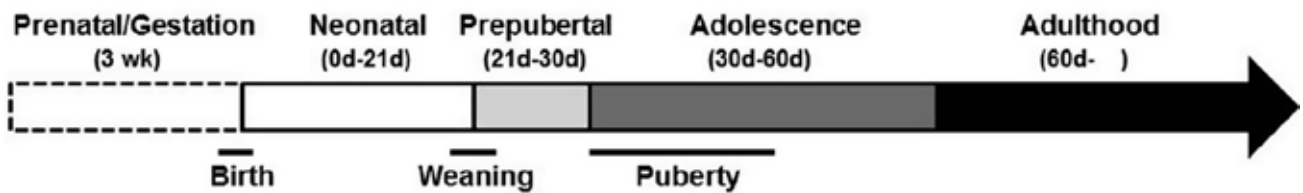
worldwide. It is one of the key issues concerning reproductive health of women not only in developing countries but also in developed countries. There is growing awareness that early child bearing has multiple consequences in terms of maternal health, child health

and over all well-being of the society. The purpose of the article is to review current trends and issues on adolescent pregnancy to update the practitioners. The readers are provided with more recent data on adolescent sexuality, child bearing as well as suggestions for addressing the challenges of teenage pregnancy. & It;p & gt; & It;p & gt; Chatt Shi Hosp Med Coll J; Vol.15 (1 The state of depression in pregnant women will cause an increase in hormones that are regulated by the hypothalamus.<sup>5</sup> As with humans, in juvenile mice that are being edited also

experience stress with signs such as fear that become more aggressive, and an increase in the hormone cortisol and ultimately can cause death in these mice. In this study the juvenile mice that were edited had more deaths and were not pregnant than the control group.

In accordance with the theory which says that the age of productive mice and ready to be impregnated is the age of 8 weeks. This is likely influenced by the readiness of the reproductive organs.<sup>5</sup>

**A. Rodent (e.g., rat, mouse)**



**B. Human**



**Figure 2: the growth and development of the hypothalamic Pituitary Adrenal<sup>9</sup>**

Factors affecting pregnancy such as stress can affect the growth and development of the hypothalamic Pituitary Adrenal<sup>10</sup>. Maternal prenatal stress is the initial environmental factor that affects cortisol reactivity.<sup>5</sup> Stress is referred to as a state in which the state of homeostasis in an organism is considered threatening by external or internal effects. The effector of the main end of the stress system is cortisol, which is produced by the axis of the Hypothalamic-Pituitary-Adrenal Axis (HPA Axis).<sup>11</sup>

Under stressful pregnancy conditions, spurring an increase in the hormone cortisol through the placenta and an increase in glucocorticoids will inhibit the expression of Brain Derived Neurotrophic Factor resulting in an increase in the number of neuron cells undergoing apoptosis in the hypothalamic paraventricular nucleus<sup>12</sup>.

Path of Stress Mechanism to Neurotransmitter Signaling in Neuron Cell apoptosis



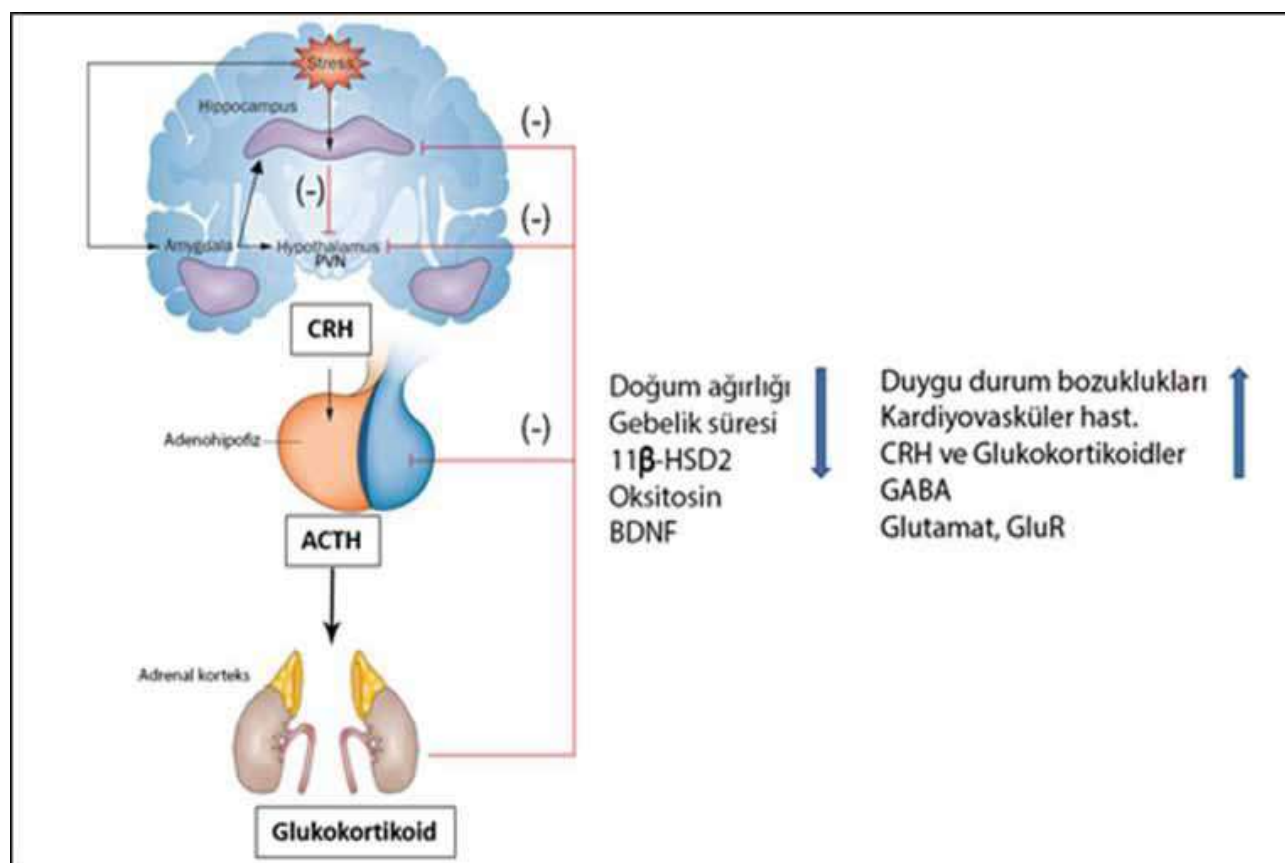


Figure 3: Mechanism of stress in pregnancy <sup>11</sup>.

During pregnancy, the hypothalamic CRH, and the placenta also produce and release CRH into the bloodstream, causing hyperactivity of the HPA axis, and a considerable increase in the ratio of free / bound cortisol. Production of placental CRH and the presence of excess cortisol begin during the second trimester and increase linearly to term, with surges in the last 6-8 weeks of pregnancy <sup>13</sup>. The regulation of the prenatal HPA axis shown in Figure 2.5 has shown that when pregnant women progress, the cortisol response to acute stress reduction shows a blunt HPA axis due to high placental CRH levels. In humans, where the fetus is developing, the placenta enzyme 11β-HSD-2, which converts cortisol to cortisone is inactive, forms a maternal glucocorticoid barrier. However, 10-20% of maternal cortisol passes through the fetus, which under stress conditions is caused by increased maternal HPA activity, which gives effect to fetal cortisol and increases long-term effects on the developing brain of the fetus. <sup>11</sup>

Maternal stress and depression during pregnancy are reprogrammed <sup>14</sup>. The HPA axis, reducing placental

enzymes 11B-HSD2 and decreasing dopamine and serotonin levels but increasing glucocorticoid / cortisol affect behavior, nerve development and signaling pathways in offspring of mice (prenatal stress models). PS exposure interferes with hippocampal neurogenesis in offspring <sup>11</sup>.

The process of apoptosis can play a role in the development of the nervous system and the final structure of brain function <sup>15</sup>. Apoptosis occurs during the growth period, as a homeostatic mechanism to maintain cell populations in tissues, in response to cell damage <sup>16</sup>. Pregnancy stress is associated with an increase in glucocorticoids which will inhibit the expression of Brain Derived Neurotrophic Factor (BDNF) resulting in an increase in the number of neuron cells undergoing apoptosis in the hypothalamic paraventricular nucleus *Rattus norvegicus*. <sup>11</sup> The number of cells undergoing apoptosis depends on the synapse. The more synapses, the less apoptosis that occurs. Thus the more rich the neuron cells will dendritic site, the more synapses can be formed so that the number of cells that experience fewer

apoptosis, thus it can be concluded that brain capacity will be further enhanced<sup>11</sup>.

### Conclusion

From this research there are significant differences in apoptosis index of brain neuron cells in the newborn Mus musculus mice in teenage pregnancy and the control group. Future research is needed to prove the influence of adolescent pregnancy can have a long-term impact due to an increase in apoptosis index on structural growth, biomolecular and functional brain growth.

**Conflict of Interest:** None

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**Ethical Clearance:** Taken from The Ethics Committee of the Faculty of Dentistry, Universitas Airlangga (ethics approval number: 107/HRECC.FODM/IV/2019).

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# The Affect of Zinc and Calcium Adequacy Levelon Stunting Toddler Aged 24-59 Months (In Bulak Banteng Health Center, Surabaya)

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## Abstract

**Context:** Stunting is a undernutrition chronic status in the period of growth and development since the beginning of life. The incidence of stunting is influenced by several factors several factors. One of the factors is the adequacy of toddler nutrition during the growth period. The purpose of this study was to analyze the level of adequacy of the Zinc intake and Calcium intake for the incidence of stunting.

This research used observational method with a case-control design. The case group was a group of stunting toddlers aged 24-59 months, whereas the control group was normal toddlers (H/A) toddler age 24-59 months. Research was carried out in the working area of Bulak banteng Health Center Surabaya. The number of sample on this research was 28 for both stunting and non-stunting cases. Data was collected first by measuring height to know height of toddler, collect questioners from respondents and toddler, SQ-FFQ (Semi-Quantitative Food Frequency Questionnaire) to understand the level of adequacy. This data was analyzed of to find out the number of stunting cases.

The result showed that there were influences between the level of adequacy zinc ( $p=0,000$ ) (OR=-2,625), Calcium ( $p=0,000$ ) (or=-3,420) to stunting.

The conclusions in this study is nutrient adequacy will reduce the risk of stunting. Furthermore, mothers must improve the adequate nutrient for toddler and puskesmas (Center of Public Health must to increase the quality of public education about infants' nutrition needs

**Keywords:** *Toddler, stunting, adequate nutrition*

## Introduction

Stunting reflects a lack of nutrition status that is chronically challenging during the period of growth and development since the beginning of life. This situation is presented with a high body z-score according to age (TB / U) of less than -2 standard <sup>(1)</sup>

The prevalence of stunting toddlers in Indonesia in 2010 was 35.6%, in 2013 it was 37.2%, and 2018 was 30.8%. The stunting prevalence in East Java is 26.7% of the total number of children in the province of East Java <sup>(2)</sup>. One of the stunting areas in Surabaya is the BulakBanteng village. The BulakBanteng village was chosen as the research site because of the high number of stunting. Nutrition Monitoring Status (PSG) of the Surabaya City Health Office, the prevalence of stunting in Surabaya in 2017 was 23.50%.

Childhood is a period in which children very sensitive to the environment, so special attention is needed, especially nutritional adequacy. Nutrients that are needed during the toddler's growth period are zinc and

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calcium. Low zinc levels affect cellular responses that regulate growth hormones such as insulin-like growth factor-1 (IGF-1). Zinc requirements physiologically during periods of rapid growth due to DNA replication, DNA transcription, and endocrine function. Iron is a microelement that is essential for the body. Toddlers are in a group that has the highest risk of developing iron deficiency due to rapid growth processes <sup>(3)</sup>Calcium deficiency will affect linear growth if the calcium content in bone is less than 50% of the normal content. In infants, calcium deficiency in the bones can cause rickets, whereas in children, lack of deposits can cause growth retardation. <sup>(4)</sup>so it is necessary to do research on the level of adequacy of zinc and calcium nutrients in infants aged 24-59 in the work area BulakBanteng Health Center.

**Material and Method**

The type of this research is observational research and analytic research because it makes observations without giving treatment or intervention. The design of this study uses quantitative design. Based on the duration of the study, this study included a case control study.

Data collected is toddler height using microtoise measuring grouped into Stunting if <-2 Standard Deviation and not stunting if -2 Standard Deviation to 2 Standard Deviations. Zinc and calcium adequacy levels through the Semi Quantitative Food Frequency Questionnaire (SQ-FFQ) questionnaire through multiplication between the frequency of consumption and the portion of food consumed in the last 1 month.

To determine the level of adequacy of nutrients used EAR (Estimated Average Requirement) as a reference. Given the adequacy grouped into, Zinc Adequacy at 24-48 months of age was classified as less if <EAR (2.83 mg) and sufficient if > EAR (2.83 mg). At the age of 48-59 months grouped less if <EAR (3.33 mg), and enough if > EAR (3.33 mg). Calcium adequacy at 24-48 months of age was classified as less if <EAR (541.6 mg) and sufficient if > EAR (541.6 mg). At the age of 48-59 months it was classified as less if <EAR (833.3 mg) and less if <EAR (833.3 mg). In addition, data collection was also related to family characteristics including family income and the level of maternal education.

The independent variable in this study was the level

of zinc, calcium adequacy and the dependent variable was stunting. Data analysis using binary logistic regression test with SPSS v20 application was conducted to analyze the effect of zinc and calcium consumption levels on the incidence of stunting. Odds Ratio (OR) analysis was conducted to assess the magnitude of risk factors for zinc and calcium adequacy levels on the incidence of stunting.

**Findings:**

**A. Distribution of family Family characteristics:**

The family characteristics studied in this study included family income and mother’s education level. The number of research subjects involved in the study were as many as 56 respondents by dividing 28 respondents from the stunting group and 28 respondents from the non-stunting group.

**Table 1: Distribution of Family Characteristics**

No.	Karakteristik keluarga	Stunting		Non-stunting		
		N	%	n	%	
1.	Family Income	Rendah	24	85,7	16	57,1
		Tinggi	4	14,3	12	42,9
2.	Mother’s education level	Tamat SD	19	67,9	14	50
		Tamat SMP	7	25	5	17,9
		Tamat SMA	0	0	6	21,4
		Perguruan Tinggi	2	7,1	3	10,7

Based on Table 1, the family income group in the stunting and non-stunting children was the lowest in the low category, each at 85.7% and 57.1%. While for high income category in stunting toddlers at 14.3% and in non-stunting families at 42.9%. The level of education of mothers in stunting and non-stunting children is at the primary level at 67.9% and 50% respectively.

**B. Distribution of Characteristics of Toddlers:**

Characteristics of toddlers studied in this study include birth weight and birth length. The number of research subjects involved in the study were as many as 56 respondents by dividing 28 respondents from the stunting group and 28 respondents from the non-stunting group

**Table 2: Distribution of Characteristics of toddlers**

No.	Karakteristik Balita		Stunting		Non-stunting	
			n	%	n	%
1.	Birth Weight	Low Birth Weight (<2500 gram)	21	75	13	46,4
		Normal (≥2500 gram)	7	25	15	53,6
2.	Birth Length	Low (<48 cm)	8	28,6	4	14,3
		Normal (≥ 48 cm)	20	71,4	24	85,7

Based on Table 2, the lowest birth weight occurs in stunting toddlers, which is equal to 75% while the most normal birth weight in non-stunting infants is 53.6%. The group of toddlers' body lengths showed that there were more categories in stunting toddlers, namely 28.6%, while non-stunting toddlers with less categories, namely 14.3%.

**C. The Influence Effect of Zinc Adequacy Level:** The level of toddlers' adequacy studied in this study is the intake of toddlers from food sources containing zinc. The number of research subjects involved in the study were as many as 56 respondents by dividing 28 respondents from the stunting group and 28 respondents from the non-stunting group.

**Table 3: Distribution of Zinc Adequacy Rate for Stunting and Non-stunting Children in BulakBanteng Surabaya Health Center in 2019**

Zinc adequacy level	Stunting		Non-stunting		p-value	OR
	n	%	n	%		
Less	21	75	5	17,9	0,000	-2,625
Enough	7	25	23	82,1		

Based on the results of the study it was found that the zinc adequacy rate affected the incidence of stunting

(p = 0,000) because the result of p-value < 0,005 it means significant. The risk analysis obtained an OR value of -2,625 means that toddlers with a sufficient level of zinc sufficiency will reduce the risk of stunting by 2,625 times compared to those with a lack of zinc adequacy.

**D. The Influence Effect of Zinc Adequacy Level:** The level of toddlers' adequacy studied in this study is

the intake of toddlers from food sources containing calcium. The number of research subjects involved in the study were as many as 56 respondents by dividing 28 respondents from the stunting group and 28 respondents from the non-stunting group

**Table 4: Distribution of Calcium. Adequacy Rate for Stunting and Non-stunting Children in BulakBanteng Surabaya Health Center in 2019**

Tingkat kecukupan kalsium	Stunting		Non-stunting		p-value	OR
	n	%	n	%		
Less	23	82,1	15	53,6	0,026	1,383
Enough	5	17,9	13	46,4		

Based on the results of the research, it was found that the level of calcium adequacy had an effect on the incidence of stunting (p = 0.026) because the result of p-value < 0,005 it means significant. The risk analysis obtained an OR value of 1.383 means that toddlers with a low level of calcium sufficiency would risk 1,383 times compared to stunting compared with the level of calcium adequacy sufficient.

**Discussion**

Based on the results of research on family characteristics, namely family income and mother's education. Most of the income in the family of low-stunting children under the Surabaya city minimum wage is Rp. 2,746,428. Low income is related to the source of income in the family which only comes from the father while the mother of the toddler is only a housewife. In addition, mothers of children under five mostly graduated from elementary school so that the ability of mothers was lacking in finding ways to increase family income. Family income is one of the factors that can affect economic status. Low economic status can have an impact on the inability to produce sufficient and quality food because of the low purchasing power (5)the prevalence of stunting and severe stunting in Brebes reached 26.9 % and 16.8 %. These prevalences of stunting were higher than the stunting prevalence in Central Java Province (11.0%)The education level of mothers in stunting and non-stunting children is the most elementary school education for children under five. Parental education can influence the ability to access information and knowledge related to parenting.

Based on the characteristics of toddlers, namely birth weight and birth length, the percentage of toddlers

who have a history of low birth weight (LBW) is more in stunting toddlers. Low birth weight babies (LBW) indicate a lack of nutrients during pregnancy, poor diet, poor eating quality, and frequency of frequent illnesses. Birth weight depends on maternal nutritional status during pregnancy and before conception<sup>(6)</sup>. Based on the results of the study, it was found that the proportion of infants with a history of birth length was more or less in the stunting toddler group. Babies born with short birth lengths indicate malnutrition since the womb. Mothers who experience malnutrition will give birth to babies who are malnourished as well. Nutritional deficiencies from the womb affect the organs and fetal growth. Babies who experience a lack of nutrients during pregnancy can still be repaired with good intake so that they can grow according to their development. However, if the intervention is done late the toddler will not be able to catch up with the growth delay called failure to thrive. Likewise with normal toddlers there is a possibility of growth disruption if the intake is insufficient. Nutrition that is in accordance with needs will help the growth and development of children<sup>(7)</sup> especially occurred in developing and poor countries. Stunting can increase the risk of morbidity and mortality, and suboptimal brain development so that delayed motor development and mental retardation. Stunting is a form of growth failure due to the accumulation of nutrient insufficiency from the beginning of pregnancy until 24 months old. This situation is exacerbated by inadequate catch-up growth. In Indonesia, based on Basic Health Research, there was an increase of 36.8% stunted children in 2010 to 37.2% in 2013. Over the past 20 years, handling the problem of stunting is very slow. Globally, the percentage of children who were stunted declined by only 0.6 percent per year since 1990. WHO proposed a global target reduction in the incidence of stunting in children under five years old by 40% in 2025, but it was predicted only 15-36 countries that meet those targets. The purpose of this article was to examine the incidence of stunting reduction and interventions of the policy. Focus on movement to improve nutrition to target the first 1,000 days of life, in the global order it was called Scaling Up Nutrition (SUN)

The results of the variables studied were the effect of the level of nutrient adequacy, indicating that there was an effect of zinc adequacy on the incidence of stunting. In accordance with the research study<sup>(8)</sup> democratic rights and freedom of expression have been key issues in discourses surrounding EU, Turkey

relations. Discussions on these questions often centre on state censorship and legislative constraints. The role of the media themselves, however, and the deeply-ingrained elements and historically-contingent norms and practices within public culture that shape the public sphere, have received a significantly lower level of attention. Despite recent legislative changes towards greater freedom of expression, major hurdles that limit democratic rights and freedoms persist in practice, as highlighted by the judicial trial (and the subsequent murder in January 2007) in this study, it was found that children under five who lacked zinc consumption had an odds ratio of 11.67 times for stunting compared to children under five with sufficient zinc consumption. It was also proven by the research of (9) that children who had zinc deficiency were 2.67 times at risk of stunting. Zinc interacts with important hormones involved in bone growth such as somatomedin, osteoclastin, testosterone, thyroid and insulin, besides higher zinc concentrations in bone compared to other tissues show that zinc in bone is a very important substance during the growth stage and in times child development (3)

The results showed that there was an effect on the level of calcium adequacy with stunting events similar to the study conducted by (10) is a linear growth retardation, which results from inadequate intake of food over a long period of time that may be worsened by chronic illness. Over a long period of time, inadequate nutrition or its effects could result in stunting. This paper examines the correlates of stunting among children in Ghana using data from the 2008 Ghana Demographic and Health Survey (GDHS). It was found that there was an influence between the level of calcium adequacy and the incidence of stunting. In toddlers whose calcium adequacy level has less risk of stunting 3.93 times greater than toddlers with sufficient levels of calcium sufficiency. Calcium concentrations in plasma, especially free calcium ions, are acted to transmit nerve impulses and muscle contractions, as well as catalysts for various biological reactions, such as B12 absorption, fat breakdown enzymes, pancreatic lipase, pancreatic insulin secretion, acetylcholine formation and<sup>(4)</sup> Calcium homeostasis is regulated primarily through an integrated hormonal system that controls calcium transport in the intestines, kidneys and bones. During growth, demands for bone mineralization are very high, very low calcium intake can cause hypocalcemia, despite the secretion of the maximal parathyroid gland, which can result in low bone mineralization matrix and new osteoblast dysfunction.

(11)there are 165 million children under the age of suffering from stunting. Research done showed that nationally stunting prevalence in 2013 is 37,2%. West Borneo is one of the twenty provinces with the stunting prevalence above the national average. During growth period, children need calcium especially for ossification. The lack of calcium is mainly caused by inadequate intake and or non-optimal calcium absorption. Some of previous research has showed that the level of calcium serum of children with stunting has significantly lowered than the normal children. Objective: The aim of this study was to analyse the calcium serum level of the children with stunting aged of 24-59 months in Pontianak City. Method: This study is a cross sectional design. It conducted in East Pontianak and North Pontianak subdistricts. Number of samples was 90 childrens. Statistical analysis was performed using Chi-Square, t-test, and logistic regression. Results: There was no significance in serum calcium level between stunting and non stunting children (p=0,193)

### Conclusions

Based on the results of research conducted, the family characteristics of stunting and non-stunting children are based on family income and the same level of education, namely low income and education level of elementary school mothers. Then the characteristics of stunting and non-stunting toddlers were low birth weight and the least height was in stunting toddlers. There is an influence of zinc and calcium adequacy levels on the incidence of stunting.

Suggestions given to respondents are toddlers' mothers to increase the amount of toddler food consumption so that adequate nutrition is fulfilled. In addition, Puskesmas (Center of Public Health) are advised to improve the quality of counseling by adding the theme of counseling on toddlers' nutritional needs such as the use of various types of food.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

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**Ethical Clearance:** The study was approved by the institutional Ethical Board of Universitas Airlangga Faculty of Public health Research Ethical Clearance Commission.

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# Different Grades of Body Mass Index is Correlated with Left Atrium and Ventricle Structure in Patients with Hypertensive Heart Disease

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## Abstract

**Background:** Hypertensive Heart Disease (HHD) is usually followed by cardiac remodeling. Different grades of Body Mass Index (BMI) also influence the cardiac structure. Hence, we evaluate the cardiac structure of HHD patients with various BMI grades.

**Materials and Method:** This cross-sectional study involves 50 consecutive patients with HHD (hypertensive heart disease) from the Cardiology and Vascular Medicine Departement, Soetomo General Hospital Indonesia. Echocardiographic examination was done using GE vivid 7. Statistics were evaluated with SPSS 25.0.

**Results:** The research showed that the grades of BMI (body mass index) was positively correlated with LA major ( $r=0.335$ ), RA Major ( $r=0.371$ ), LVD Mass ( $r=0.341$ ), LVS Mass ( $r=0.303$ ), LVPWD ( $r=0.369$ ), LVPWS ( $r=0.391$ ), and inversely correlated with LVSI Dopp ( $r=-0.376$ ). Obese (BMI>30) patients have significantly lower ejection fraction compared to normoweight (BMI<25) patients ( $64.3\pm 3.67\%$  vs  $62.12\pm 0.98\%$ ,  $p=0.046$ ).

**Conclusions:** The grades of BMI in the HHD patient is associated with an increased volume of the left atrium and ventricle. This suggested that obese patient with HHD should be assessed carefully for atrial and ventricle enlargement.

**Keywords:** Cardiac Structure, Echocardiography, Hypertension, Obese, Remodelling

## Introduction

Hypertensive heart disease (HHD) can be manifested as asymptomatic cardiac hypertrophy to clinical heart

failure. Alteration of blood vessel and cardiac structure in the HHD was caused by the chronic elevation of the blood pressure.<sup>1</sup> This remodelling subsequently contribute to the pathophysiology of circulatory disorders in the HHD patient.<sup>2</sup> The progression of cardiac structure remodelling in the HHD patient is influenced by various factor such as type of overload, neurohormonal activation, co-existence with other diseases and genetic factors.<sup>3</sup>

Obesity rates are rising worldwide. Obesity is defined as abnormal or excessive fat accumulation that may impair health, including increased risk of cardiovascular disease and hypertension that may induce

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some changes in cardiac structure and function. World Health Organizations (WHO) and National Institute of Health defines Normal weight as BMI 18.5-24.9, Overweight as BMI 25-29.9, Obesity as BMI  $\geq 30$  kg/m<sup>2</sup>, severe obesity as BMI  $\geq 40$  kg/m<sup>2</sup>, and super obesity as BMI  $\geq (50$  kg/m<sup>2</sup>).<sup>4</sup> Obesity may also induce several modifications in cardiac structure and function in the absence of other atherosclerotic risk factors, to the extent that some authors have suggested the specific form of “obesity cardiomyopathy,” which resulted in left ventricular (LV) structural and functional abnormalities.<sup>5</sup> 15 402 individuals aged 45-64, living in two towns in the west of Scotland underwent comprehensive cardiovascular screening. We analysed all deaths and hospitalizations for cardiovascular reasons occurring over the subsequent 20 years according to baseline body mass index (BMI). Obesity is well known to imply some cardiac consequences with the inducement of several modifications in cardiac structure and function, which are associated with hemodynamic volume overload. Atrial and ventricular remodeling is common in obese patients, and this pathophysiological change plays a pivotal role in atrial and ventricular dysfunction.<sup>6</sup> Hence, it is hypothesized that different grades of BMI may contribute to the cardiac remodeling progression in the HHD patient. This research investigates whether different grades of BMI status is correlated with echocardiographic findings in HHD patient.

## Materials and Method

**Research Design:** This retrospective study consisted of subject  $\geq 18$  years old with hypertensive heart disease evaluated at the Echocardiography Laboratory of the Department of Cardiology and Vascular Medicine Dr. Soetomo General Hospital, Surabaya, Indonesia between January 2018 and January 2019. Eligible patients required to have LV Ejection Fraction (EF)  $\geq 50\%$ . Normal weight, overweight, and obesity were defined according to body mass index (BMI) established criteria.<sup>4</sup> Diabetes mellitus and hypertension were defined according to current recommendations.<sup>7-8</sup>

Patients were excluded if they had a history of acute coronary syndromes, angina, or revascularization procedures or evidence of segmental wall motion abnormalities at echocardiography, or a history of heart failure. Other exclusion criteria were significant aortic or mitral valve disease, severe mitral annular calcification, hypertrophic cardiomyopathy, secondary forms of

cardiomyopathy, stroke, peripheral artery disease, and chronic kidney disease.

**Doppler Echo cardiography:** Trans thoracic two-dimensional and Doppler echo cardiographic examination was carried out by Vivid S6, Logic E9, and Vivid S60 Ultrasound instrument (General Electric) with 2nd-harmonic imaging and a 3.5-MHz transducer. Patients were examined in the left lateral decubitus position, and data were acquired in the parasternal (long- and short-axis views) and apical views (two chambers (A2C) and four chambers (A4C) and apical long-axis views). In every echo cardiographic evaluation, all parameters were derived according to current indications and considered in relation to their established reference ranges. Left ventricular volumes and EF were calculated from apical A2C and A4C views using the TEICH and Modified Simpson’s Biplane rule. LV mass was calculated and indexed according to body surface area and height. Left atrial (LA) and Right atrial (RA) size were also measured by major and minor dimension. Relative wall thickness (RWT) was derived as the ratio between 2 multiplied posterior wall diastolic thickness and end-diastolic diameter. Pulsed wave Doppler mitral velocity curves were obtained from the A4C view by positioning sample volume between the tips of the mitral valve leaflets in diastole. From mitral velocity tracings, peak early (E) and late (A) transmitral flow velocities, their ratio E/A, and E-wave deceleration time (EDT) were measured accordingly. From A4C view, tissue Doppler longitudinal velocities were recorded with the sample volume placed at the junction between LV wall (medial and lateral) and the mitral annulus. The ratio of mitral E peak velocity and averaged ratio of mitral to myocardial early velocities (E/e’) was calculated. The peak tricuspid regurgitation (TR) velocity was measured from the maximal velocity of tricuspid Doppler regurgitant jet. To derive stroke volume and cardiac output using Doppler method, continuity equation at LV outflow tract and velocity time integral were used.<sup>7,9,10</sup>

**Statistical Analyses:** Statistical analyses were performed using IBM SPSS Statistics 25.0. Data are considered significantly different if  $p < 0.05$ . Continuous variables, presented as mean  $\pm$  SD, were evaluated for normal distribution and compared using the ANOVA test, as appropriate. The correlation was evaluated with Spearman Rho analysis followed by multiple stepwise linear regression test to determine Beta Coefficient and R-square.

**Findings:**

**Demography of HHD Patients:** The echocardiographic finding was obtained from 50 HHD patients with demography as follow:

**Table 1: Characteristic of the HHD patients**

No	Description	n (%) or mean±SD
1.	Age (years)	60.34±9.83
2.	Gender	
	a. Male	13 (26%)
	b. Female	37 (74%)
3.	Body Height (cm)	155 ± 6.24
4.	Body Weight (kg)	62.63 ± 11.88
	Weigh Classification	
	a. Normoweight	24 (48%)
	b. Overweight	18 (36%)
	c. Obese	8 (16%)
6.	Systolic Blood Pressure	137.5 ± 24.35
7.	Diastolic Blood Pressure	80.0 ± 7.56

Echo cardiographic Findings from HHD Patients

**Table 2: Significant Difference in Echocardiographic Findings of HHD patients**

No	Description	BMI < 25	25 ≤ BMI<30	BMI >30
1.	LA Major	4.55±0.71 <sup>b</sup>	5.10±0.69 <sup>a</sup>	4.93±0.29
2.	RA Major	3.92±0.69 <sup>b,c</sup>	4.35±0.59 <sup>a</sup>	4.52±0.25 <sup>a</sup>
3.	Ejection Fraction	64.3±3.67	66.51±4.01 <sup>c</sup>	62.12±0.98 <sup>a,b</sup>
4.	LVD Mass	140.21±36.58 <sup>c</sup>	161.59±39.61	194.93±58.05 <sup>a</sup>
5.	LVS Mass	126.02±29.39 <sup>c</sup>	140.77±41.91	173.68±46.29 <sup>a</sup>
6.	LVSI Dopp	50.36±6.76 <sup>b</sup>	44.15±10.32 <sup>a</sup>	44.30±7.54
7.	LVPWD	1.00±0.14 <sup>c</sup>	1.11±0.21	1.29±0.35 <sup>a</sup>
8.	LVPWS	1.39±0.15 <sup>c</sup>	1.49±0.22 <sup>c</sup>	1.71±0.36 <sup>a,b</sup>

Comparison of the echocardiographic finding of normoweight (BMI<25), overweight (25 ≤ BMI<30), and obese (BMI >30) patient with HHD. Different annotation showed a significant difference (p<0.05) if compared with normoweight (a), overweight (b), obese (c).

As shown in Table 2 above, Significant difference was observed between normoweight and overweight patient in LA Major, RA Major, and LVSI Dopp (p<0.05). Comparison between normoweight and the obese patient showed a significant difference in RA Major, LVD mass, LVS mass, LVPWD,

and LWPWS (p<0.05). Comparison between overweight and obesity only showed significant difference in Ejection Fraction and LVPWS (p<0.05).

**Table 3: Correlation Between BMI with Echocardiographic Findings of HHD patients**

No	Description	Correlation	Beta Coefficient	R- Square
1.	LA Major	0.335*	0.310*	0.055
2.	RA Major	0.371*	0.359*	0.111
3.	Ejection Fraction	-		-
4.	LVD Mass	0.341*	0.393**	0.137
5.	LVS Mass	0.303*	0.362*	0.113
6.	LVSI Dopp	-0.376*	-0.313*	0.079
7.	LVPWD	0.369**	0.403**	0.145
8.	LVPWS	0.391**	0.401**	0.143

Annotation \* showed significance at p<0.05 and \*\* showed significance at p<0.01

As shown in table 3 above, Positive correlation was shown between different grades of BMI with LA Major, RA Major, LVD Mass, LVS Mass, LVPWD, and LVPWS. Inverse correlations can be observed only on LVSI.

## Discussion

Obesity induces several modifications in cardiac structure and function, which are associated with hemodynamic volume overload. Atrial and ventricular remodeling is common in obese patients, and this pathophysiological change plays a pivotal role in atrial and ventricular dysfunction.<sup>6</sup> In this research, we found that comparison between obese patients has significantly higher RA Major, LVD mass, LVS mass, LVPWD, and LVPWS. Previous longitudinal research has demonstrated that increasing BMI for 5 units from normoweight patient in the 4 years, can significantly increase the LA and LV compared to patient without increased BMI. Other cross-sectional studies also demonstrated that obesity and greater BMI are correlated with the larger LA dimensions.<sup>11</sup> Previous research also showed that patient with lower BMI (BMI <18.5) will also followed by significantly lower LVMI and smaller LV mass.<sup>12</sup> This suggested that atrial and ventricular dimension are increased in the HHD patient as BMI grades increased.

Correlation test also showed that different grades of BMI are positively correlated with LA Major, RA Major, LVD Mass, LVS Mass, LVPWD and LVPWS, suggesting that higher BMI grades will affect the volume of the left atrium, right atrium and left ventricle. Additionally it will also affect the systolic and diastolic function of left ventricle. Previous research also showed similar finding, which found a linear correlation between increased LV mass (g/m<sup>2</sup>) with BMI.<sup>13</sup> We analysed the literature in order to provide a comprehensive information on the left-ventricular structural changes, as assessed by echocardiography, associated to obesity. DESIGN: A literature search using the keywords 'left ventricle', 'left-ventricular hypertrophy', 'cardiac hypertrophy', 'obesity', 'hypertension' and 'echocardiography' was performed in order to identify relevant papers. Full articles published in English language in the past 12 years reporting studies in adult obese individuals were considered. Results: A total of 22 studies including 5486 obese individuals were considered. Overall, in the pooled obese population, prevalence of LVH, defined by 12 criteria, was 56.0% (range 20.0-85.0%). It was also

shown that increased BMI is related to both LV systolic and diastolic dysfunction.<sup>6</sup> However, another study showed that obesity might not follow by increasing the LV Mass if the obesity is followed by confounding disease, which can alter the hypertrophic progression such as myocardial infarction.<sup>14</sup> This suggested that in the patient with HHD, increasing BMI is associated with atrial and ventricular enlargement and HHD may not alter the hypertrophic progression of the heart muscle.

There are several limitations to our findings. Firstly, obesity was only measured through BMI rather than the direct measurement of central obesity, such as abdominal circumference or waist and hip circumference. While many studies have shown that central obesity measurement is more robust predictors of cardiovascular outcomes, this suggested that more detailed metrics of central adiposity will be important to be considered in future studies.

Secondly, our sample size was limited and not equally distributed between underweight, normoweight, overweight, and obese which might affect lack of significance in cardiac dimension measured through echocardiography. More samples with better distribution among the BMI grades would be beneficial for future research. Thirdly, as the data only derived from single cardiology center in urban area, the data may not be representative or generalizable to other populations

## Conclusion

BMI grades is associated with the functional and structural changes such as LA Major, RA Major, LVD Mass, LVS Mass, LVPWD and LVPWS in the heart of HHD patients.

**Conflict of Interest:** The authors declare no conflict of interest

**Source of Funding:** This research received no external funding

**Ethical Clearance:** The research was conducted in accordance with the Helsinki declaration of 1975 as revised in 2000. All participating patient has signed written informed consent. The study protocol has been approved by the local ethics committee. Data which shows patient personal information was omitted.

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# Correction of the Manifestations of Attention Deficit Hyperactivity Disorder in Primary School Children

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## Abstract

**Context:** Currently, attention deficit hyperactivity disorder remains very common among children. The ongoing attempts to correct this condition, including using an integrated approach through the use of several individually selected method at once, have not yet yielded satisfactory results. In the course of the study, the correctional possibilities of the author's methodology of teaching chess for children aged 7-9 years with attention deficit hyperactivity disorder were evaluated. The technique turned out to be effective due to the integrated use of multimedia accompaniment and special techniques for switching the attention of children during classes. It is established that the author's technique helps to reduce the severity of symptoms in children with attention deficit hyperactivity disorder. Semi-annual classes provided in all cases the elimination of existing violations and the achievement in children of a balance of excitation and inhibition in the cerebral cortex during the development of a game of chess according to the author's method.

**Keywords:** *Attention deficit hyperactivity disorder, learning to play chess, children, primary school age, chess, inclusive education.*

## Introduction

Living organisms inhabiting the planet, despite the serious successes of modern science, remain heavily burdened by various pathologies<sup>1</sup>. This is equally true for wildlife, productive animals<sup>2</sup> and humans<sup>3</sup>. Despite the increased attention of science and practice of medicine to humans, significant pathological burden still remains at all ages and in all countries<sup>4</sup>. It significantly reduces the quality of life and can shorten its upcoming duration<sup>5</sup>. One of the most common pathological conditions in the children's population remains attention deficit hyperactivity disorder. The frequency of this syndrome

in children reaches 18%. Its main symptoms are impaired attention and impulsiveness due to a lack of control over behavior. In the absence of adequate treatment, attention deficit hyperactivity disorder subsequently leads to a violation of social and emotional development and often to associative behavior<sup>6</sup>.

Modern science is actively seeking approaches to the correction of attention deficit hyperactivity disorder. To achieve a good effect in such children, it is customary to use an integrated approach to correction through the use of several individually selected method at once<sup>7</sup>.

In mild cases of attention deficit hyperactivity disorder, children seek to develop creative abilities in order to correct them. To this end, children with this syndrome often use chess training programs adapted to their capabilities<sup>8</sup>. This program allows you to adjust the condition of such children by providing them with information in small, logically completed blocks (10-15 minutes each). Pauses between them are filled with physical activity, often in the form of outdoor games using chess attributes<sup>9</sup>. However, the development

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of such programs for children with attention deficit hyperactivity disorder is not complete and there is a need to increase their effectiveness, which requires further research.

The purpose of the study is to assess the dynamics of the state of children with attention deficit disorder and hyperactivity using the author's methodology of teaching the game of chess.

### Material and Research Method

The conduction of the research was approved by the local Ethics Committee of the Russian State Social University in May, 15<sup>th</sup>, 2018 (Record №7).

The study was conducted in 2017-2018 on the basis of a chess school named after A.E. Karpov Gymnasium №16 of the city of Mytishchi, Moscow Region, Russia. The study involved 16 boys of 7-9 years old with a diagnosis of attention deficit hyperactivity disorder.

All examined for the purpose of correcting attention deficit hyperactivity disorder underwent six months of training in the basics of the game of chess according to the author's methodology. Its application was aimed at the development of basic mental characteristics: attention, memory, thinking; imagination, creativity, perseverance, determination and independence in decision making.

Classes were held twice a week for an hour in groups of 6 people. These groups were formed by age, taking into account the psychological characteristics of each child. Within an hour of being in a group, each child was immersed in a developing learning environment with the help of individually adapted for the whole group of developing techniques of playing chess. This ensured

the achievement of the maximum, long-lasting positive trace in the emotional sphere of children.

At the beginning of each lesson, with the help of an author's audio recording of chess in the form of a song in combination with a video collage (vivid entertaining chess pictures and photographs), children's attention was switched to chess lessons. As a result, the children reflexively developed an attitude toward the training process. During the lesson, techniques were used that smoothly switched the attention of children from one type of activity to another.

The dynamics of the condition of children was evaluated using a number of method. Emotional stability with the determination of the integral indicator of a vegetative response was recorded by the method of Suvorova V.V.<sup>10</sup>. Identification of the degree of anxiety was carried out on a scale of situational and personal anxiety Spilberger-Khanin<sup>11</sup>. Express diagnostics of the properties of the nervous system by psychomotor indices was determined by the method of the tapping test of E. P. Ilyin<sup>12</sup>. Assessment of volitional self-control was carried out according to the method of A.G. Zverkova, E.V. Eidman<sup>13</sup>. The degree of social normalization and organization was revealed according to the method of Kettel's multifactorial personality questionnaire (16-PF)<sup>14</sup>. The mathematical processing of the results with the calculation of the student criterion is applied.

### Research Results and Discussion

The results of the study of the considered characteristics of those examined with attention deficit hyperactivity disorder during their learning to play chess are presented in table 1.

**Table 1: Dynamics of personality parameters of children with attention deficit hyperactivity disorder during learning to play chess**

№	Registered indicators	Initial data	Level	At the end of observation	Level
1	Emotional stability, points	3.02±0.64	Low	3.62±0.46*	Average
2	The degree of anxiety, points	3.55±0.50	Average	3.12±0.42*	Low
3	The presence of internal tension, points	3.28±0.39	Average	2.88±0.35*	Low
4	The level of social self-control, points	1.91±0.43	Low	3.52±0.38**	Average
5	The degree of social organization, points	2.66±0.27	Low	3.94±0.31**	Average

**Legend:** reliability of dynamics during observation \* – p<0.05, \*\* – p<0.01.

When taken under observation in children with attention deficit hyperactivity disorder, low emotional stability, an average degree of anxiety, and an average severity of internal tension were noted. This was accompanied in their initial state by a low level of social self-control and a low degree of social organization.

As a result of learning to play chess, children with attention deficit hyperactivity disorder have shown significant progress in mastering chess and the school curriculum. Regular classes in the game of chess ensured six months later in children with attention deficit hyperactivity disorder positive changes in all the parameters taken into account. All examined persons managed to increase emotional stability by 19.9%, taking it to an average level. Moreover, they experienced a decrease in the degree of anxiety from medium to low (by 13.8%). This was accompanied by a decrease of 13.9% in the degree of internal tension, which ensured its exit to a low level. Regular playing the game of chess according to the author's method also ensured that the children observed had an increase to the average level of their social self-control (increase by 84.3%) and the degree of their social organization (increase by 48.1%).

Children with manifestations of attention deficit hyperactivity disorder are always at a low level of self-control, there is low productivity of cognitive processes and their high overall emotionality. They almost never have the presence of life strategies focused on solving existing problems, and almost always there is a tendency to avoid problems and social indifference<sup>15</sup>.

In many countries of the world, psychostimulants are most widely used in the treatment of attention deficit hyperactivity disorder. The effect of these psychostimulating agents is based on an increase in the content of dopamine and norepinephrine. Despite the large number of studies on the use of these psychostimulants in the treatment of attention deficit hyperactivity disorder, this issue is still accompanied by discussions about the likelihood of side effects<sup>16</sup>.

In Russia, nootropic drugs have traditionally been used to treat attention deficit hyperactivity disorder. In the presence of attention deficit hyperactivity disorder accompanying the disorder, tics, tranquilizers are allowed<sup>17</sup>.

The generally accepted position is that the treatment of attention deficit hyperactivity disorder should be comprehensive, that is, include both drug therapy and

psychotherapeutic method. The leading link in the psychocorrection of children with attention deficit hyperactivity disorder is often considered changes in the behavior of adults - parents and teachers, with the replacement of non-adaptive approaches to their children with adaptive ones<sup>15,17</sup>.

Behavioral psychotherapy method are often used to change children's behavior. Its basis is a reward for the required behavior and punishment for the wrong<sup>14</sup>.

The author has developed a methodology for treating children with attention deficit hyperactivity disorder by teaching chess.

The mechanism of teaching a game of chess is the directed activation of nonspecific activating systems of the brain and the intensification of the processes of morphofunctional development of immature elements of the cortex due to the normalization of neurodynamics. Apparently, this leads to a decrease in the degree of functional immaturity of the brain<sup>18</sup>. Such treatment allows, in the practical absence of undesirable side effects, to directionally change the functional state of the brain. The achieved results can also be regarded as a consequence of the stimulating and at the same time balancing effect of the game of chess on the author's technique on the brain. Apparently, the upcoming effect is also associated with stimulation of energy exchange in the cerebral cortex and in the subcortical nuclei<sup>19</sup>, as well as with balancing the number of inhibitory and activating mediators formed and synaptically ejected in all zones of the cortex<sup>20</sup>.

Apparently, the basis of the obtained results is such an important factor as the universal ability to morphofunctional plasticity inherent in the cerebral cortex. Many facts indicate a high plasticity of sensory functions, their ability to change their functional characteristics under the influence of training and exercises. By themselves, these facts indicate the presence of a deep interdependence between the two main mechanisms of higher nervous activity: analyzers and temporary connections. The facts of the exercise of sensory functions indicate that the development of conditioned reflexes from the analyzer increases its efficiency, makes the brain more adapted to various conditions of the physical and social environment<sup>16, 18</sup>.

Hemispheric connections between different areas of the brain, which begin to work actively during the learning of a game of chess, are even more plastic than



the intrahemispheric ones. Unlike the former, they are more inherent in individual characteristics, which are very closely related not only to cognitive abilities, but also to the nature of the activity performed. As a training effect on the brain, chess is considered the most physiological, “soft” and effective<sup>21</sup>.

The increase in the adaptive capabilities of the cortex of the children observed in the study was manifested in an increase in their academic performance at school and in their receipt of sports categories in chess.

As an illustration of the effectiveness of the author’s methodology used in the study, examples of the dynamics of the considered indicators in children with attention deficit hyperactivity disorder are given.

1. Denis P. began studying chess in the author’s technique at the age of 7. At the time of the start of classes, the child was diagnosed with attention deficit hyperactivity disorder. Initially, the child had low emotional stability (2.8 points), average anxiety (3.4 points), average internal stress (3.1 points) with low levels of social self-control (1.8 points) and social organization (2.5 point). After six months of training according to the author’s method, the child’s emotional stability (3.5 points), the degree of social self-control (3.3 points) and the severity of social organization (3.8 points) increased to an average level while lowering to a low level of anxiety (3, 0 points) and internal tension (2.9 points). In the qualification tournament, after six months of classes, the child fulfilled the norm of the 3rd youth category in chess.
2. Egor Y. 8 years old, diagnosed with attention deficit hyperactivity disorder. Initially, he had low emotional stability (2.7 points), average anxiety (3.5 points), average internal stress (3.2 points) with low levels of social self-control (1.7 points) and social organization (2.3 points). After six months of training according to the author’s method, the child showed an increase to an average level of emotional stability (3.6 points), the degree of social self-control (3.4 points) and the severity of social organization (3.9 points) while lowering to a low level of anxiety (2.9 points) and internal tension (2.8 points). In the qualification tournament, the child fulfilled the norm of the 2nd youth category in chess after six months of classes.
3. Dmitry P. 9 years old, diagnosed with attention

deficit hyperactivity disorder. Initially, he had low emotional stability (2.6 points), average anxiety (3.6 points), average internal stress (3.0 points) with low levels of social self-control (1.9 points) and social organization (2.4 points). After six months of training according to the author’s method, the child’s emotional stability (3.7 points), the degree of social self-control (3.5 points) and the severity of social organization (4.0 points) increased to an average level while lowering to a low level of anxiety (3.0 points) and internal tension (2.7 points). In qualifying tournaments, the child fulfilled the norm of the 1st junior category in chess after six months of classes.

## Conclusion

In the course of the study, the correctional possibilities of the author’s methodology of teaching chess for children aged 7–9 years with attention deficit hyperactivity disorder were evaluated. The methodology turned out to be effective due to the integrated use of multimedia accompaniment and special techniques for switching the attention of the child during classes. It has been established that the author’s technique helps to reduce the severity of symptoms of attention deficit hyperactivity disorder in children. Semi-annual classes provided in all cases the elimination of the manifestations of the syndrome that the children had and the achievement of a balance of excitation and inhibition in the cerebral cortex during the development of the game of chess according to the author’s technique.

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# Functional Features of External Respiration in School Children of Adolescence, Long Suffering from Chronic Obstructive Bronchitis

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## Abstract

**Context:** In the modern world, chronic bronchitis is one of the most common diseases in childhood and adolescence that can stably degrade their quality of life. In this regard, an additional examination of patients in this category was carried out. The purpose of the work is to assess violations of the functional state of the external respiration system in adolescents suffering from chronic obstructive bronchitis. The study involved 42 adolescents 13-14 years old, suffering from at least 5 years of chronic obstructive bronchitis of moderate severity with no signs of respiratory failure. At the time of the examination, the disease was among the examined adolescents in a state of unstable remission. For adolescents with chronic obstructive bronchitis, a decrease in the vital capacity of the lungs and diameter of the bronchi of any caliber is characteristic. This inevitably leads them to a marked decrease in the functional capabilities of the external respiration apparatus. It became clear that early enough with this disease, the respiratory center becomes resistant to hypoxia and weakens the adaptive capabilities of the entire external respiration system. All identified violations lead in adolescents with chronic obstructive bronchitis to an increase in the functional weakness of their respiratory system and circulatory system, and, therefore, form a low resistance to hypoxia even at a young age.

**Keywords:** Respiratory system, bronchi, lungs, obstruction, chronic bronchitis, adolescents.

## Introduction

Ontogenesis of any organism implies its continuous interaction with the environment, which does not always positively affect<sup>1,2</sup>. All external influences on the

organism sometimes cause a whole series of genetically determined reactions in it<sup>3,4</sup>, aimed at adapting to the current conditions of existence<sup>5,6</sup>. Due to the severity of harmful environmental influences and the frequent imperfection of adaptation mechanisms and responses, various dysfunctions and sometimes pathological processes can occur in the body<sup>7,8</sup>.

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Often affected by the pathology in the human body are the cardiovascular system, the blood system and the respiratory system<sup>9</sup>. Being life support systems, they significantly support the overall viability of the mammalian organism<sup>10, 11</sup>. Moreover, in recent years there has been a clear increase in the number of various lung diseases, especially at a young and young age<sup>12,13</sup>.

Chronic obstructive bronchitis is currently one of the most common diseases in childhood and adolescence, capable of consistently worsening the quality of life of patients and their families, and in severe cases of pathology leading to disability. It is well established that chronic obstructive bronchitis is a chronic disease of predominantly inflammatory etiology. This disease always leads to changes in the sensitivity of the walls of the bronchi and the development of airway hyperresponsiveness<sup>14,15</sup>.

Despite the fairly widespread prevalence of chronic obstructive bronchitis in adolescents, the features of disorders in their external respiration system need to be clarified. For this reason, it was necessary to conduct additional examinations of patients in this category.

The purpose of the study was to assess impaired functional state of the external respiration system in adolescents suffering from chronic obstructive bronchitis.

### **Materials and Research Method**

The study was approved by the local ethics committee of the Russian State Social University on September 15, 2017 (protocol №11). The study was conducted on the basis of the Moscow City Children's Clinic №38 and the Russian State Social University in Moscow, Russia. The study involved 42 adolescents 13-14 years old, suffering from at least 5 years of chronic obstructive bronchitis of moderate severity with no signs of respiratory failure. At the time of the examination, the disease was in all teenagers in a state of unstable remission. The control group consisted of 20 adolescents of a similar age, clinically completely healthy.

The work was performed on the SMP-21/01- "R-D" spiograph produced by the Monitor scientific-production enterprise (Russia). A number of indicators were estimated from the spiogram: minute respiratory volume, lung vital capacity, maximum lung ventilation, inspiratory reserve volume, expiratory reserve volume, forced expiratory lung capacity, forced expiratory volume in 1 second, peak volumetric rate, maximum volumetric rate of 25%, 50% and 75% of the forced vital capacity of the lungs.

All adolescents underwent a functional test of Stange by determining the maximum possible time for holding the breath after a deep breath<sup>16</sup>.

All included in the study underwent a functional test of Genchi, determining the maximum possible time for breath holding on exhalation. After 3-5 minutes of rest in a sitting position, the examinees were offered to exhale and inhale completely, then exhale again and hold their breath<sup>16</sup>.

For a comprehensive assessment of the functional state of the cardiorespiratory system in the examined, the Skibinsky index was calculated. This indicator characterizes the overall functional state of the external respiration system and its resistance to hypoxia. The calculation of the Skibinsky index was carried out in the following way: vital lung capacity/100 × Stange test, s/heart rate. The results obtained during the calculation were evaluated on the following scale: less than 5 - very poor; 5-10 - unsatisfactory; 10-30 - satisfactory; 30-60 - good; 60 or more is very good.

The value of the chest excursion was measured using a centimeter tape, which was applied posteriorly at the level of the angles of the shoulder blades, and in front, above the mammary glands (in girls), then the difference between the maximum inspiration and expiration was calculated<sup>16</sup>.

The results were processed using mathematical statistics method using statistical packages of Microsoft Excel. The statistical processing performed included the calculation of the arithmetic mean value (M) and the error of the arithmetic mean value (m). To identify the statistical difference between the indicators in the group of patients and in the control group, t-student criterion was used.

### **Research Results and Discussion**

In adolescents suffering from chronic obstructive bronchitis, a significant violation of the indices of the function of external respiration was noted (Table 1).

**Table 1: Indicators of external respiration function in adolescents with obstructive bronchitis**

Estimated performance	Group of sick teenagers, n=42, M±m	Control group, n=20, M±m
Vital lung capacity, l	1.9±0.11	2.4±0.12 p<0.05
Forced vital capacity, l	1.7±0.09	2.3±0.17 p<0.01
Forced expiratory volume in 1 second, l	1.6±0.12	2.2±0.15 p<0.01
Minute breathing volume, l/min	12.3±0.43	10.1±0.45 p<0.05
Maximum ventilation, l / min	47.7±0.36	57.9±0.82 p<0.05
Peak space velocity, l/s	2.7±0.25	4.2±0.32 p<0.01
Maximum space velocity <sub>25</sub> , l/s	3.2±0.24	4.3±0.27 p<0.05
Maximum space velocity <sub>50</sub> , l/s	2.4±0.22	3.0±0.20 p<0.05
Maximum space velocity <sub>75</sub> , l/s	1.6±0.10	1.8±0.16 p<0.05
Stange Result, s	41.8±0.41	61.2±0.48 p<0.01
Gencha test result, s	24.9±0.52	32.6±0.42 p<0.05
Chest excursion, sm	2.8±0.36	5.8±0.39 p<0.01
Skibinsky index, conventional units	28.5±0.72	61.3±0.71 p<0.01

**Legend:** p-significance of differences in indicators between patients and the control group.

Values of lung capacity in adolescents with chronic obstructive bronchitis were lower than the control group by 26.3%. The value of the forced vital capacity of the lungs was 35.3% lower than the control level. Moreover, in terms of forced expiratory volume for 1 second, the control group exceeded the same indicator in sick adolescents by 37.5%.

By comparing the indicators of minute volume of breathing, it was possible to establish its increase in adolescents with chronic obstructive bronchitis compared with the control group by 21.8%. In addition, in the group of patients, the maximum ventilation rate was reduced by 21.4%.

In the group of adolescents with chronic obstructive bronchitis, the peak volumetric rate was reduced by 55.5%. This was accompanied by a decrease of 34.4% in the average value of the maximum volumetric rate indicator at the level of 25% of the value of the forced vital capacity of the lungs. Their maximum volumetric rate, which is at the level of 50% and 75% of the value of the forced vital capacity, was reduced by 25.0% and 12.5%, respectively. In addition, in adolescents with chronic obstructive bronchitis, the indicators of hypoxic tests and the level of chest excursion were significantly lower than those in the control group. Moreover, the average Skibinsky index in sick adolescents was significantly lower than in the control group (2.1 times).

## Discussion

Now, chronic obstructive bronchitis in adolescents is a very common pathology. Often, it manifests itself already in childhood and progresses rapidly, sometimes leading to disability in young and adulthood<sup>17, 18</sup>.

It is known that the development of the pathological process in the respiratory system at any age has a very negative effect on the parameters of external respiration. Even in adolescence with chronic obstructive bronchitis, significant violations of the external respiration function are noted. It was shown in the work that this contingent of patients is characterized by a significant decrease in lung vital capacity<sup>19,20</sup>. In addition, their average indicator of forced vital capacity of the lungs is also significantly inferior to the level of control. Their growing bronchial obstruction inevitably leads to a decrease in the volume of forced expiration in 1 second. This was confirmed in the study. The authors revealed a decrease in maximum ventilation in adolescents with chronic obstructive bronchitis<sup>21,22</sup>. These changes should be considered as evidence of the low functionality of the external respiration apparatus in adolescents suffering from chronic obstructive bronchitis, as well as their weakening ability to mobilize respiratory function reserves<sup>23,24,25</sup>.

A comparison of the indices of minute respiratory volume in both observation groups showed its increase in adolescents with chronic obstructive bronchitis<sup>26,27</sup>.

Moreover, the found decrease in peak volume velocity in the group with chronic obstructive bronchitis proved that they had low functional capabilities of the respiratory muscles and reduced patency of the large-caliber bronchi. The reduced values of the maximum volumetric rate index found at 25% of the level of forced vital capacity of the lungs revealed in the work confirmed the development of progressive worsening of patency at the level of large bronchi in adolescents with chronic obstructive bronchitis<sup>28,29</sup>. The found decrease in chronic obstructive bronchitis of the average values of the maximum volumetric rate indicator at the level of 50% and 75% of the forced vital capacity of the lungs also proved in sick teenagers a decrease in the patency of their bronchi of medium and small caliber. Negative changes in their indices of hypoxic tests and a decrease in the volume of chest excursion proved the possibility of developing, in this pathology, a pronounced resistance of the respiratory center to hypoxia and weakening the adaptive capabilities of the entire external respiration system<sup>30,31</sup>. The decrease in the Skibinsky index found in the observation group should be regarded as a manifestation against the background of chronic obstructive bronchitis of functional weakness of the respiratory and circulatory organs, and, consequently, low resistance of their body to any hypoxic conditions<sup>32</sup>.

### Conclusion

In the modern world, chronic obstructive bronchitis remains one of the most common diseases of the respiratory system. The presence of this pathology changes in the sensitivity of the walls of the bronchi to external influences and the development of their hyperreactivity creates the basis for dysfunction of external respiration. These disorders occur already in adolescence and are sometimes manifested by significant violations of the function of external respiration. Such patients are characterized by a decrease in vital capacity of the lungs and diameter of the bronchi of any caliber. This leads already in adolescents suffering from chronic obstructive bronchitis to a marked decrease in the functional capabilities of the external respiration apparatus, as well as to a weakening ability to mobilize the reserves of the respiratory apparatus. Quite early in this disease, resistance of the respiratory center to hypoxia and a weakening of the adaptive capabilities of the entire external respiration system arise.

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# Specificity of the Neurotic Syndrome of Employees of Organizations with Professional Deformations

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## Abstract

**Context:** An in-depth understanding of the “neurotic syndrome” phenomenon. The specificity of the neurotic syndrome of employees of organizations with professional deformities has been determined. The main symptoms of the average level of neuroticism of employees with professional deformities are: asthenia, anxiety, obsession, tension, sleep disorders, psychasthenic disorders, tendency to neurotic depression, somatic disorders, fears, anxiety, difficulties in social contacts. The links between the general level of neuroticism and psychosomatic symptoms (asthenia, sleep disorders, somatic disorders, psychasthenic disorders), social symptoms (difficulties in social contacts), emotional symptoms (anxiety and tension, anxiety, obsession, neurotic depression, fears and phobias) have been revealed.

**Keywords:** *Neurosis, neurotic states, neurotic syndrome, neuroticism, professional deformities.*

## Introduction

The functioning of the organism is clearly determined by its genetic program<sup>1,2</sup> and environmental factors<sup>3,4</sup>, which can either increase its resistance<sup>5</sup> or cause various dysfunctions<sup>6,7</sup>. Prolonged exposure to adverse environmental factors almost always leads to the development of persistent disorders in various systems

of the body<sup>8,9</sup>. A very unfavorable result of negative environmental impacts is dysregulation in the central mechanisms supporting homeostasis<sup>10,11</sup>.

Professional deformations are changes in the personality structure of workers that occur during prolonged work experience and a tense production situation that adversely affect the professional activities and personal lives of specialists<sup>12,13,14</sup>.

**The main prerequisites for neurotic and professional deformations are:**

1. at the intellectual level (impulsive thinking, impaired judgment, indecision, increased distractibility, constant negative thoughts, loss of initiative, deterioration of concentration)<sup>15</sup>,

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2. at the motivational level (inconsistency of direction, the struggle of motives, the presence of intrapersonal conflict)<sup>16</sup>,
3. at the behavioral level (antisocial behavior, more intense smoking and alcohol consumption, finishing work at home, voice tremor, conservatism, speech disorder, neglect, low productivity, poor adaptability, poor distribution of time, loss of appetite or overeating, stubbornness)<sup>17</sup>,
4. at the physiological (psychosomatic) level (headaches, complaints of pain in the joints, itching, infections, skin rashes, indigestion, rapid and arrhythmic heartbeats, feeling of a lump in the throat, feeling of lack of air during inhalation)
5. on an emotional level (anxiety, depression, exhaustion, gloomy mood, job dissatisfaction, suspicion, irritability, reduced self-esteem, fussiness, decrease in life satisfaction, cynical and inappropriate humor, a feeling of estrangement)<sup>18</sup>.

The purpose of the study is to examine the specifics of the neurotic syndrome of employees of organizations with professional deformities.

### Materials and Method

The study involved 368 employees of organizations that have identified a level above the average and a high level of professional deformation (emotional and/or physical exhaustion, depersonalization, reduction of personal achievements).

#### Procedures for Diagnosing Professional Deformities:

1. "Maslach burnout inventory (MBI)", authors – C. Maslach & S. Jackson<sup>19</sup>; The author of an adapted version of the questionnaire - N.E. Vodopyanova<sup>20,21</sup>;
2. modification of the Burnout Inventory (Maslach burnout inventory (MBI)), authors — C. Maslach & S. Jackson<sup>22</sup>; the authors of the questionnaire modification - teachers of the Department of Psychology of Professional Activity of St. Petersburg State University<sup>23</sup>; the author of the interpretation of the results - OB Polyakova<sup>21,22</sup>;
3. the questionnaire "Definition of mental burnout", author - B.A. Farber<sup>24</sup>; Author of the adapted version - A.A. Rukavishnikov<sup>25</sup>.

#### Procedures for the Diagnosis of Neurotic Syndrome:

1. Do you have a neurosis? (authors: K. Heck and X. Hess; the goal is to carry out a preliminary rapid diagnosis of the presence or absence of neurosis in humans)<sup>26</sup>; (interpretation of results: 0-8 - low level (there is no neurosis), 9-16 - level below average (possible presence of neurosis), 17-24 - average level of neurosis, 25-32 - level of neurosis above average, 33-40 - high neurosis level);
2. Clinical questionnaire for identifying and assessing neurotic states<sup>27</sup>.
3. Symptomatic questionnaire (author - E. Aleksandrovich; the goal is to conduct a quantitative determination of the severity of the neurotic syndrome)<sup>28,29</sup>; (interpretation of results: scale "Fear, phobias": 0-18 points - low level, 19-38 points - level below average, 39-58 points - average level, 59-78 points - level above average, 79-98 points - high level; scale "Depressive disorders": 0-9 points - low level, 10-19 points - level below average, 20-29 points - average level, 30-39 points - level above average, 40-49 points - high level; scale "Anxiety, tension": 0-14 points - low level, 15-28 points - level below average, 29-42 points - average level, 43-56 points - level higher than average, 57-70 points - high level; scale "Sleep disturbance": 0-7 points - low level, 8-14 points - level below average, 15-21 points - average level, 22-28 points - level above average, 29-35 points - high level; scale "Hysterical disorders": 0-9 points - low level, 10-19 points - level below average, 20-29 points - average level, 30-39 points - level above average, 40-49 points - high level; scale "Neurasthenic disorders": 0-10 points - low level, 11-22 points - level below average, 23-33 points - average level, 34-45 points - level above average, 46-56 points - high level; "Sexual Disorders" scale: 0-9 points - low level, 10-19 points - level below average, 20-29 points - average level, 30-39 points - level above average, 40-49 points - high level; "Realization" scale: 0-10 points - low level, 11-22 points - level below average, 23-33 points - average level, 34-45 points - level above average, 46-56 points - high level; "Obsession" scale: 0-10 points - low level, 11-22 points - level below average, 23-33 points - average level, 34-45 points - level above average,

46-56 points - high level; scale "Difficulties in social contacts": 0-7 points - low level, 8-14 points - level below average, 15-21 points - average level, 22-28 points - level above average, 29-35 points - high level; scale "Hypochondriacal disorders": 0-8 points - low level, 9-16 points - level below average, 17-25 points - average level, 26-33 points - level above average, 34-42 points - high level; "Psychasthenic disorders" scale: 0-9 points - low level, 10-19 points - level below average, 20-29 points - medium level, 30-39 points - level above average, 40-49 points - high level.

To identify the statistical difference between the indicators in the group of patients and in the control group, t-student criterion was used.

### Results and Discussion

The results of the identification of symptoms of neurosis showed that the majority of employees of organizations with professional deformities (79%) determined the level above the average (the existing signs of neurotization complicate production and personal contacts and negatively affect the results of professional activity)<sup>30</sup>.

The results of the assessment of neurotic states showed that the majority of employees of organizations with professional deformities (60%) showed a level above average (there are signs of such neurotic states as: the presence of asthenia and the hysterical type of response, increased anxiety, manifestations of autonomic and obsessive-phobic disorders, a tendency to neurotic depression):

1. on a scale of anxiety, a high level dominates (48%), anxiety is constantly present in the lives and activities of employees with professional deformations;
2. on the scale of neurotic depression, a level above average was found (79%), there are symptoms of asthenia, depressed mood, sleep disorders, anxiety);
3. on the scale of asthenia, a high level (46%) is determined, at which fatigue and asthenic conditions are observed and experienced;
4. on the scale of hysterical type of response, the majority of employees with professional deformations (51%) found a level above the average (moderate hysterical manifestations become the category of hysterical type of response);

5. on the scale of obsessive-phobic disorders, the average level dominates (69%), which is characterized by manifestation of fears and obsessions, as well as vegetative and somatic disorders;
6. on the scale of vegetative disturbances, the level was found above the average (37%), there are dizziness, cough, digestive disorders).

**The results of determining the symptoms of neurotic syndrome showed that the average level (63%) with a brief experience of anxiety, tension and fears, periodic sleep disorders, unpleasant thoughts, ideas, memories, doubts, difficulties in social contacts:**

1. on the scale of fears and phobias, the average level (56%) is determined, at which fears and phobias periodically arise;
2. on the scale of depressive disorders, the majority of employees with professional deformities (55%) found a level below average, which is characterized by insomnia, loss of interest and pleasure from activity, prerequisites of depression, low mood);
3. on the scale of anxiety and tension, the average level dominates (64%) with frequent manifestations of anxiety and tension;
4. on a scale of sleep disturbance, the level was above average (68%), negative dreams, intermittent sleep, and difficulty falling asleep were observed;
5. on the scale of hysterical disorders, the level is determined below the average (51%), they show little effect, but the manipulative behavior, emotional feelings, emotional instability are alarming;
6. on the scale of neurasthenic disorders, the majority of employees with professional deformities found a level below the average (60%), moderate severity of impotence, hypersensitivity, irritability, mental exhaustion are observed;
7. on the scale of sexual dysfunction, the level below average dominates (48%), there are practically no complaints of sexual dysfunction;
8. on the scale of derealization, the average level was revealed (64%), which negatively affects the personal life more than the professional one;
9. on the scale of obsession, the average level is determined (54%), there are obsessive thoughts and actions;

10. on the scale of difficulties in social contacts, an average level was found (53%), there are conflicts, difficulties in communicating with other people, lack of communication, difficulties in achieving agreement, a feeling of loneliness<sup>31,32</sup>;
11. on the scale of hypochondriacal disorders, the level below average dominates (83%), there is almost no concern for one's health;
12. on the scale of psychasthenic disorders, an average level was revealed (75%), sometimes difficulties in decision-making, reduced mental energy, doubts are manifested;
13. on the scale of somatic disorders, the average level (80%) was determined, complaints about violations of the cardiovascular, respiratory system and gastrointestinal tract were voiced<sup>33</sup>.

The results of the study across the entire diagnostic unit showed that 67% of employees of organizations with professional deformities revealed an average level of the neurotic syndrome, which is characterized by neuroticism, anxiety, tension, fears, sleep disorders, obsessions, difficulties in social contacts, anxiety, asthenia, a tendency to neurotic depression, psychasthenic and somatic disorders.

### Conclusion

According to a study of the specificity of the neurotic syndrome, employees of organizations with professional deformations carried out a mathematical processing of the results using the Spearman's rank correlation coefficient ("SPSS Statistics" ("Statistical Package for the Social Sciences"), available on the IBM International Business Machines website) ("<https://www.ibm.com/ru-ru/?ar=1>"), access code: <https://www.ibm.com/ru-ru/products/spss-statistics>):

1. there is a significant relationship between the general level of neuroticism and asthenia (0.745 \*\*), anxiety and tension (0.984 \*\*), sleep disturbance (0.815 \*\*), somatic disorders (0.717 \*\*), anxiety (0.739 \*\*), difficulties in social contacts (0.836 \*\*);
2. here is a moderate connection between the general level of neuroticism and obsession (0.533 \*\*), neurotic depression (0.530 \*\*), psychasthenic disorders (0.605 \*\*), fears and phobias (0.548 \*\*).

Note: \*\* -  $p < 0.05$  ( $r = 0.27$ ).

For the purpose of psychological prevention and

psychological correction, it is necessary to use active forms of work (exercises and games: "Draw your own fear", "Compliments", "Technique to get out of apathy", "But", "Anxious sculpture"), continue diagnosis using the method "Diagnosis of anxiety and depression", "Diagnosis of the level of neuroticism", "Questionnaire for determining the level of neurotization and psychopathization".

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# The Physiological Reaction of the Surface Properties of Erythrocyte Membranes in Individuals who Previously Had Low Physical Activity at the Beginning of Regular Physical Training

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## Abstract

**Context:** The rheological parameters of red blood cells largely determine the processes of microcirculation and metabolism in all tissues. Assessing their characteristics in people with low physical activity, who began to regularly experience moderate physical activity, can help to more fully reveal the mechanisms for optimizing the micro-rheological properties of red blood cells. The observation group consisted of 45 men of the second adulthood, who began regular classes in the athletics section 3 times a week, who previously had low physical activity. The control group consisted of 42 men of the same age who regularly visited the athletics section 3 times a week for at least 10 years. Biochemical, hematological and statistical research method were applied. For 6 months of physical training, people who previously had low physical activity noted the elimination of the imbalance of arachidonic acid metabolites, lowering cholesterol and acyl hydroperoxides with an increase in their total phospholipids. After 6 months, these individuals showed an increase in red blood cells-discocytes by 8.2% with a decrease in the number of reversibly and irreversibly altered forms of red blood cells by 18.5% and 2.1 times, respectively. It is clear that for people of the second adulthood, who began regular physical activity after a long period of low physical activity, a gradual improvement in the cytoarchitectonic properties of red blood cells is characteristic, which improved their microcirculation processes and activated metabolism.

**Keywords:** *Second adulthood, prolonged low physical activity, red blood cells, surface properties of the membrane, athletics loads.*

## Introduction

Low physical activity is very common in modern people<sup>1,2</sup>. It causes the implementation of many variants

of a hereditary predisposition to pathology<sup>3,4</sup>, which was traced in various categories of the population of industrialized countries<sup>5,6</sup>. The consequences of low physical activity in humans manifest themselves at a young age, increasing the frequency of episodes of temporary disability due to weakening of the functional reserves of the whole organism and the gradual development of pre-pathological and pathological conditions<sup>7,8</sup>. With age, low physical activity leads to a worsening of many diseases and their chronic course<sup>9,10</sup>.

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It is noted that low physical activity adversely

affects many blood counts<sup>11</sup>. This is due to the fact that this condition causes the development of a number of functionally unfavorable changes in the body<sup>12,13</sup>. Low physical activity at a young age is accompanied by micro-rheological dysfunctions of some blood cells, which contributes to the onset of hypoxia in the tissues<sup>14</sup>. The chronic lack of oxygen arising under these conditions disrupts the course of anabolic processes throughout the body<sup>15</sup>. This situation creates the basis for the development of pathology in the internal organs<sup>16</sup> and contributes to the emergence of persistent vasospasm<sup>17</sup>. It was observed that against the background of low physical activity, conditions can often be created for increasing blood pressure, leading to the gradual development of arterial hypertension<sup>18</sup>. In addition, under these conditions, the rheological properties of the largest population of blood cells, erythrocytes, may worsen, which manifests itself already in young and first adulthood, aggravating the existing pathology and contributing to the formation of resistance to ongoing drug therapy<sup>19,20</sup>. The goal of the work is to assess the dynamics of the micro-rheological properties of red blood cells in people of the second adulthood with low physical activity and who started regular running exercises.

### Material and Method

The study was approved by the local ethics committee of the South-West State University of Kursk (Russia) on May 14, 2014 (protocol №7). All subjects examined gave written informed consent to participate in the study.

The observation group consisted of 45 men of the first adulthood (average age  $44.9 \pm 2.2$  years) who had not previously experienced regular physical exertion during their lives. All of them started regular running exercises 3 times a week for at least 1 hour. The control group consisted of 42 healthy men of the second adulthood (average age  $42.8 \pm 2.6$  years) who regularly trained for at least 10 years in the athletics section 3 times a week with a duration of at least 1 hour.

In the blood plasma of the examined patients, the content of the thromboxane A<sub>2</sub> metabolite - thromboxane B<sub>2</sub> and the prostacyclin metabolite - 6-keto-prostaglandin F<sub>1 $\alpha$</sub>  was determined by enzyme-linked immunosorbent assay using kits from Enzo Life science (USA).

After washing and resuspension in erythrocytes, cholesterol levels were quantified by enzymatic

colorimetric method using a set of Vital Diagnosticum (Russia) and total phospholipids by the amount of phosphorus contained in them<sup>21</sup>. The severity of the processes of intraerythrocytic lipid peroxidation was determined in washed and resuspended erythrocytes by the concentration of malondialdehyde in the reduction of thiobarbituric acid and by the number of acyl hydroperoxides<sup>22</sup>.

The amount of normal and altered forms of red blood cells in the blood was determined using light phase contrast microscopy.

In the observation group, the examination was carried out at the first examination, after 3 and 6 months. physical training. All persons in the control group were examined and examined once.

Statistical processing of the results was carried out by Student t-test.

### Results

In the blood of individuals with low physical activity, at the beginning of the observation, an imbalance of arachidonic acid metabolites was noted: the level of thromboxane B<sub>2</sub> in their plasma was increased compared to the control by 28.5% ( $p < 0.01$ ). At the same time, the level of its functional antagonist derivative, 6-keto-prostaglandin F<sub>1 $\alpha$</sub> , in individuals with low physical activity before exercise was reduced by 14.4% compared to the control group ( $p < 0.01$ ) (table).

In the erythrocyte membranes of individuals with low physical activity, before the start of regular running exercises, the cholesterol level exceeded the control by 13.8%, and the total phospholipids was lower than the control values by 14.1% ( $p < 0.01$ ). Moreover, in the erythrocytes of physically untrained individuals at the beginning of the observation, the number of acylhydroperoxides and malondialdehyde exceeded the similar indices in the control by 29.6% ( $p < 0.01$ ) and 38.9% ( $p < 0.01$ ), respectively.

At the beginning of the observation, those who had low physical activity showed a decrease of 12.2% in the blood of the content of erythrocyte-disc cells in comparison with the control group ( $p < 0.01$ ) (table). The number of reversibly and irreversibly altered forms of red blood cells in their blood was increased in comparison with the control by more than 48.4% and 2.5 times, respectively ( $p < 0.01$ ).



In the blood of people who previously had low physical activity and started regular running exercises, a decrease in the severity of arachidonic acid metabolites was noted: the level of thromboxane B2 in their plasma during the observation period decreased by 3,6 months by 5.6%, by 6.7 months by 10.7% ( $p < 0.05$ ). At the same time, the concentration of its functional antagonist derivative, 6-keto-prostaglandin F1 $\alpha$  in the observation group increased compared with the start of observation for 3 months by 4.1%, for 6 months by 12.2% ( $p < 0.05$ ).

In the erythrocyte membranes of individuals of the observation group, against the background of their physical exertion, a decrease in cholesterol level by 3.9% after 3 months and by 10.3% after 6 months of observation was noted. This was accompanied by an increase in their total phospholipids by 3.1% and 10.9% ( $p < 0.05$ ), during these periods, respectively. At the same time, the decrease in acyl hydroperoxides (by 8.6% by 3 months and by 19.9% ( $p < 0.01$ ) by 6 months) and malondialdehyde after 3 months of physical training by 11.8% was found in red blood cells of people who started physical training ( $p < 0.05$ ), after 6 months by 24.3% ( $p < 0.01$ ).

In individuals who began to experience regular physical activity, there was an increase in the blood percentage of erythrocyte-discocytes in comparison with the start of observation (after 3 months by 3.6%, after 6 months by 9.5%,  $p < 0.05$ ) (table). The number of reversibly and irreversibly altered forms of red blood cells in the blood of individuals of the observation group gradually decreased by 18.5% ( $p < 0.01$ ) and 2.1 times ( $p < 0.01$ ), respectively.

## Discussion

Long-term maintenance of a physiological optimum in the human body and its effective healing is possible only with rational, regular physical activity<sup>23</sup>. It has long been noted that low physical activity can cause pre-pathological conditions and enhance the existing pathology, sometimes drastically weakening the body<sup>24</sup>.

The excess products of lipid peroxidation in red blood cells causes rearrangements of the membranes of these cells, which impairs their function<sup>25</sup>. This is exacerbated by the development of low lipid imbalance in the erythrocyte membranes, which further contributes to the deterioration of the functioning of these blood cells<sup>26</sup>. The emerging changes in the amount and ratio of phospholipids and cholesterol in their membranes are

apparently functionally disadvantageous. They violate the selective permeability and viscosity of the membrane in red blood cells and adversely affect membrane-bound proteins as a result of the modification of their secondary structure.

A significant increase in the number of reversibly altered red blood cells and an increase in their irreversibly altered forms inevitably lead to an increase in the number of red blood cells in the blood of these people and difficulty in blood flow.

In the vascular wall of individuals with low physical activity, the synthesis of biologically active substances that can affect red blood cells decreases. Thus, the intensification of the formation of thromboxane and the weakening of the production of its functional antagonist prostacyclin, noted in the observation group, creates an imbalance of arachidonic acid metabolites. The erythrocyte micro-rheological dysfunctions formed under these conditions can themselves negatively affect the microcirculation processes and weaken trophism in the vessel walls and the production of disaggregants in them.

To improve this situation, the body in the present study was assigned regular, feasible athletics physical activity to people with low physical activity. Against their background, the examined had a reduction in the number of lipid peroxidation products in red blood cells, which helped to optimize the state of the membranes of these cells. The effect was enhanced during the increase in physical activity by the positive dynamics of the lipid composition of erythrocyte membranes, which positively affects the functioning of these blood cells<sup>27</sup>. Positive changes in the amount and ratio of phospholipids and cholesterol in their membranes were functionally advantageous and brought the selective permeability and viscosity of their membranes closer to the optimum in red blood cells, and also improved the state of the secondary structure of membrane-bound proteins of a significant part of red blood cells.

As the study showed, the beginning of regular physical exertion in people who previously had a low physical activity for a long time is characterized by a decrease in their blood levels of reversibly and irreversibly altered forms of red blood cells due to a tendency to an increase in the number of their discoid forms. At the same time, a decrease in the number of reversibly altered red blood cells and a decrease in their

irreversibly altered forms led to a decrease in the number of red blood cells in the blood of these people and a decrease in the degree of involvement of ever new red blood cells in them.

### Conclusion

Low physical activity is often accompanied by an increase in the number of superficially altered blood cells. This is especially often observed in red blood cells, which complicates their passage through the microvasculature and weakens the metabolic process. It was found that in people of the second adulthood who started regular running exercises after a long period of low physical activity, lipid peroxidation is inhibited in red blood cells. This is accompanied by a decrease in their blood number of altered forms of red blood cells, which contributes to the activation of trophism in the tissues. Given the incomplete recovery of micro-rheological disorders after 6 months physical training in people who previously had low physical activity, it seems rational to recommend that they continue to experience physical activity with monitoring the state of the cytoarchitectonics of their red blood cells.

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# Preventive Potential of Health Tourism in Terms of Preventing the Development of Arterial Hypertension

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## Abstract

**Context:** A very socially significant pathology in the modern world is arterial hypertension. The fight against it is built on the positions of prevention and rehabilitation, including using tourism. It is based on a change of scenery with the exception of monotonous living conditions and distraction from negative moments. Hiking and travel take people to a new landscape and climate environment, provide them with emotionally-colored contact with nature. The improvement of people with arterial hypertension by means of health tourism is largely based on the positive effect of natural health resources on their bodies in combination with recreational and health moments - air and sun baths, health path, herbal medicine, florotherapy. Normalization of blood pressure in people predisposed to arterial hypertension also often occurs in the conditions of camping trips. This is also facilitated by their diet with increased consumption of foods saturated with potassium and the restriction of salt.

**Keywords:** Health, tourism, prevention, arterial hypertension, blood pressure.

## Introduction

The state of prehypertension is more often recorded in men than in women, but not all researchers agree with this<sup>1,2</sup>. At the same time, most of them define arterial hypertension as the most common, very dangerous due to its complications and a very serious disease of the adult population<sup>3</sup>. Often, arterial hypertension can be a consequence of a disease and then it is called secondary hypertension<sup>4</sup>.

High blood pressure is a significant excess load on the heart, the result of which is the earlier wear of this organ<sup>5</sup>. Additional load on the heart leads from the beginning to muscle hypertrophy of the left heart, then it develops muscular dystrophy, resulting in heart failure<sup>6,7</sup>. Myocardial infarction and stroke also occurring in arterial hypertension further aggravate the clinical picture and exacerbate the immediate and long-term prognosis<sup>8,9</sup>.

One of the very effective options for the improvement of arterial hypertension is considered to be health tourism - a special type of tourism, designed to restore human strength spent as a result of labor<sup>10</sup>.

It is of great interest to consider the preventive possibility of health tourism in terms of reducing the likelihood of arterial hypertension in the presence of high normal blood pressure<sup>11</sup>.

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**Purpose:** to consider the possibilities of health tourism in terms of the prevention of arterial hypertension.

**The main factors in the development of arterial hypertension:** It is recognized that the etiology and pathogenesis of arterial hypertension are closely related to emotionally stressful situations. There is an assumption that arterial hypertension occurs in individuals with a special form of mental activity<sup>12</sup>.

The existence of a connection between psychoemotional states and the nature of pathological processes suggests that mechanisms that are repeated in response to negative emotional reactions can accelerate the course of the disease to which a person is predisposed<sup>13</sup>. A very common psychoemotional state in a person with arterial hypertension is anxiety and frustration<sup>14</sup>.

Anxiety is defined by researchers as an unmet need of a person. Often anxiety is defined as an experience of emotional discomfort associated with the expectation of ill-being, with a premonition of imminent danger<sup>15</sup>.

The most acute problem of anxiety is faced by child and adolescent psychology since the consolidation of anxiety as a personality trait leads to many diseases, including arterial hypertension. A similar negative effect on the body and contributing to the development of arterial hypertension is exerted by another negative psychoemotional state - frustration. This mental state of failure, arising in the presence of real or imaginary insurmountable obstacles to a goal, is a form of stress in the face of loss of adaptation<sup>16,17</sup>.

Common to frustration is, firstly, the presence of negative experiences associated with a significant situation, secondly, the presence of insurmountable obstacles (real or imaginary), and thirdly, negative experiences arise in response to events that have already occurred<sup>18</sup>. The most common reaction to frustration is the occurrence of aggressiveness, most often aimed at obstacles<sup>19</sup>. The state of frustration can leave an imprint on a person's entire life and health, since it is a holistic reaction of the body during adaptation to the environment<sup>20</sup>.

The prolonged course of arterial hypertension also influences a person's behavior in a situation of frustration, developing a whole range of protective mechanisms. Typically, patients with arterial hypertension present numerous complaints<sup>21</sup>. At the same time, the state of

health sharply worsens during emotional fluctuations<sup>22</sup>.

Arterial hypertension is a psychosomatic disorder, the course of which is largely determined by the characteristics of the emotional sphere of a sick person (excessively high demands on himself and others; desire for power, pedantry, punctuality)<sup>23</sup>. A typical psychological state of hypertensive patients is increased anxiety, anxiety, constant fear for their state of health and related disability<sup>24</sup>.

The pathogenesis of arterial hypertension is a combination of functional changes in various control loops and, usually, as a result, a complex of structural changes in affected organs and systems. Pathologies of the cardiovascular system are no exception. In the pathogenesis of arterial hypertension, regulatory disturbances and specific structural changes in the vascular wall of the arterial bed as a whole or in its separate basins are usually referred to<sup>25</sup>.

With arterial hypertension, an increase in stroke volume and total peripheral resistance occurs. Vasoconstriction and, consequently, an increase in peripheral resistance are caused by the activation of two neurohumoral systems - the renin-angiotensin-aldosterone system and the sympathetic nervous system, while their activation is mutually stimulating. An increase in sympathetic influences, in addition, leads to an increase in heart rate and myocardial contractility, which, in turn, leads to an increase in stroke volume<sup>26</sup>.

Of particular importance in the pathogenesis of arterial hypertension is the activation of tissue renin-angiotensin-aldosterone system, which causes the formation of left ventricular myocardial hypertrophy, glomerular hypertension, vascular smooth muscle hypertrophy. Activation of angiotensin receptors leads to activation of the sympathetic nervous system, causing an increase in the production of norepinephrine. The interaction of these two neurohumoral systems is carried out both by activating the central sympathetic ganglia in the brain, and by increasing the release of norepinephrine from the pre-sympathetic nerve endings. In turn, norepinephrine activates the  $\alpha$  receptors of blood vessels<sup>27</sup>.

**The possibilities of health tourism in lowering the risk of developing and inhibiting the progression of arterial hypertension:** Health tourism is a special type of tourism with the main goal - the restoration of the physical and mental forces of man. The main effect,

for which recreational tourism is used, is to increase the efficiency of tourism. Subjectively, the effect of increasing working capacity is expressed in the form of relieving fatigue, the appearance of a sense of vitality and a surge of strength, and objectively, in improving the functional and psycho-emotional states of a person. We can assume that tourism is an option for outdoor activities<sup>26</sup>.

A variant of health tourism is sports tourism. It is very useful due to the presence of unforced loads in it. Often there is a shift in health tourism towards rehab in the presence of beneficial climatic conditions and the use of tourism in the form of dosed walking and other activities that contribute to the treatment of cardiovascular diseases<sup>27</sup>. In some sources, recreational forms of the place of physical exercises are indicated, in others physical recreation finds expression in such terms and concepts as “mass physical culture”, “mass-improving”, “improving”, “production gymnastics”, “mass sport”, “Mass-improving”, “active rest”<sup>28</sup>.

An important preventive mechanism of tourism in relation to arterial hypertension is a change of scenery with the exception of everyday, monotonous tedious living conditions and distraction from the tiring negative effects of everyday life. Hiking takes a person with arterial hypertension to a new landscape-climatic environment, giving him close and emotional contact with nature<sup>29,30</sup>.

The healing process of people with arterial hypertension using the means of health tourism is largely based on the positive effect of natural health resources on their bodies in combination with recreational and healthful moments - air and sun baths, health path, herbal medicine, florotherapy<sup>31</sup>.

Air baths can be considered as one of the effective method of hardening, when freely moving air acts on a partially or completely naked body. The healing power of fresh air lies in its richness in oxygen, light ions, volatile and other substances useful to the body. This increases appetite, improves sleep, improves mood and normalizes blood pressure, accelerates blood flow, and reduces vascular tone<sup>32</sup>.

Sunbathing is also very beneficial for the skin and internal environment of the body. Under their influence, the hemoglobin level increases in the blood, and immunity to infectious diseases is activated. They also improve the activity of the nervous system and endocrine

glands, which stimulates the metabolism.

Elimination of the adverse effects of “muscle hunger” by means of physical culture increases the physical activity of the body. Hiking and water tourism are one of the effective means of developing general physical performance<sup>33</sup>.

There is no doubt that the so-called non-drug method of treatment are of particular importance in the healing of patients with prehypertension. First of all, these are measures aimed at correcting their lifestyle. Effective recommendations of dosed physical activity, focused on reducing excess body weight, smoking cessation, normalizing the diet and stably positive psychoemotional status. Normalization of blood pressure in prehypertension is promoted by a diet based on an increase in the consumption of foods saturated with potassium and the restriction of table salt<sup>34</sup>.

The optimal duration of the wellness trip, which makes it possible to lower blood pressure levels in patients, is not clear. There is only information in the literature on health tourism that it helps to stabilize the condition of patients. Therefore, when selecting a load for hypertensive patients during a camping trip, one should take into account not only the age of the patients, but also the duration of the disease, the severity of complications and the degree of arterial hypertension, approaching individually in many ways<sup>35</sup>.

Effective therapy of already formed arterial hypertension should be comprehensive and include, in addition to health tourism, several components: the use of drugs, hardening, daily dosed physical activity, strict adherence to a healthy regime of the day, and training the patient in self-control skills.

## Conclusion

In modern society, one of the most common pathologies is arterial hypertension. The fight against it should be based on prevention and rehabilitation, including the use of tourism. Its important action in relation to arterial hypertension is a change of scenery with the exception of everyday, tiring living conditions and distraction from negative everyday life. Hiking hikes transfer hypertension to a new landscape and climatic environment, ensure its close contact with nature. Normalization of blood pressure in people predisposed to arterial hypertension also always occurs in the conditions of tourist trips. It also contributes to a

diet with increased consumption of foods saturated with potassium and the restriction of salt.

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# Short Term Outcomes of Laparoscopic Complete Mesocolic Excision with Central Vascular Ligation for Right Colonic Cancer

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## Abstract

**Background:** Laparoscopic complete mesocolic excision with central vascular ligation, when performed in the right mesocolic plane, produces high quality surgical specimens.

Aim of the work: Assessment of feasibility, safety, and quality of surgical specimen after laparoscopic complete mesocolic excision with central vascular ligation in right colon.

**Patients and Method:** Fifty patients with right colonic cancer were assigned to receive laparoscopic complete mesocolic excision with central vascular ligation during the period from April, 2017 till June, 2019 and their data were prospectively collected.

**Results:** The average length of the ileocolic segment was  $26.67 \pm 2.10$  cm, the average distance from near bowel wall to high vascular tie was  $85.26 \pm 5.32$  mm, the average distance from tumor to high vascular tie was  $107.82 \pm 3.39$  mm, and Average number of LN harvest was number  $22.72 \pm 10.17$ .

**Conclusion:** Laparoscopic complete mesocolic excision with central vascular ligation procedure is associated with minimal operative blood loss, rapid recovery after operation, and short hospital stay and adequate number of harvested lymph nodes.

**Keywords:** *Outcome, laparoscopic, complete mesocolic.*

## Introduction

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and the fourth leading cause of cancer death worldwide <sup>1</sup>.

In 2009, Hohenberger et al <sup>2</sup> translated the concept of TME to colonic cancer, noting that traditionally more favorable oncologic results of colon neoplasia was eventually overtaken by rectal cancer and a more radical

surgical approach performed along embryonic planes of development with higher quality specimens, produce better oncologic outcome; thus, complete mesocolic excision (CME) with central vascular ligation (CVL) was theorized, standardized and eventually validated by several studies 3&4.

## Patients & Method

**Patients:** Fifty patients with right colonic cancer underwent laparoscopic complete mesocolic excision with central vascular ligation in Minia university hospital and El Salam oncology center during the period from April, 2017 till June, 2019 and their data were prospectively collected.

Written consents were taken from patients explaining the details of surgery, the advantages of

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minimally invasive surgery, and clarifying the possible complications of surgery and the possibility of conversion to open surgery.

All patients had preoperative examinations including chest radiographs, abdominal computed tomography, colonoscopy and biopsy, routine laboratory testing, and tumor markers. Patients were excluded from the analysis if they had metastasis, received emergency surgery due to acute intestinal obstruction or perforation, pregnant, or had severe cardiopulmonary disease.

**Surgical technique:** Surgical approach was conducted under general anesthesia. The patient is placed in supine position, the patient's left arm is tucked along his side and the right arm extended on an arm abroad. Creation of pneumoperitoneum using veress needle and insufflation of CO<sub>2</sub> is done until intrabdominal pressure reaches between 12- 14 mmHg. The first port is inserted using the optiview technique (12 mm umbilical port for the telescope) and then 3 other ports were inserted under direct vision (one 10 mm and two 5 mm) in the suprapubic region, left lower abdomen, and right upper abdomen respectively. Patients were placed in steep Trendelenburg with the right side elevated. Once the working space is created (by placing the greater omentum and transverse colon over the liver), a medial to lateral approach was used in all cases. The first step is always a thorough exploration of the abdominal cavity. The right colon was pulled upwards and toward the right lower quadrant, stretching and exposing the ileocolic pedicle (figure 1). The peritoneum was incised and the ileo-colic vessels were identified clipped and divided close to their origin. Mesenteric lymphadenectomy was conducted from the origin of ileo-colic vessels in a caudal direction along the superior mesenteric vein (SMV) to the origin of the Henle's gastro-colic trunk, and then toward the terminal ileum. Completion of devascularization, the right colic vessels were isolated and sectioned if present. Then pulling up the transverse colon, its mesentery was dissected from the root and the right branches of the middle colic vessels were identified and dissected by Endoclips. The right colon was then reflected medially from the hepatic flexure downward, dividing the peritoneal reflection in the right gutter. The specimens were exteriorized through a small Pfannenstiel incision after wound retraction using Alexis port. By using harmonic device enterotomies were done in both the small intestine and the colon. Intracorporeal side to side ileo-transverse anastomosis was done using

EndoGIA stapler (figure 2) and closure of enterotomy using 3/0 PDS sutures.



**Figure 1: identification of ileocolic pedicle.**



**Figure 2 : ileotransverse anastomosis using EndoGIA stapler.**

**Data Collection:** Patient data included gender, age, and tumor site and pathological type. Other data collected included operative time, intraoperative blood loss, conversion to laparotomy, length of postoperative hospital stay, and intraoperative and postoperative complications. Quality of surgical specimens assessed as follows: Plane of dissection (mesocolic, intramesocolic and muscularis propria), proximal & distal margins, length of ileocolic segment, distance from near bowel wall to high vascular tie (mm), area of mesentery (mm<sup>2</sup>), and number of LN harvest.

**Statistic Analysis:** The data collected were coded, tabulated, and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 25. Descriptive statistics were done for parametric quantitative data by mean  $\pm$  standard deviation, and for non-parametric quantitative data by median, while they were done for categorical data by number and percentage.

### Results

The study was conducted on 50 patients with right colonic cancer to whom laparoscopic resections were done. The age of this group of patients ranged from 37-65 years ( the mean age was 54.86±9.27 years).56 percent of our patients complained of medical disorders and were distributed as follow 22% diabetic, 22% hypertensive,6% cardiac,and 6% hepatic. The tumor site was 38% in the ascending colon, 34% in the caecum and 28% in the hepatic flexure.

The intraoperative data discussed in table 1 revealed that the conversion rate to open technique was 6%,operative time ranged from 123 minutes to 210 minutes ( the mean operative time was 156.44±21.30), intraoperative blood loss ranged from 50 ml to 200 ml (the mean blood loss was 95.80±45.68 ml).Finally no intraopeative complications such as vascular or visceral injury occurred in any of our patients.

Postoperative data discussed in table 2 shows that the mean postoperative oral intake was 3.52±0.64 days

. As regard to postoperative complications (which occurred in 11 patients),they are, 6 cases suffered from paralytic ileus and 5 cases suffered from urinary tract infection.

The parameters that determine the quality of surgical specimen were discussed in table 3. The plane of dissection that being the mesocolic plane in 94% and the intramesocolic in 6% . The proximal and distal margins of the resected ileocolic segment which were free in all excised specimens. The length of the ileocolic segment ranged from 23.5 cm to 31 cm (the average length was 26.67±2.10 cm).The distance from near bowel wall to high vascular tie ranged from 77 mm to 96 mm (the average distance was 85.26±5.32 mm). The distance from tumor to high vascular tie ranged from 101 mm to 114 mm (the average distance was 107.82±3.39 mm). Area of mesentery ranged from 15500 mm<sup>2</sup> to 19800 mm<sup>2</sup> (the average was 18810±1146.64). Number of LN harvest ranged from 12 to 60 (with an average number 22.72±10.17).

**Table 1: The intraoperative parameters and hospital stay duration of studied sample:**

Intraoperative parameters		
Conversion to open:	n (%)	3(6%)
Operative time(minutes)	Mean ±SD	156.44±21.30
	Median (range)	155(123-210)
Intraoperative blood loss(ml)	Mean ±SD	95.80±45.68
	Median (range)	85(50-200)
Hospital stay(days)	Mean ±SD	5.92±0.87
	Median (range)	6(5-8)
Intraoperative complications: n (%)	Vascular injury	0(0%)
	Visceral injury	0(0%)
Histologic type	Well differentiated	24(48%)
Adenocarcinoma: n (%)	Moderately differentiated	10(20%)
	Poorly differentiated	16(32%)

**Table 2: postoperative data of studied samples**

Postoperative follow up		Descriptive statistics
Postoperative oral intake	Mean ±SD Median (range)	3.52±0.64 3(3-5)
Postoperative complications: n (%)	Paralytic ileus	6(12%)
	Intramural bleeding	0(0%)
	Anastomotic leakage	0(0%)
	Port site infection	0(0%)
	Abdominal abscess	0(0%)
	Port site hernia	0(0%)

Postoperative follow up		Descriptive statistics
	Pneumonia	0(0%)
	UTI	5(10%)
	DVT	0(0%)
Recurrence:	N (%)	0(0%)
Perioperative mortality:	N (%)	0(0%)

**Table 3: Quality of surgical specimen:**

Variable		Descriptive statistics
Grade of plane of mesocolic dissection: n (%)	*mesocolic *intramesocolic *muscularis propria	47 (94%) 3(6%) 0(0%)
Proximal & distal margins: n (%)	Free	50 (100%)
Length of ileocolic segment (cm)	Mean ±SD	26.67±2.10
	Median (range)	26(23.5-31)
Distance from near bowel wall to	Mean ±SD	85.26±5.32
high vascular tie(mm)	Median (range)	84(77-96)
Distance from tumor to high	Mean ±SD	107.82±3.39
vascular tie(mm)	Median (range)	108(101-114)
Area of mesentery (mm <sup>2</sup> )	Mean ±SD	18810±1146.64
	Median (range)	19200 (15500-19800)
Number of LN Harvest	Mean ±SD	22.72±10.17
	Median (range)	21(12-60)
Number of positive LN	Mean ±SD	0.72±1.62
	Median (range)	0(0-5)

**Discussion**

Complete excision of the primitive dorsal mesentery along the anatomo-embryological and surgical planes by means of CME is now the standard of care for colonic cancers. Technical strategies for CME include two aspects: sharp separation of visceral and parietal fascia, and ligation at the root of central supply vessels and more radical lymph node dissection for improving oncological outcomes <sup>5</sup>. However, the right hemicolectomy is performed routinely worldwide, the feasibility and safety of complete mesocolic excision has recently been showed in open and laparoscopic surgeries <sup>6</sup>.

In our study, the mean age of patients (16 males and 34 females) was 54.86±9.27 years. According to a study done by L. m. siani et al 2015, the mean age of patients (75 males and 40 females with a male to female ratio of 1.8) was 65±1.3years <sup>7</sup>. while in a study done by Hossam et al 2019, the mean age of patients (14 males(46.7%) and 16(53.3%) females) was 58.33±5.88 years<sup>8</sup>. Jung et al 2018, in his study reported the mean age of patients (445 (44.1%) males and 565 (55.9%) females) was

60±11 years<sup>9</sup>.

In our study, the mean operating time was 156.44±21.30 minutes and intraoperative blood loss was 95.80±45.68 ml. According to a study by Hossam et al 2019, the mean operating time was 180.0±20.0 minutes, and intraoperative blood loss was 200.6±50.5 ml <sup>8</sup>, while in a study by jung et al 2018, the mean operating time was 165± 50 minutes <sup>9</sup>. IL Yong et al 2016 also reported operating time of 178 minutes, intraoperative blood loss was 149 ml <sup>10</sup>. Finally L. m. siani et al 2015 in his study reported, mean operative length of 179±39min <sup>7</sup>. Contrasting our results with other studies, our mean operating time was slightly lower compared to others.

The mean duration of hospital stay in our thesis was 5.92±0.87 days. IL Yong et al 2016 reported hospital stay of 11 days <sup>10</sup>. Hossam et al 2019 in his study reported hospital stay 4.40±0.910 days <sup>8</sup>. According to study done by Jung et al 2018, the mean duration of hospital stay was 9.3± 3.2 days <sup>9</sup>, while L. m. siani et al 2015 reported hospital stay duration of 10.5±1.9 days<sup>7</sup>. The

mean hospital stay in our thesis was even shorter than that of other studies except a study done by Hossam et al 2019. This can be attributed to the enhanced recovery program that was followed during the study. King et al., 2006 demonstrated with the standardized postoperative program in a randomized controlled trial that the patients who underwent laparoscopic resection was associated with 32% reduction of hospital stay<sup>11</sup>. Senagore et al., 2003 showed that with a standardized technique and a standardized postoperative care plan, a reduction of mean hospital stay of 2.9 days and a low morbidity of 6.6% could be achieved<sup>12</sup>. Thus the use of laparoscopic surgery and a standardized fast track postoperative protocol is likely the optimal treatment for patients with colorectal cancer.

There were no deaths in our study, also Jung et al 2018 reported no deaths in his study<sup>9</sup>. While L. m. siani et al 2015 reported postoperative mortality of 1.7% (2 patients)<sup>7</sup>. Eleven morbidities (22%) occurred in our thesis. Sixtth Patients (12%) complained of paralytic ileus and conservative management in the form of iv fluids, NGT insertion and NBM was done and they passed successfully. Five patients(10%) developed UTI who were managed by urinary antiseptics.

Overall complication rates after laparoscopic colon resection were evaluated in many trials. Hossam et al 2019 reported an incidence of complications following laparoscopic colon resections of 26.7%(8cases)<sup>8</sup>. Jung et al 2018 demonstrated a morbidity of 18.3% (125 cases) after laparoscopic resection for colon cancer<sup>9</sup>. L. m. siani et al 2015 reported a 22.6%(26 cases) incidence of postoperative complications following laparoscopic resection for patients with right colon cancer<sup>7</sup>.

Three conversions occurred in our thesis (6%),all of them because of extensive adhesions.

In our study,plane of dissection was mesocolic in 47 cases (94%) and intramesocolic in three cases (6%). The average number of harvested lymph nodes was  $22.72 \pm 10$ . Histological examination revealed that proximal and distal margins were free of microscopic disease. The length of the ileocolic segment was  $26.67 \pm 2.10$  cm. the distance from near bowel wall to high vascular tie was  $85.26 \pm 5.32$  mm. the distance from tumour to high vascular tie was  $107.82 \pm 3.39$  mm. Area of mesentery was  $18810 \pm 1146.64$  mm<sup>2</sup>.

Jung et al 2018 in his study reported that, the average number of harvested lymph nodes was  $25.7 \pm$

10.9. Histological examination revealed that proximal and distal margins were free. The length of the proximal and distal margins were  $15.1 \pm 9.7, 15.2 \pm 7.4$  cm respectively<sup>9</sup>.

According to a study done by L. m. siani et al 2015, Colonic resection was classified as mesocolic plane in 65.2% (75 cases), intramesocolic plane in 21.7% (25 cases) and muscularis propria plane in 13% (15 cases). For mesocolic plane of surgery, mean ileocolic segment length was  $23.5 \pm 3.7$  cm and resection margins were all free of microscopic disease; distance from the nearest bowel wall to high tie was  $83 \pm 7$  mm, distance from tumor and high tie was  $103 \pm 5$  mm, and area of mesentery was  $15.350 \pm 1.570$  mm<sup>2</sup>; mean lymph nodes harvested were  $29 \pm 5$ . For non-mesocolic (i.e. intramesocolic and muscularis propria) planes of resection, mean ileocolic segment length was  $21.3 \pm 2.5$  cm and resection margins were all free of microscopic disease; distance from the nearest bowel wall to high tie was  $67 \pm 5$  mm, distance from tumor and high tie was  $87 \pm 9$  mm, and area of mesentery was  $14.135 \pm 1.150$  mm<sup>2</sup>; mean lymph nodes harvested were  $19 \pm 7$ .<sup>7</sup>

## Conclusion

Laparoscopic complete mesocolic excision with central vascular ligation procedure is associated with minimal operative blood loss, rapid recovery after operation, and short hospital stay, high quality of surgical specimen and adequate number of harvested lymph nodes

This study was approved by the Institutional Ethics Committee of School of Medicine, Minia University, Egypt, and all patients gave informed consent before participation in this study. The study conducted in accordance with the ethical guidelines of the 1975 Declaration of Helsinki and International Conference on Harmonization Guidelines for Good Clinical Practice.

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# Comparative Study Between Inversion and Non Inversion of the Staple Line in LSG

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## Abstract

**Background:** Morbid obesity has become a big health problem due to its multiple co-morbidities. Bariatric surgery proved to be an effective way for management of morbid obesity and its co-morbidities. In recent years, sleeve gastrectomy (SG) evolved single-stage for treatment of morbid obesity.

**Aim of the Work:** To compare inversion and non inversion of staple line in LSG as regard: the percentage of leakage, percentage of bleeding, percentage of thromboembolism and percentage of infection complication. This comparative randomized study was conducted 40 morbidly obese patients operated upon for LSG 20 without inversion of staple line & 20 with inversion of staple line and are followed up afterwards to evaluate and postoperative leakage rate in the early six months in Surgery Department, Kasr El-Aini Hospital and Ahmed Maher Teaching Hospital in the period between August 2015 and August 2016.

**Results:** There is no statistically significant difference between group A (LSG without inversion of staple line) and group B (LSG with inversion of staple line) in age(range 23 to 60 years VS 19 to 60 years), mean BMI (49.49 VS 45.06), co morbidities, time of surgery (124 min VS 108 min) and complications which include:(bleeding,infection, leakage and thromboembolism).

**Conclusion:** laparoscopic SG is effective treatment for morbid obesity with accepted range of complications. Reinforcement of staple line has no significant impact on percentage of suture line bleeding or leakage or on the operative time or hospital stay. This technique can be restricted to special individual cases depending on the operative findings. However, more intense practice and wide range of cases are required for more precise assessment.

**Keywords:** *Bariatric surgery, Laparoscopy, Morbid obesity, Leakage, Sleeve gastrectomy, Weight loss.*

## Introduction

Obesity is known as an excess of body fat relative to lean body mass <sup>1</sup>.

LSG is developed first stage of duodenal with the intention to decrease risks of complex technique. Short

term follow up demonstrated give a better outcome in term of weight loss. Weight loss is comparable with the gastric bypass, with a% EWL of 65–70% achieved at 2 year follow-up <sup>2</sup>.

Gagner et al. reported leak rate with the use of buttressed sutures. Whilst the overall incidence was 2.1% which increased to 3.3% when buttressing the staple lines with bovine pericardium and lower when absorbable polymer membrane was used with an incidence of 1.09%<sup>3</sup>.

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**Aim of the Work:** To compare inversion and non inversion of staple line in LSG as regard:

1. The percentage of leakage
2. Percentage of bleeding
3. Percentage of thromboembolism
4. Percentage of infection complication

**Patients and Method:**

**Population of Study & Disease Condition:**

This comparative randomized study was conducted in Surgery Department, Kasr El-Aini Hospital and Ahmed Maher Teaching Hospital in the period between August 2015 and August 2016.

Patients who have BMIs of 40kg/m<sup>2</sup> or more, or between 35kg/m<sup>2</sup> and 40kg/m<sup>2</sup> with significant comorbidity.

**The Target Population Was Divided Into 2 Groups:** 40 patients divided into 2 groups

**Group A:** It included 20 morbidly obese patients who underwent LSG without inversion of the staple line.

**Group B:** It includes 20 morbidly obese patients who underwent LSG with inversion of the staple line

**Inclusion Criteria:** The subjects considered appropriate candidates for this study if they were:

1. Willing to give consent and comply with the evaluation and treatment schedule, are 18–65 years old (inclusive).
2. Patients who have BMIs of 40kg/m<sup>2</sup> or more, or between 35kg/m<sup>2</sup> and 40kg/m<sup>2</sup> with other significant disease that could be improved if they lost weight.
3. All appropriate non-surgical measures have been tried but have failed to achieve or maintain adequate clinically beneficial weight loss for at least six months.
4. Patients received management in a specialist obesity service.
5. Patients are generally fit for anesthesia and surgery.
6. Patients commit to the need for long-term follow up.

**Exclusion Criteria:**

**The Exclusion Criteria Included:**

1. Pregnancy or lactation .
2. A documented history of drug and/or supplements within 30 days.
3. Alcohol abuse within 2 years of the screening visit.
4. Previous malabsorptive or restrictive procedures performed for the treatment of obesity.
5. Any condition that would preclude compliance with the study.

**Methodology**

**All patients were subjected basically to the following:**

1. Written informed consent.
2. Full history taking.
3. Full clinical examination including pattern of obesity and weight, BMI measurement.
4. Preoperative investigations in the form of:
  - i. Complete blood count.
  - ii. Lipid profile, blood cholesterol and triglyceride assay.
  - iii. Liver and kidney functions tests.
  - iv. Blood glucose level.
  - v. Hormonal assay in selected patients (Cushing's disease or myxedema).
  - vi. Pulmonary function tests.
  - vii. Chest x-ray.
  - viii. Electrocardiogram.
  - ix. Abdominal ultrasound.
  - x. Upper gastrointestinal endoscopy.

**Preoperative preparation:**

1. The operation dates were recorded, with a note on the operative approach and duration of surgery.
2. Antibiotic prophylaxis in the form of intravenous injection of third generation cephalosporin 2 hours before operation.
3. Thromboprophylaxis in the form of low molecular weight heparin 2 hours before operations.



Arrangement for availability critical care bed if needed postoperatively

Operative technique:

1. After prophylactic antibiotics and general anaesthesia were administered, the patient was placed in the supine split-leg position.
2. Sequential compression boots were placed for DVT prophylaxis.
3. Five or six trocars were used for LSG.
4. The first step consisted of exploration of the entire intrabdominal cavity then we opened the gastrocolic ligament. Meticulous dissection was performed at the angle of His with full mobilization of the gastric fundus. The mobilization of the stomach continues dissecting the greater gastric curve toward the antrum up to 3-5 cm from the pylorus.
5. At this time a 36-Fr orogastric tube is inserted then stapler to greater curve started. methylene blue leaking test at the end of procedure
6. In selected group B inversion of staple line using polyglycolic acid 2/0 with rounded needle.

**Follow-Up Assessment:** Patients were followed up at regular intervals on the first week postoperatively and then at 1, 3, 6, 12 months, at each visit we recorded the following:

- 1) We measured BMI of the patient, and excess weight loss.
- 2) We took a full history and clinical examination of the patient after the procedure we assessed complications of surgery and resolution of comorbidities we asked about:
  1. Regurgitation of food and Gastro-esophageal reflux
  2. Gastritis, nausea and vomiting.
  3. Upper or lower gastrointestinal bleeding.
  4. Gastric obstruction.
  5. Dysphagia.
  6. Diarrhea or constipation.
  7. Abdominal pain.

8. Wound infection and fever.
9. Abnormal healing, hair loss and alopecia.
10. Psychological disturbance.
11. Failure to lose weight.
12. Obstructive sleep apnea.

**Statistical Analysis of the Results:** Data were statistically described in terms of mean  $\pm$  standard deviation ( $\pm$  SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using Mann Whitney *U* test for independent samples. For comparing categorical data, Chi square ( $\chi^2$ ) test was performed. Yates correction equation was used instead when the expected frequency is less than 5. *p* values less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

## Results

The present study included 40 morbidly obese fulfilled criteria of this study. Patients were divided into two groups A & B.

**Group A:** It included 20 morbidly obese patients who had LSG without inversion of the staple line.

**Group B:** It included 20 morbidly obese patients who had LSG with inversion of the staple line.

### Demographic data of the study group:

**Demographic data depend on age and BMI:** Mean age for patients group A 34.20years  $\pm$  8.16.with a range from 23 to 60 years. Age in B 32.95years  $\pm$  10.0 ranged 19 to 55 years with insignificant.

BMI of patients group A 49.494kg/m<sup>2</sup>  $\pm$  6.13with a range from 42.6 to 67.8 Kg/m<sup>2</sup>. Mean BMI for patientsgroup B 45.067g/m<sup>2</sup>  $\pm$  4.33with a range from 40.5 to 57.7 Kg/m<sup>2</sup> with insignificant.

**Sex distribution in both groups** There was no statistically significant difference as regard sex distribution between both groups.

**Table 1: Preoperative comorbidities in both groups**

Preoperative comorbidities	Group A	Group B
Diabetes mellitus	9	7
Hypertension	7	4
Obstructive sleep apnea	8	5
Arthritis	8	7

There was no statistically significant difference as regard preoperative comorbidities between both groups.

**Table 2: Operative time in both groups**

		Operative. Time
Group A	Mean	108.45
	N	20
	Std. Deviation	33.021
	Minimum	63
	Maximum	173
Group B	Mean	124.50
	N	20
	Std. Deviation	27.860
	Minimum	82
	Maximum	165
Total	Mean	116.48
	N	40
	Std. Deviation	31.231
	Minimum	63
	Maximum	173

P value 0.105

There was no statistically significant difference as regard operative time between both groups with a P-value of 0.105.

**Table 3: Postoperative complications in both groups**

Type of complications	Group A	Group B
Port site bleeding	1	1
Wound infection	1	2
DVT	0	1
Leak	1	0
Post op bleeding	1	0

Postoperative complications in patients group A had port site bleeding which was managed conservatively, one patient had wound infection which was managed by local wound care & antibiotics according to culture & sensitivity, one patients had postoperative internal bleeding which was managed conservatively with

packed RBC,s & fluid transfusion without surgical intervention, one patient had postoperative leakage which was managed with U/S guided pig tail drain and with mega stent insertion endoscopically. As regard postoperative complications of patients group B,one patient had left ileofemoral DVT approved with duplex and treated conservatively by anticoagulation, one patient had port site bleeding which stopped conservatively,twopatientshad wound infection which was managed by local wound care & antibiotics according to culture & sensitivity.

There was no mortality in both groups.

**Table 4: Post op. internal bleeding in both groups**

		Group A	Group B	
	Count	1	0	1
	% within Post op bleeding	100.0%	0.0%	100.0%
	% within Inversion	10.0%	0.0%	2.5%
Total	Count	20	20	40

P value 0.147

Although intraperitoneal bleeding occurred only in group A there was no statistically significant difference as regard postoperative bleeding between both groups with a P-value of 0.035

**Table 5: Post op leak in both groups**

Post op leak		Group A	Group B	
	Count	1	0	1
	% within Post op leak	100.0%	0.0%	100.0%
	% within Inversion	5.0%	0.0%	2.5%
Total	Count	20	20	40

P value 0.311

Although postoperative leakage occurred only in group A There was no statistically significant difference as regard postoperative leakage between both groups with a P-value of 0.311.

**Hospital stay in both groups:** There was no statistically significant difference as regard hospital stay between both groups with a P-value of 0.882

**Table 6: Excess weight loss in both groups.**

		<b>EBW loss%-3m</b>	<b>EBW loss%-6m</b>	<b>EBW loss%-1y</b>
Group A	Mean	33.149%	50.894%	67.306%
	N	20	20	20
	Minimum	18.4%	28.7%	41.4%
	Maximum	46.6%	67.3%	95.4%
Group B	Mean	33.567%	52.561%	69.443%
	N	20	20	20
	Minimum	16.0%	26.8%	40.2%
	Maximum	66.8%	81.2%	96.4%
Total	Mean	33.358%	51.727%	68.374%
	N	40	40	40
	Minimum	16.0%	26.8%	40.2%
	Maximum	66.8%	81.2%	96.4%

In this study we found that no significant differences regard to effect of both techniques on EWL% during first year.

### Discussion

Bariatric surgery is an effective way to treat morbid obesity and decrease the weight, or remission of comorbid, and ultimately a reduction of mortality<sup>4</sup>.

SG is a partial gastrectomy where the majority of curvature of stomach was removed. Antrum is divided 4 cm from the pylorus and a tubular stomach is fashioned around a bougie (32 to 40)<sup>5</sup>.

This thesis is a comparative prospective randomized controlled study between inversion and non-inversion of staple line in LSGas regard the percentage of leakage, percentage of bleeding, percentage of thromboembolism, and percentage of infection complication.

As regard demographic data in the study group, sex distribution in the study group showed that 28 morbidly obese patients were females and 12 morbidly obese patients were males. This indicated a higher frequency of morbidly obese patients in females as compared to males putting in mind that patients were selected randomizedly. This is in concordance with the W.H.O. where found not similar to developed centuries; obesity is prevalent among women and in urban areas in eastern land<sup>6</sup>.

According to age and BMI for patients there are no statistical significant difference between both groups.

As regards obesity related comorbidities in morbidly obese patients in the current study, were almost matched in both groups.

In the current study although inversion of staple line take a longer operative time (124 min vs 108 min) yet this was statistically insignificant results.

Inversion of staple line has no significant impact in hospital stay (4.7 days vs 4.8 days).

It can be concluded from the current study that no statistically significant difference between both groups as regard leakage, bleeding, thromboembolism and wound infection, both procedures were safe and almost having the same early postoperative complications. Leak rate in our study was 2.5%.

Prospective randomized evaluating three different ways of reinforcement (over sewing, absorbable buttress, thrombin matrix) reported similar results<sup>7</sup>.

Choi in a meta reported that, reinforced LSG lower bleeding than non-reinforced. Sub-group given lower incidence of bleeding than non-reinforced<sup>8</sup>.

In addition, inversion of staple line led to stricture of GS and leak through the tears caused by the sutures. Rogula et al.<sup>9</sup> reported that, inverting suture (Lambert's suture) improved strength and burst pressure of staple line found a positive effects on leak occurrence not similar to sutures are potentially dangerous, but evaluation was in vitro and in a small number of patients.

Two patients groups had underwent LSG, first LSG performed with a running absorbable suture placement at the staple line and second had suture was not placed, results shown more problems after reinforcement of the staple line. Dealing with possible leaks and hemorrhage of the staple line problematic after placement of the running suture<sup>10</sup>.

Study showed that both LSG with & without inversion of staple line have achieved a good reduction in the excess weight. In LSG without inversion of staple line%EWL was at 6 months and 1 years, 50.89% and 67.306%, respectively. While in LSG with inversion of stable line it was 52.56% at 6 months and 69.44% at 1 year.

Also in this study we found that no significant difference to effect of both procedures on EWL% in first year.

In a study by **Dapri et al.**<sup>11</sup>, found%EWL after SG (35% to 71.6%) in 6 months, 45% to 83% in 1 year, 47% to 83% in 2 years and 66% at 3 years. Five deaths reported (morbidity was significantly low)

### Conclusion

LSG is effective treatment for morbid obesity. Reinforcement of staple line has no significant impact on percentage of suture line bleeding or leakage or on the operative time or hospital stay.

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**Ethical Clearance:** Cleared by the ethical committee of kasr Al Ainy faculty of medicine

**Conflict of Interest:** No

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# Intralesional Ethanolamine Oleate Injection for Management of Venous Malformations: Case series

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## Abstract

**Objective:** Venous Malformations can result in severe functional and aesthetic disorders, modern trends toward sclerotherapy are backed by the fear of the potential risk of injuring vital structures associated with the traditional surgical approach. This study is presenting our center experience with intralesional Ethanolamine Oleate (EAO) in the management of VMs, over a period of 12 months.

**Method:** This study is a retrospective review of a cohort of 13 patients who were presented with VMs. All the cases were treated with intralesional injection of EAO 5%. A standardized set of data for each patient was recorded including demographic and clinical data. A dose of 1 cc diluted in 4 cc distilled water, 6 sessions, at 7 days interval. Before injection aspiration was done, all the cases were injected by the same operator.

**Results:** Thirteen patients were managed with serial injections of intralesional EAO 5% with a mean age of 3.5 years (range from 8 months to 12 years). The mean follow up was 7 months (range from 3 to 12 months). The average number of sessions was  $5.2 \pm 0.79$ . Recorded clinical response was; complete response in 5/13 (38.6%), marked improvement was detected in 4/13 (30.7%). Two cases (15.3%) showed moderate improvement and 1 case (7.6%) recorded a slight response. Only one case (7.6%) showed no response to treatment. No systemic adverse effects were reported.

**Conclusion:** Intralesional EAO injection is an effective and safe modality for treating VMs in the pediatric age group.

**Keywords:** Ethanolamine Oleate; Sclerotherapy; Intralesional injection; Venous malformations.

## Introduction

Venous malformations (VMs) are the commonest form of vascular malformations with an estimated incidence of 1 to 2 in 10,000. They are formed of small to large anomalous channels lined with vascular

endothelium and may show hamartomatous changes and microthrombi.<sup>[1,2]</sup> Accurate diagnosis depends mainly on history and clinical examination, with equal gender affection. Although VMs may occur later in life, mostly they are present at birth. Their growth is proportionate to the child growth, however, sudden increase in size may be in response to trauma or pubertal hormonal changes.<sup>[3]</sup>

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Although there are many protocols for VMs treatment, yet surgical excision remains in the frontline for successful management. However, surgery may harbor many difficulties such as the inability of complete excision, bleeding, injury of adjacent vital structures, and scarring. Therefore, the topical application of

sclerosing agents emerged as a part of preoperative management by aiding in lesion size reduction, or as a part of postoperative care for residual lesions, or as a solo treatment option. [4]

Many sclerotic agents are available including ethanol, bleomycin, 3% polidocanol, and 5% ethanolamine oleate (EAO), all have been proven to be effective. Also, new sclerotic agents are developed continually, such as foam preparations (sodiumtetradecyl sulphate). One of the most widely used sclerosants is absolute ethanol due to its easy availability, antiseptic quality, and low rate of recurrence. However, complications following injections such as skin ulceration, nerve atrophy, and systemic complications occur at a high rate. [5]

EAO as a sclerosing agent is accepted for cutaneous vascular lesions and esophageal varices treatment. In 2005, Johann et al. conducted the first clinical trial to assess the safety of EAO usage in managing oral vascular anomalies. [6] Compared to ethanol, EAO causes less vascular wall invasion, thus reducing the hazardous effect on the adjacent tissues especially nerves. [7]

In this study, we present our center experience with intralesional Ethanolamine Oleate injection in the management of VMs in pediatric age group, focusing on clinical outcome evaluation, efficacy of the medication and the potential complications.

## Material and Method

This study is a retrospective review of a cohort of 13 patients who were presented with VMs to the vascular anomalies clinic at the department of Paediatric Surgery of a tertiary referral university-based children's hospital from June 2017 to June 2018. All the cases were treated with intralesional injection of EAO 5%. The mean age was 3.5 years (range: 8-months to 12-years old) and the male to female distribution was 7:6.

A standardized set of data for each patient was recorded in a sheet including age, sex, site, and size of the lesion, clinical history, dosage and timing of injections, clinical response, side effects and follow up visits.

Colored photographs were taken for each patient at the first visit, throughout the treatment course and after finishing treatment. The diagnosis was established as a VMs after clinical evaluation by a pediatric surgery consultant and confirmed by radiological studies in the form of doppler ultrasonography (US) and magnetic resonance imaging (MRI).

The treatment protocol was: Under complete aseptic conditions and ultrasound guidance for deep lesions, intralesional injection of EAO 5% at a dose of 1 cc diluted in 4 cc distilled water, 6 sessions, at 7 days interval. [8] Before injection aspiration was done, all the cases were injected by the same operator.

Clinical response was evaluated according to the following criteria: complete response (complete disappearance of vascular tissue), marked improvement (>70% disappearance of tissue), moderate improvement (40–70% of vascular tissue), slight improvement (<40% disappearance of vascular tissue), and no response. [9]

Follow up was done on weekly basis intervals alongside with injection sessions until no more intervention was needed, then every 3 months till 1 year from starting of the therapy. Two independent blinded examiners evaluated the images, to assess the degree of improvement based on the baseline images prior to starting injections.

**Statistical Analysis:** Statistical data analysis was done using Microsoft® Excel® 2013 (15.0.4420.1017) 32-bit software. Descriptive data analysis as well as analytical analysis were done using Anova: Single Factor test, t-Test: Two-Sample Assuming Unequal Variances, and F-test two-sample for variances.

**Findings:** Thirteen patients were managed with serial injections of intralesional EAO 5% with a mean age of 3.5 years (range from 8 months to 12 years). Seven males and 6 females were included in the study. Regarding the site of the lesions, six out of 13 (46.2%) occurred in the head and neck region, three cases (23.1%) in the lower extremities, four cases (30.7%) in the trunk. The mean follow up was 7 months (range from 3 to 12 months). The average number of sessions was  $5.2 \pm 0.79$ . **Table (1)** summarizes patients' demographics and clinical response.

Regarding the clinical response; five (38.6%) out of the 13 patients showed a complete response (**Fig. 1**). Marked improvement was detected in 4/13 (30.7%) (**Fig. 2**). Two cases (15.3%) showed moderate improvement and 1 case (7.6%) recorded a slight response. Only one case (7.6%) showed no response to treatment.

In the vicinity of adverse effects; two cases (15.3%) showed signs of infection in the form of epithelial sloughing and ulceration with purulent discharge, bleeding from the puncture site occurred in 1 case (7.6%).

**Table (1): Summarizes patients’ demographics and clinical response.**

Case no.	Age(yrs)	Sex	Site	Size(cm)	No. of sessions	Outcome	Surgery	Follow up (m)
1	4	M	Oral Cavity	1.5*2	6	Complete	Nil	6
2	6	M	tongue	3*2	6	Complete	Nil	6
3	4	M	Lip	3.2*2	4	Marked	Nil	8
4	1.5	M	Lt index	1.15*0.4	4	Complete	Nil	12
5	4.5	M	Rt forearm	2.37*0.9	6	Marked	Nil	6
6	10 m	F	Rt foot	2.5*3	5	Complete	Nil	10
7	3.5	F	Lt shoulder	5*4	5	Marked	Nil	4
8	2.5	F	Back of neck	4*2.5	6	Marked	Nil	12
9	8 m	F	Back	7*4	6	Slight	Nil	6
10	12	F	Upper lip	2*3	6	Moderate	Nil	5
11	5	M	Back	3*2	5	No	Excision	3
12	2.5	M	Chest wall	9*12	5	Moderate	Nil	6
13	3	F	Forehead	4*3	4	Complete	Nil	7

**Abbreviations:** (m) months, (yrs) years, (cm) centimeter, (Lt.) left, (Rt.) right.

**Figures:**



**Figure 1: 4 years old boy with VMs in retro-molar region on Lt side after 6 sessions of EAO injection.**



**Figure 2: 2.5 years old girl with VMs in the back after 4 cycles of EAO injection.**

### Discussion

VMs are formed of dysplastic vascular channels lined with normal endothelium unlike vascular tumors that show cellular proliferation, they affect both genders equally, and they are almost always present at birth, grow proportionally with age and they never regress spontaneously. [10]

Throughout the literature, no consensus upon a single modality for dealing with VMs. With small and localized lesions surgery may offer an ideal solution; however, with head and neck lesions or markedly large lesions, debulking is much more feasible keeping in mind the high risk of injuring adjacent vital structures, scarring and functional losses. [2]

Historically, various sclerosing agents were provided for treatment of VMs, such as hypertonic solutions, surfactants, and detergents. However, none of them was superior. Familiarity with the treating physician, availability of the sclerosant, low cost, site, and morphology of the VMs were among the factors that influenced the selection of the sclerosing agent. [4]

Owing to its availability and low cost, Ethanol is the most widely used sclerosing agent; however, it harbors the risk of adjacent tissue damage due to the high neural and mucosal tissue sensitivity to ethanol, and

alcohol intoxication. Sodium tetradecyl sulfate (STS), an anionic surfactant, has the advantages of efficacy at low concentrations and compared to ethanol it is less cytotoxic. However, with extravasation, it may cause thrombosis and skin necrosis. Ethanolamine has the advantage of being less cytotoxic, but it has a deleterious side effect on the kidney. [11]

EAO is a fatty acids emulsion, it exerts its sclerosing effect via induction of thrombosis as a result of vascular endothelial damage. [12] Johann et al., in 2005 conducted his study on 30 cases, and he reported total resolution in all his cases. Kaji et al. also reported similar results in 2009. [13]

The reported overall response ranges between 88% and 100%. [14] In this study, nine (69.2%) of the cases showed more than 70% response to the injections, and about 92% showed a response which is comparable with the literature. Only one case (7.6%) did not show any response that was managed by surgical excision; that lesion was in the back.

In therapeutic doses EAO is highly diluted and once it reaches the circulation it is neutralized by serum albumin and serum globulin, which spares the patient from the hazardous systemic complications like hemolysis and renal failure. Hypersensitivity and anaphylaxis form



the drug may also occur. [15] In our study, complications recorded was local infection in (2/13, 15.3%) that was managed with withholding injections for 1 week and antibiotic application, and puncture site bleeding in (1/13, 7.6%) that was controlled by local compression for 2 minutes.

### Conclusion

Intralesional Ethanolamine Oleate injection is an effective and safe modality for treating VMs; complications are mild, and no evidence of associated systemic manifestations in our series. A larger number of patients and longer follow up will help in establishing a solid opinion about EAO usage in VMs.

**Conflict of Interest:** The authors declare that they have no conflict of interests.

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**Ethical Clearance:** Ethical approval was obtained via the departmental research ethics and scientific committee. Informed consent was obtained from all the candidates' parents prior to starting the treatment.

**Consent for Publication:** This study was conducted in a tertiary university hospital (teaching) centre which operates under directives allowing retrospective utilization of non-identifiable clinical data with no written consent. Verbal consent for publication was obtained by telephone from the parents of all cases included.

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# Health Literacy Survey on Medical Students

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## Abstract

**Background:** The term health literacy was first used in 1970 and has become important in public health and health services. Health literacy is defined as a level where people can access, understand, assess and communicate information to engage with the demands of different health contexts in order to promote and maintain good health in life. Poor health literacy has a relationship with a low understanding of written information and poor communication with health workers. Health literacy is important in effective communication between patients and health workers. However, there is very little research on health literacy in health workers.

**Objective:** This study aims to determine the level of health literacy in the education participants of the Sriwijaya University medical faculty general practitioner.

**Method:** Qualitative descriptive studies have been conducted. The population and sample in this study were all students of the Sriwijaya University medical faculty who were taken by convenient sampling. Frequency of distribution and relationship analysis was calculated using SPSS version 22.

**Results:** From this study 503 questionnaire data were obtained, Most questions of the health literacy questionnaire have a relationship with age and years and no relationship with work of the father, mother's work, and income.

**Conclusion:** Health literacy of general medical students of Sriwijaya University medical faculty has more relationship with age and years than the work of father, mother's work, and income.

**Keyword:** *Health literacy, public health, medical students, qualitative descriptive, sriwijaya university*

## Introduction

The term health literacy was first used in 1970 and has become important in public health and health services.<sup>1,2</sup> Health literacy is defined as a level where people can access, understand, assess and communicate information to engage with the demands of different health contexts in order to promote and maintain good health in life.<sup>3,4</sup>

According to the Institute of Medicine (IOM), health literacy arises from the interaction of individuals with social and information needs regarding health in their environment which can include the context of health services, public health, health promotion and management of chronic diseases. Our level of literacy directly influences our ability not only to act on health

information but also to better control our health as individuals, families and communities.<sup>3</sup>

Several studies have proven that the level of health literacy of each person can have a major influence on individual societies, and low health literacy is a risk factor independent of hospital care.<sup>5,6</sup> Literacy of poor health has a relationship with a low understanding of written information and poor communication with health workers.<sup>7-9</sup> Research in 2003 showed that more than a third of Americans have low health literacy.<sup>10</sup> In 2006, it was found that nearly 60% of adults in Australia had low levels of health literacy.<sup>11</sup> In 2012, only 8.80% of China's population had basic health literacy.<sup>12</sup>

Measurement of one's health literacy is carried out on attitudes of knowledge, motivation, behavioral

intentions, personal skills and self-efficacy related to health so that it leads to new knowledge, more positive behaviors, greater self-efficacy, positive health behaviors and better health.<sup>13</sup>

Health literacy is important in effective communication between patients and health workers.<sup>14</sup> However, research on health literacy in health workers is very little.<sup>15-17</sup> International research finds that there is a low level of health literacy among health workers.<sup>18</sup> Some studies show that students in the health sector and health workers in the United States have very limited health literacy.<sup>18</sup> A cross-sectional study of health-related knowledge in students shows that medical students' health literacy levels are inadequate.<sup>19</sup> Most medical students will become health workers who will interact a lot with patient. Therefore, their level of health literacy needs more attention. The importance of health literacy is indeed well understood, but most health literacy research is focused on patients, the general public, and students outside the health field. Therefore researchers want to conduct research on the level of knowledge of FK Unsri students in Palembang. The researcher also hopes that this data can be used as data and reference for future health literacy research.

## Method

This research is a qualitative descriptive study with a qualitative cross-sectional design to obtain information about the level of health literacy of students of the Medical Faculty of Sriwijaya University by using the questionnaire method. The population and sample in this study were all students of the Sriwijaya University medical faculty who were taken by convenient sampling. The study was conducted in April to May 2016. The variables studied in this study were gender, age, health literacy, BMI, Force, father's work, maternal occupation, income, health status, and personal behavior. After the data is collected, the data is presented in the form of narratives and tables. Data is then analyzed analytically in narrative form.

## Results

This research is a qualitative descriptive study by collecting data using questionnaires. Data collection was

conducted from April to May 2016. 503 samples were obtained.

From the socio-demographic frequency distribution (gender, age, BMI, years, father's occupation, mother's occupation, and income) 503 samples obtained the most results were women (69.6%), age <20 (50.9%), BMI normal (76.1%), 2011 Years (25.4%), father's job as a civil servant (37.4%), mother's job as a housewife (47.5%), monthly income of Rp. 2,200,000 - 6,599,999 (39.6%).

From the frequency distribution of health literacy surveys (Q1 to Q12) the most answers were easy Q1 (58.6%), Q2 was easy (54.1%), Q3 was difficult (49.3%), Q4 was difficult (49.9%), Q5 is easy (46.3%), Q6 is easy (46.7%), Q7 is easy (52.5%), Q8 is easy (53.7%), Q9 is easy (62.0%), Q10 is easy (53, 3%), Q11 is easy (49.9%), and Q12 is easy (44.7%). The majority of the results of the frequency distribution of health literacy surveys answered easily (10 questions) with an average percentage of 52.18% (> 50%) probably because samples were taken from general medical students who understood health.

From the frequency distribution of health status, the most obtained results were good health status (57.9%), diabetes (0.2%), hypertension (1.6%), heart disease (0.4%), hepatitis (0.2%), cancer (0.6%), cerebrovascular disease (0.2%), chronic lung disease (1.2%), kidney disease (0.6%), mental illness (1.2%), and arthritis (0.6%).

From the frequency distribution of personal behavior the most results were unlimited activity (52.9%), never smoked (92.0%), exercised for 30 minutes several times a month (61.2%), contacted emergency services for the past year < 2 (93.2%), went to the doctor for the past year <2 (72.4%), and was hospitalized for the past year <2 (93.4%).

Analysis of the Relationship Between Socio-Demographic Determinants and Health Literacy Socio-Demographic determinant data used in this study were gender, age, class, father's occupation, maternal occupation, and income. Health literacy used is Q1 to Q12.

**Table 1: Socio-Demographic Relationship Analysis with Health Literacy**

Health Literacy	Socio-Demographic	Sig.
Q1	1. Gender	0,405
	2. Age	0,024*
	3. Years	0,006*
	4. Father's Occupation	0,104
	5. Mother's Occupation	0,006*
	6. Income	0,453
Q2	1. Gender	0,496
	2. Age	0,011*
	3. Years	0,002*
	4. Father's Occupation	0,008*
	5. Mother's Occupation	0,002*
	6. Income	0,232
Q3	1. Gender	0,331
	2. Age	0,047*
	3. Years	0,008*
	4. Father's Occupation	0,685
	5. Mother's Occupation	0,698
	6. Income	0,419
Q4	1. Gender	0,484
	2. Age	0,047*
	3. Years	0,540
	4. Father's Occupation	0,962
	5. Mother's Occupation	0,527
	6. Income	0,474
Q5	1. Gender	0,753
	2. Age	0,008*
	3. Years	0,036*
	4. Father's Occupation	0,102
	5. Mother's Occupation	0,905
	6. Income	0,714
Q6	1. Gender	0,758
	2. Age	0,238
	3. Years	0,198
	4. Father's Occupation	0,016*
	5. Mother's Occupation	0,340
	6. Income	0,686
Q7	1. Gender	0,581
	2. Age	0,000*
	3. Years	0,000*
	4. Father's Occupation	0,065
	5. Mother's Occupation	0,066
	6. Income	0,132
Q8	1. Gender	0,106
	2. Age	0,046*
	3. Years	0,001*
	4. Father's Occupation	0,437
	5. Mother's Occupation	0,034*
	6. Income	0,477

Health Literacy	Socio-Demographic	Sig.
Q9	1. Gender	0,159
	2. Age	0,144
	3. Years	0,209
	4. Father's Occupation	0,241
	5. Mother's Occupation	0,351
	6. Income	0,362
Q10	1. Gender	0,781
	2. Age	0,775
	3. Years	0,087
	4. Father's Occupation	0,001*
	5. Mother's Occupation	0,257
	6. Income	0,617
Q11	1. Gender	0,765
	2. Age	0,769
	3. Years	0,376
	4. Father's Occupation	0,119
	5. Mother's Occupation	0,660
	6. Income	0,976
Q12	1. Gender	0,474
	2. Age	0,011*
	3. Years	0,214
	4. Father's Occupation	0,091
	5. Mother's Occupation	0,781
	6. Income	0,020*

**Discussion**

All questions on the health literacy questionnaire have no relationship with gender. Yan Zhang in his research on health literacy in medical students found that the average health literacy score for women was lower than that of men except in the ability to find health information and the ability to understand health information.<sup>20</sup> But according to Athanassios Vozikis's research on health literacy in students by random sampling showed that men had lower health literacy than women.<sup>21</sup>

Most questions of the health literacy questionnaire have a relationship with age and years. In the research conducted by Yan Zhang, there was also a relationship between health literacy and the age group where the highest years had the highest level of health literacy while the lowest years had the lowest level of health literacy.<sup>20</sup>

Most of the questions on the health literacy questionnaire have no relationship with the work of the father, mother's work, and income. This is not in accordance with the research conducted by Wafaa Hassan, Brenda Matzke, and Athassios Vozikis which

shows that there is a relationship between health literacy with parents' socioeconomic status, where the higher the socioeconomic status of parents the higher the level of health literacy.<sup>21-23</sup> In research conducted by Wafaa Hassa, mother's work has a more significant relationship than father's work.<sup>22</sup>

Most questionnaire questions have a relationship with age and force but most do not have a relationship with the work of the father, the work of the mother, and possible income because the sample taken is general medical students who have knowledge about health that is distinguished by age and years. If the sample taken is ordinary people, the possibility of father's work, mother's work, and income has a relationship with the level of health literacy.

### Conclusion

Health literacy of general medical students of Sriwijaya University medical faculty has more relationship with age and years than the work of father, mother's work, and income.

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# Descriptive Study of the Implementation of Primary Health Care Services for Senior Citizens in Surabaya

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## Abstract

**Context:** High life expectancy in Indonesia also increases as the population of senior citizens increases. The reduction in physical and mental abilities has the potential for older people. The eldercare health services are needed to maintain health and productivity. Puskesmas is public providers of primary health care in Indonesia. The research was descriptive and observational research. The study population was all puskesmas in Surabaya city, totaling 63puskesmas. Determination of the sample using disproportionate stratified random sampling method. The number of samples is 25 puskesmas spread in Surabaya City. The variables studied were eldercare health services efforts inside and outside the puskesmas. Secondary data was obtained from the health profile of Surabaya City and primary data was obtained through questionnaires. The implementation of eldercare health services in puskesmas starting from the registration of the elderly and as many as 15 puskesmas haven't separate the registration of elderly patients with general patients but gets a special label for registering elderly patients. Outside the puskesmas the form of services is homecare services that carried out by the majority of puskesmas many as 16 puskesmas.

**Keywords:** *Eldercare, primary healthcare, service providing*

## Introduction

The implementation of health assistance for senior citizen is aimed to maintain health and production condition, socially and economically.<sup>8</sup>Life expectancy in Indonesia also increases as the population of senior citizens increases. The older someone the greater their potential to experience health issues, mentally and physically. Most common health issues in the elderly are non-communicable diseases, such as hypertension, osteoarthritis, dental-mouth problems, Chronic Obstructive Pulmonary Disease (COPD) and Diabetes Mellitus (DM).

According to Health Law No. 36 of 2009, the government is obliged to guarantee the availability of health care facilities and facilitate the development of elderly groups. Puskesmas, as the public providers of primary health care in Indonesia, are the frontline in providing health services for the community. Surabaya City Health Profile 2015-2017 reported that the number of senior citizens in Surabaya continuously increased in the last 3 years, 2015 to 2017. The coverage of eldercare services in 2015 was 78.31% and increased to 78.81% in 2016. However, it dropped significantly in 2017 to 69.54%. The above achievement was still far from the predetermined target based on the Minimum Service Standard (SPM) for eldercare services which was 100%. In the implementation process, there were supporting and inhibiting factors for eldercare services. In 2017, Puskesmas had relatively low achievement in eldercare services. The attainment was only 69.54% out of 100% as targeted by the regulation of Minister of Health No. 43 of 2016. This might be caused due to various factors, from institutional to individual. To identify the problem, a system approach is used. Of the City

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Department of Health Office, contributing factors for the low achievement of eldercare services are regulation, communication and information or messages. From the environment, the contributing factors are accessibility, social support and socio-culture, while age, gender, knowledge, education level and profession are the contributing factors from the individual. It was also due to human resource issue, facilities and infrastructure, standard operational procedure, budget and the attitude of health workers in Puskesmas toward eldercare services. Therefore, it is necessary to develop health services that prioritize efforts to improve, prevent, and maintain health, in addition to healing and recovery efforts.

### Material and Method

This is a descriptive and observational research. Data was collected by observing and measuring the variables without giving any intervention or treatment to the primary health care. In addition, data collection was also collected by describing the implementation of eldercare services in primary health care, known as Puskesmas, around Surabaya. The population were all Puskesmas in Surabaya, totaling 63 Puskesmas, with a total sample of 25 Puskesmas. Sample was selected using disproportionate stratified random sampling method.

Samples were taken disproportionately from the total member of each stratum/group. The first stratum was Puskesmas with excellent (paripurna) achievement category. There were 2 Puskesmas in this category, so the sample was only 1 Puskesmas. From the second stratum, the prime (utama) achievement category, which covered 32 Puskesmas, the samples were 13 Puskesmas. From the third stratum, the medium (madya) category, which

covered 27 Puskesmas, the samples were 10 Puskesmas and for the fourth level, the basic (dasar) achievement category, the sample was only 1 Puskesmas there were only 2 Puskesmas in the category.

Data was taken from the Puskesmas, covering data from November 2018 and ended on June 2019. The data itself was collected by the researcher on May 2019. The variable for this study is the efforts of providing eldercare services, both inside Puskesmas and outside Puskesmas. The secondary data was obtained from Health Profile of Surabaya City, while the primary was obtained from the questionnaires.

**Findings:** This study was aimed to describe the implementation of primary eldercare services in 25 Puskesmas in Surabaya. The results showed that eldercare services for which were carried out inside the Puskesmas and also outside the Puskesmas were as follows:

**Eldercare Services in side Puskesmas:** Eldercare services inside Puskesmas consisted of health services for the pre-elderly, elderly health services, elderly medical rehabilitation, elderly physical activities and physical training. It was in line with the regulation of Ministry of Health Number 67 of 2015 concerning Eldercare Services at the Puskesmas.

**Pre-Elderly Health Services:** The pre-elderly health services were gymnastic activities or physical training, health counselling, early detection for potential diseases, health checks, treatment, and rehabilitative efforts. The table below shows the number of Puskesmas that carry out pre-elderly health services:

**Table 1: Number of pre-elderly services in 25 Puskesmas in Surabaya based on the regulation of Ministry of Health No. 67 of 2015**

Pre – Elderly Services	Frequency of Puskesmas	Percentage (%)
Elderly gymnastic and brain vitalization	24	96
Health promotion	25	100
Health screening	25	100
Health check	25	100
Diseases medicine	25	100
Rehabilitation	17	68
<b>Total</b>	<b>25</b>	<b>100,0</b>

Table 1 showed that all puskesmas have provided almost all pre-elderly health services commanded by the regulation. Pre-elderly group is age group of people aged 45-59 years. At this age, degenerative process of body cells starts and the risk of the degenerative diseases start to emerge. The results showed that the application of pre-elderly health services was not only carried out in puskesmas, but also in health service post for the elderly (Posyandu Lansia).

**Eldercare Services:** Eldercare services in Surabaya have been carried out comprehensively. Full examination has been carried out regarding vital conditions, physical, social, psychosocial, mental, and independence level of the elderly. Below is the data of puskesmas that implement 8 components of examinations using a Comprehensive Geriatric Assessment (CGA):

**Table 2: The coverage of complete examinations for the elderly in 25 puskesmas in Surabaya, based on the regulation of Ministry of Health No. 67 of 2015**

Components of examination	Implementation				Total	
	Yes	%	No	%	Frequency of Puskesmas	%
Vital sign examination	25	100	0	0	25	100
Physical examination	25	100	0	0	25	100
Measuring nutritional status					25	100
Early detection with MNA	12	48	13	52	25	100
Nutrition record	7	28	18	72	25	100
Measuring body mass index	25	100	0	0	25	100
Physiology examination with ADL's Barthel and Test Up and Go Instrument.	17	68	8	32	25	100
Psychosocial Examination	22	88	3	12	25	100
Social Examination	22	88	3	12	25	100
Cognitive measuring with AMT instrument	19	76	6	24	25	100
<b>Mental health status</b>						
Two minutes method	8	32	17	68	25	100
GDS method	25	100	0	0	25	100
MMSE method	14	56	11	44	25	100

Table 2 shows that all puskesmas conducted vital aspects examinations, physical examinations, and mental health checks based on the Geriatric Depression Scale (GDS). However, the results showed that only 7 puskesmas (27.8%) conducted examinations on the elderly using CGA, while the other 18 did not. This was due to the health workers ignorance of CGA and the limited number of health workers, the available time.

Eldercare services are different from general care services. The difference is due to the decreasing physical abilities of the elderly, easily disturbed mental and psychological conditions, and decreasing independence. In addition, the shift of elderly diseases from infectious to degenerative diseases also influences the type of services provided.<sup>7</sup> Eldercare services must be carried

out thoroughly and comprehensively because the diseases that emerge in the elderly are not only caused by one factor, but many factors. Therefore, it is necessary to have a comprehensive examination in order the doctors, nurses and other health workers know the cause of the disease. The examination for the elderly is recommended to use the Comprehensive Geriatric Assessment (CGA) approach. Comprehensive Geriatric Assessment (CGA) is a process used to manage vulnerability in the elderly.<sup>9</sup> With CGA, health workers can conduct a comprehensive assessment of the elderly from the biological, cognitive, psychological, and social aspects to determine problems and plan for the Eldercare management. This examination is a thorough examination that requires all health workers not only doctors but also nurses and other professional health personnel.<sup>9</sup>

CGA consists of 8 examination components that must be carried out, namely vital signs, physical, nutritional status, functional status, psychosocial status, social status, cognitive status and mental status examination. The results of this study indicate that most puskesmas have fully implemented six of the eight components of the examination. Most of the puskesmas did not carry out nutritional and mental examination. The results of the study also showed that most of the examinations were carried out at the elderly posyandu. The examination instruments were filled by the cadres of the elderly.

**Medical Rehabilitation Services:** Medical rehabilitation services held at the puskesmas are primary medical rehabilitation services. The following table shows the distribution of puskesmas that carry out primary medical rehabilitation services:

**Table 3: The Implementation of medical rehabilitation program in 25 puskesmas in the city of Surabaya**

Implementation of medical rehabilitation	Frequency of Puskesmas	Percentage (%)
Yes	1	5,5
No	24	94,5
Total	25	100,0

Table 3 shows that almost all puskesmas do not have primary medical rehabilitation services. Based on information obtained from the person in charge of the elderly program, medical rehabilitation is an advanced level of service provided at advanced health facilities and not provided at puskesmas. Medical rehabilitation was not carried out at puskesmas due to the absence of physical therapist at puskesmas.

According to Minister of Health Decree No. 378 of 2008 concerning Medical Rehabilitation Service Guidance in Hospitals, medical rehabilitation is a health service for physical disorders and functions caused by conditions of illness, diseases or injury through a combination of medical intervention, physical therapy, and/or rehabilitation in order to achieve optimal function capability.<sup>4</sup> The efforts of medical rehabilitation services at puskesmas are intended to provide basic medical rehabilitation services. Physiotherapists and general practitioners who have medical rehabilitation skills can perform as the medical rehabilitation therapist.

The provision of medical rehabilitation services at puskesmas must be reviewed due to the inconsistency of regulations that explain the provision of medical rehabilitation. The BPJS regulation explains that medical rehabilitation is a service provided in hospitals or advanced health facilities.

In the regulation concerning puskesmas, it was also explained that the physiotherapist was not one of health workers that must be available at puskesmas, but the other regulation concerning the implementation of eldercare services stated that elderly basic medical rehabilitation is provided in puskesmas. The review of medical rehabilitation services at puskesmas must be done, so that they can provide better services.

**Physical Activity and Exercise:** According to Minister of Health Regulation Number 67 of 2015, physical activity and exercise is one form of eldercare services in puskesmas. The following table is the distribution of personnel that guide physical activities and training for elderly people in puskesmas:

**Table 4: Distribution of personnel that guide physical activities and training for elderly people in 25 puskesmas in Surabaya**

Kind of Personnel	Frequency of Puskesmas	Percentage (%)
Doctor	0	0
Nurse	8	32
Physiotherapist	0	0
Elderly cadres	17	68
Total	25	100,0

Table 4 shows that the majority of guides in the course of activities and physical training for the elderly at puskesmas are elderly cadres. This is due to the limited number of health workers in puskesmas and that it is usually carried out outside the puskesmas. Therefore, the implementation of activities and physical training is left to the elderly cadres.

**Implementation of Eldercare Services outside Puskesmas:** Eldercare service outside puskesmas is one form of eldercare services consisting of services at the posyandu, community association, elder association and home care health services.

**Eldercare Services in Posyandu/Community Association/Elder Association:** Health services at the elderly posyandu must be visited by health workers from

puskesmasat each activity. The following table shows the distribution of the attendance of puskesmas health workers in posyandu activities:

**Table 5: Number of health workers attendance in elderly posyandu in 25 puskesmas in Surabaya**

The presence of healthcare staff	Frequency of Puskesmas	Percentage (%)
Yes	16	64
No	9	36
Total	25	100,0

Table 5 shows that the majority of elderly posyandu activities had been accompanied by health workers from puskesmas. Sixteen puskesmas delegated their health workers to assist the elderly posyandu activities, while the other nine puskesmas occasionally delegated their health workers to assist the posyandu. This was due to limited human resources available at puskesmas.

Health workers are an important factor in influencing changes on people behaviour, for example by carrying out health promotion so that people can be more motivated to make behavioural changes. Health promotion itself can be done by conducting training for the community, transforming knowledge and providing support to the community (Aryantiningasih, 2014). Health workers also can act as facilitators and empower communities through posyandu activities. Posyandu activities can be said to be well-developed when the community involvement is also higher, so that the target of the health program can be materialized<sup>1</sup>

In addition to the problems related to health workers, there were other problems during the implementation of the elderly posyandu activities. The elderly attendance to the elderly posyandu was low. Aryantiningasih (2014) stated that the low visits of elderly to elderly posyandu can be influenced by several factors including knowledge, distance between their house and posyandu location, family support, posyandu infrastructure, elderly attitudes and behaviour, economic income, and health workers support. Research from Melita et al. (2018) also stated that elderly visits to the elderly Posbindu are influenced by predisposing factors such as knowledge, supporting factors such as family and health workers support, as well as needs factors.<sup>5</sup>

**Home Care Health Services:** Home care health services are one form of eldercare services outside puskesmas which aim to expand the coverage of

health services to the elderly. The following table is the distribution of puskesmas that conduct home care services:

**Table 6: Number of puskesmas that carry out home care service programs from 25 puskesmas in Surabaya**

Home Care Services	Frequency of Puskesmas	Percentage (%)
Yes	16	64
No	9	36
Total	25	100,0

Table 6 shows that the majority of puskesmas had implemented home care health services. The person in charge of the elderly health program, who carried out home care services, stated that the home care service was combined with the implementation of Community Health Care activities. Puskesmas which do not provide home care services stated that it was due to the constraints of limited human resource in their puskesmas.

Home care services are not only provided by health workers but also through friends, neighbours and cadres. The role of the environment such as friends, neighbours, and cadres is very important to reduce morbidity in the elderly.<sup>3</sup> Home care programs both formally and informally can reduce the risk of depression in older adults and improve mental health in general.<sup>2</sup> The older the more important it is to maintain mental health for poor mental health can cause a variety of disabilities.

### Conclusion

Primary eldercare services have been being carried out in puskesmas in Surabaya City. The services are divided into two types, namely inside and outside puskesmas services. Eldercare services inside puskesmas consist of pre-elderly health services, elderly services, medical rehabilitation, as well as physical activity and exercises. Eldercare services outside puskesmas consist of health services at posyandu and home care services. The implementation of the majority of pre-elderly service activities has been carried out by all puskesmas, in line with Minister of Health Regulation No. 67 of 2015. There were 18 out of 25 puskesmas that do not carry out any assessment using Comprehensive Geriatric Assessment (CGA).<sup>6</sup> All of puskesmas in this study did not have a medical rehabilitation program and assistance to physical activity. Almost all of physical exercises were guided by elderly cadres. Eldercare service outside

puskesmas in the form of home care has been carried out by most of the puskesmas.

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# Intrinsic and Extrinsic Factors of Cadre Performance in Non-Communicable Disease Integrated Development Post (Posbindu Ptm): Qualitative Study on Posbindu PTM Cadre in Gadingrejo Public Health Center, Pasuruan, East Java, Indonesia

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## Abstract

**Background:** Non-communicable Disease Integrated Development Post (Posbindu PTM) is the manifestation of the public participation in the early detection and monitoring of main noncommunicable disease in integrated, routine, and periodic manners. The activities of Posbindu PTM in Gadingrejo Public Health Center Working Area are based on the Activity Performance Indicator (API) of Posbindu. Regardless of the above-target Posbindu coverage amount (in API number 1), the performance of Posbindu (API number 2, 3, 4) is below the national target and average. This article is aimed at analyzing and revealing the factors of the phenomenon occurred in Gadingrejo PHC Working Area comprehensively.

**Material and Method:** This article combines qualitative method with phenomenology approach. Thirty-eight respondents participated in this study have met the inclusion criteria. The study is conducted in April–May 2019 by in-depth interview to collect the research data. The collected data is analysed using content analysis approach.

**Result:** The performance phenomenon in Gadingrejo PHC Working Area is influenced by intrinsic and extrinsic factors. The intrinsic factors include: (a) individual factor (compulsion, skill and ability, ineffective training, and concurrent position of the cadres), (b) Posbindu internal factor (ineffective schedule, lack of infrastructure, active cadres, supporting investigation), and (c) psychological factor (shame, doubt, and lack of confidence). Meanwhile, the extrinsic factors include: (a) social factors (less support from the family and the society), (b) political factors (less support from the regional government apparatus, lack of assistance from the Public Health Center), and (c) economics factor (low budget).

**Conclusion:** The optimization of synergy and intervention for the intrinsic and extrinsic factors is needed to avoid the low performance of Posbindu PTM. Ottawa Charter can be used as a strategy for the promotion of non-communicable disease treatment which include healthy public policy, optimizing personal skill, and public movement.

**Keyword:** *Posbindu, NCD, IDP, Ottawa Charter*

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## Introduction

Non-communicable disease (NCD) has become one of the main mortality factors. Death due to major NCDs besides cardiovascular disease in 2015 were cancer (8.8

million), chronic respiratory diseases (3 million), and diabetes mellitus (1.6 million)<sup>1</sup>

NCD can be avoided by risk-factor intervention including smoking and tobacco use, calorie diet, physical activities, and alcohol. The recommended healthy lifestyle by WHO includes the consumption of vegetables and fruits, diet on sugar, salt, and fat, and exercise.<sup>2</sup>

In Indonesia, NCD prevention and controlling is carried out by Non-communicable Disease Integrated Development Post (Posbindu PTM). Posbindu PTM is the integrated activities to prevent and control NCD risk factors as part of the Community Based Health Services and Culture in a specific region<sup>3</sup>. Posbindu PTM is aimed at optimizing public participation in the prevention and early detection of NCD. The main targets of the activity include individuals with NCD risks and NCD patients above the age of fifteen<sup>4</sup>.

The activities of NCD prevention and controlling by Posbindu is evaluated based on the range of Activity Performance Indicator (API). The API covers the information of village/district that implement Posbindu, blood pressure measurement, obesity measurement, women with cervical and breast cancer at the age of 30–50 years old<sup>5</sup>.

The potential of Posbindu range and the number of health cadre in Pasuruan is not accompanied with high performance achievement of the Posbindu. Gadingrejo Public Health Center (PHC) in Pasuruan is constituted with high number of Posbindu around the city (14 Posbindu). However, the cumulative performance coverage is lower than the other seven Public Health Centers (18,8%)<sup>6,7</sup>.

Gibson (2003) mentioned that work performance is influenced by both intrinsic and extrinsic factors. It is known as the theory of work behavior<sup>8</sup>. By implementing the theory, this article is aimed at discovering the work phenomenon of Posbindu in a systematic way based on qualitative study.

## Material and Method

**Research Design:** This article implements descriptive research method and qualitative approach. Qualitative approach allows the production of phenomenon description to investigate complex, undiscovered issues.<sup>9</sup> It is implemented in this article to

explore the source of problems in the performance of Posbindu PTM in Gadingrejo PHC Working Area.<sup>10</sup>

**Respondents / Research Subjects:** This article divides respondents or research subjects into two categories: main respondents and triangulation respondents. Main respondent group consists of fourteen Posbindu PTM cadres. Meanwhile, triangulation respondent group consists of fourteen Posbindu members, four Posbindu supervisors, four district stakeholders, and two Posbindu programmer or Health Office representatives. Thus, the total number of respondents who met the inclusion criteria is 38 people.

**Data Collection:** The primary data is collected by in-depth interview and direct observation. Informed consent was distributed before the interview. The supporting tools used during the interview include interview guide, notebook, and voice recorder.

**Research Location and Date:** The research is conducted in fourteen Non-communicable Disease Integrated Development Post in Gadingrejo PHC Working Area in April–May 2019.

**Data Analysis and Validity:** This article implements content analysis method to process the gathered data. Data validity is measured by source triangulation and method triangulation. Source triangulation is carried out by validating the data from the main respondents using the data gathered from the triangulation respondents. Method triangulation is carried out by validating the results of in-depth interview with the results of direct observation.

**Findings:** Intrinsic Factors In Posbindu Performance Phenomenon (Individual Factor, Psychological Factor, Posbindu Internal Factor)

According to Posbindu cadres, the training delivered by the Health Office of Pasuruan and Gadingrejo PHC was insufficient to improve their confidence in conducting examination and early detection of NCD. The practice session during the training was insufficient to provide chances for the cadres, as mentioned here:

“I have joined the cadre training. From the Health Office, Public Health Center, to Lawang (training location), I attended all of them. However, I didn’t get enough practice.” (A5)

The selection of cadres in Gadingrejo PHC working area is varied. A respondent mentioned that the cadres

were appointed by The Head of the District or District apparatus. Meanwhile, another respondent mentioned the intervention from village assistant (district nurse). There were also Posbindu cadres appointed by the sub-district cadre head. Based on the interview, some of the appointed cadres were appointed by force, as expressed below:

“I was directly appointed by the Head of the Sub-District” (A3)

“I was called by the Cadre Head and she asked me to attend the cadre training in the Health Office.” (A8)

Low participation of Posbindu members caused uneasy feelings among the cadres towards the invited health workers.

“I felt uneasy towards the doctors or nurses during the Posbindu activity. The members can hardly come to the activity as it is usually carried out during working hours.”

Another respondent admitted feeling anxious due to the Posbindu advisor’s perfectionist trait. On the other hand, another respondent whose house was used as Posbindu activity place admitted that she was busy cleaning the house and preparing the food.

According to the respondents from Gadingrejo PHC, cross-sectoral program for strengthening Posbindu partnership networks is initiated in 2015. However, the results were not felt by the Posbindu cadres.

“The sub-district does not give any intervention to the Posbindu...” (A4)

“No company acted as donors for Posbindu. Our activities are mostly voluntarily. Sometimes we borrow the money from health center service for the elderly.” (A7)

All respondents commented on insufficient resources in Posbindu. It consists of the number of Posbindu active cadre, the availability of Posbindu kit, place and food, and budget. The following is the interview excerpt regarding the issue.

“Only one or two cadres who are willing to attend the Posbindu activities while it is supposed to be five people for fair job distribution and to fill the five tables.” (A2).

**Extrinsic Factors in Posbindu Performance Phenomenon (Political Factor, Social Factor, Economic Factor):** Most respondents stated that the political support from the Head of Sub-District and the Head of District (stakeholder), Posbindu assistants (nurse), the Health Office and PHC, and the local religious/public figures is below their expectations.

**Here are the interview excerpts regarding the issue:**

“The Head of the Sub-District and the Head of District have never attended the training, We have invited the Head of Sub-District via cadre head, but he never answered.” (A3)

“Village assistant from the PHC never joined Posbindu.” (A1)

“For all I know, the Health office never visited us. They only invited us for training, seminar on IVA or cancer, and distributing Posbindu facilities.” (A14)

“We have invited public figures as participants. But they seemed to ignore us. They usually come and attend the activity as the other participants but never helped us.” (A8)

Most respondents found the public to be less supportive. They only supported Posbindu by attending the activities as participants. According to T13 respondent, the public does not care about Posbindu as they have not yet realized the importance of measuring and monitoring blood pressure and body weight. Here is the excerpt:

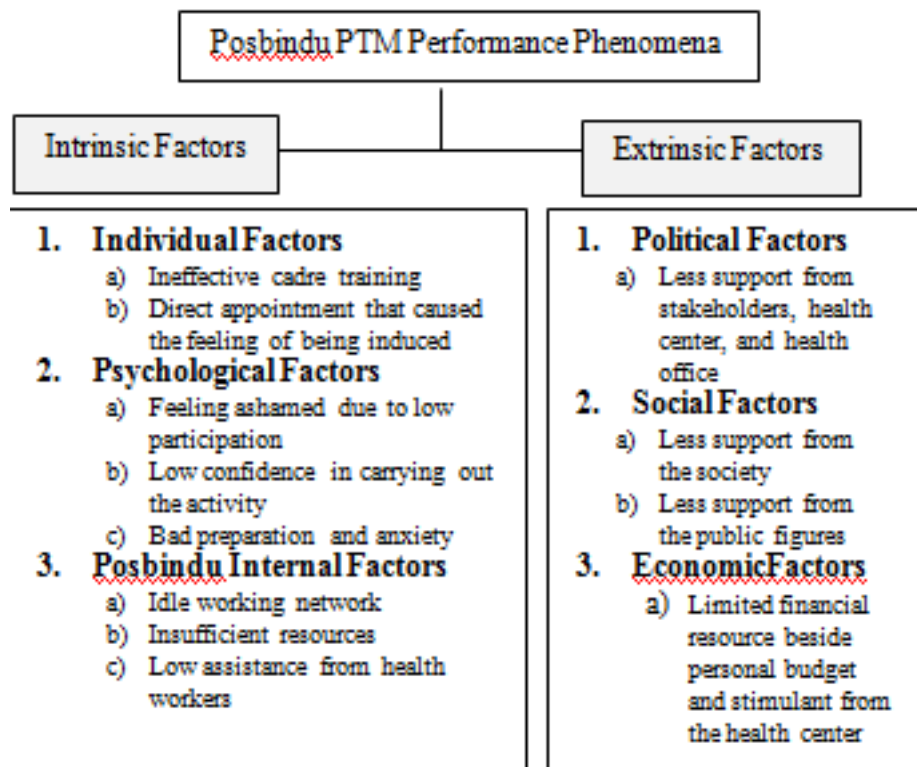
“We haven’t received much support from the society as they have not realized the importance of measuring and monitoring blood pressure and body weight.” (T13)

All respondents stated that the source of money for Posbindu was coming from the cadre with little help from the Health Center. PHC only provides incentive as a stimulant, so it is not given regularly. The money from the cadres is usually used for food. Meanwhile, they do not have any other sources.

Figure 1 summarizes our findings on the problems in Posbindu PTM performance.



**Figure 1. The summary of findings on the problems in each performance factor of Posbindu PTM.**



### Conclusion

The identified Performance Phenomenon in Posbindu PTM in Gadingrejo PHC include: (a) individual factor (compulsion, skill and ability, ineffective training, and concurrent position of the cadres), (b) Posbindu internal factor (ineffective schedule, lack of infrastructure, supporting investigation), and (c) psychological factor (shame, doubt, and lack of confidence). Meanwhile, the extrinsic factors include: (a) social factors (less support from the family and the society), (b) political factors (less support from the regional government apparatus, lack of assistance from the PHC), and (c) economics factor (low budget).

Posbindu Cadre Training by the Health Office of Pasuruan or Gadingrejo PHC is one of the health promotion strategies in improving personal skills mentioned in Ottawa Charter. Individual skill is highly expected in the attempt of developing healthy community. Knowledge on public health is undisputedly needed to develop both individual and public skills<sup>11</sup>.

The cadres were complaining about the insufficient training method that is failed to improve their soft skills. It is due to the fact that there is a positive correlation

between efficient soft-skill training method and an individual's performance<sup>12</sup>. Pedagogical approach is considered as the most efficient training method. Pedagogy is the teacher technique and method in transforming knowledge content, stimulate, monitor, and facilitate the students' development to reach the learning objectives by positioning the teacher in the central role<sup>13</sup>. Meanwhile, andragogy is an alternative method that place the teacher as a facilitator and allows multi-communication between the teacher and the learners<sup>14</sup>

Some Posbindu PTM cadres also complained the direct appointment by the apparatus that make them feel induced to work. Inducement influences an individual's intention and motivation in working. There is a positive correlation between an individual's motivation with work performance<sup>15</sup>.

Psychological problems might also disrupt their working performance in carrying out the Posbindu PTM activities. It is due to the fact that there is a negative correlation between psychological issues with work performance.<sup>16</sup> Specifically, stress and anxiety have been proven to be positively correlated with attendance, so it affects work performance.<sup>17</sup>

The dysfunctional network in Posbindu PTM caused less optimal activity. The development of working network will positively affect the organization's performance<sup>18</sup>. Further, the network is constituted with complex relations as it is influenced by several decisive factors such as job complexity, language skill, communication media, and intercultural training<sup>19</sup>.

Stimulation using incentive for cadres is expected to be able to increase participation in Posbindu activities in a specific region. Organization resource is proven to be positively and significantly affecting the organization effectivity.<sup>20</sup> Having sufficient resources will provide competitive excellence to the organization work performance.<sup>21</sup>

Political support and participation to Posbindu will provide strong motivation in the development of health quality, especially in the attempt to prevent disease and promote health.<sup>22</sup>

Insufficient assistance by health workers in the development of Posbindu PTM also affects the performance of Posbindu. The cadres admitted that they would feel confident if the health workers provided assistance to the cadre. It corresponds with the fact that participation and assistance play an important role in health education, especially in developing the program range.<sup>23</sup>

Ottawa Charter strategy can be applied by health promoter and decision makers in the bureaucracy to develop healthy public policy. It can be used to design health promotion program both for short-term and long-term duration.<sup>24</sup>

There have been several studies that explained the positive influence of social support to the development of public health in a certain region. This article found that social support gives direct impact and modifies the development of public health, especially in preventing and treating treatment, and giving intervention to the individual lifestyle.<sup>25</sup>

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# Nurse Communication and Patient Safety Incident Type of Clinical Administration

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## Abstract

**Background:** The most patient safety incidents that occurred in RSU Haji Surabaya is clinical administration type of incidents. There were 12 clinical administration incidents occurred during January 2014 until June 2016 in the inpatient installation (standard zero accident).

**Objective:** The purpose of this study is to analyze the relationship between nurse communication and patient safety incident type of clinical administration.

**Method:** This study was a descriptive study with an observational approach, and this study was designed as a cross sectional study. Researchers conducted a primary data collection using a questionnaire that has been tested for validity and reliability, then studied of the incident reports document as a secondary data. The questionnaire was distributed to 48 nurses in inpatient installations.

**Result:** The results of this research showed that the effectivity of nurse communication has a relationship with clinical administration patient safety incidents occurred. If effectivity of the nurse communication among fellow nurses and related professions getting lower in the application of patient safety program, then patient safety incidents type of clinical administration getting more often occurred in the inpatient installation of RSU Haji Surabaya.

**Conclusion:** The conclusion of this study is nurse communication among fellow nurses and related professions that are involved in the implementation of patient safety programs at inpatient rooms tend to have relationships with patient safety incidents type of clinical administration occurred in Inpatient Installation of RSU Haji Surabaya.

**Keyword:** *Clinical administration, communication, nurse, patient safety.*

## Introduction

Patient safety forms the foundation of healthcare delivery just as biological, physiological, and safety needs form the foundation of Maslow's hierarchy<sup>1</sup>. Patient safety is a discipline in the health care sector that applies safety science method toward the goal of achieving a trustworthy system of safely health care delivery. The hospital, as one of the healthcare providers, has comprehensive services because it involves various professions in its activities. The hospital is also an institution that is capital intensive, labor intensive, technology intensive, and risk intensive. The complexity components in the hospital must be accompanied with

multi-system collaboration in its activities, so that it is not easy to cause errors that may endanger patient safety.

Patient safety incidents are events that lead to cause an injury for the patient<sup>2</sup>. There are many types of patient safety incident; clinical administration is the one of them. Patient safety incident type of clinical administration is an error that occurs in patient identification process, hand over, agreement, informed consent, waiting list, reference, admission, patient's return, care's transfer, job division, and response to emergencies<sup>3</sup>.

Based on the report retrieved from RSU Haji Surabaya for January 2014 until June 2016 periods, it

shows that there have been several incidents of patient safety<sup>4</sup>. Most of the patient safety incidents that occurred in RSU Haji Surabaya were clinical administration type involving 22 incidents in the first half of 2014, 7 incidents in the second half of 2015, and 9 incidents in the first half of 2016. The patient safety incident type of clinical administration in RSU Haji Surabaya mostly occurred in inpatient installations, i.e. 12 incidents. Based on the data, patient safety incident type of clinical administration that occurred at the inpatient installation in RSU Haji Surabaya were caused by nurses<sup>4</sup>. This is not in accordance with the rules which states that the number of hospital safety incidents should be 0% or zero accident<sup>5</sup>.

Communication is one of the factors from the organizational aspect that can cause patient safety incident. Communication failures are the leading causes of inadvertent patient harm<sup>6</sup>. Analysis of 2455 sentinel events reported to the Joint Commission for Hospital Accreditation in the USA revealed that the primary root cause in over 70% was communication failure<sup>7</sup>. Similar patterns can be found in many areas of healthcare.

According to the data above, the problem that can be discussed in this study is the factors that influence the high rates patient safety incidents at the inpatient Installation in RSU Haji Surabaya. This study aims to analyzing the correlation between nurse communication and patient safety incident type of clinical administration.

## Material and Method

This study was a descriptive study with an observational approach. In this case, research was conducted The study was designed as a cross sectional study. This research was carried out in the installation of Inpatient RSU Haji Surabaya. Time data retrieval on the primary and secondary research was on 3 May to 2 June 2017.

The unit of analysis in this study was 6 inpatient rooms in the inpatient installation of RSU Haji Surabaya. Sampling was done using a probability sampling technique with simple random sampling. Based on calculations using the large sample formulas minimum on one population, it can be noted that, of the total population of 94 nurses, the minimum sample amounts were 48 nurses. Researchers performed the division of the sample with the techniques of proportional based on the work units.

Researchers conducted a primary data collection using a questionnaire that has been tested for validity and reliability. In addition, researchers also conducted secondary data collection i.e. patient safety incident reports issued by RSU Haji Surabaya. Furthermore, the data acquired will be processed and presented in the cross-tabulations, and then analyzed in a descriptive to expose the relationship between the dependent variable and independent variable.

## Results and Discussion

**Nurse Communication:** Communication is the main element for nurses in performing nursing care to achieve optimal results. Effective communication will enhance professional relationships both with among nurses, other health team, as well as the patient. Nurse communication in this study was assessed through verbal interaction liveliness by nurses with fellow nurses and the other professions in the Inpatient installation of RSU Haji Surabaya. All the elements of the existing questions in the questionnaire were related to patient safety including: the experience of communication, communication techniques, communication, and understanding of the function miscommunication results. The following table shows the distribution of categories of nurse communication effectiveness level in Inpatient Installation of RSU Haji Surabaya in 2017.

**Table 1: The Distribution Category of Nurse Communication Effectiveness in Inpatient Installation RSU Haji Surabaya in 2017**

Category of Communication	Frequency (n)	Percentage (%)
Ineffective	4	66,7
Effective	2	33,3
Total	6	100,0

Table 1 shows that most nurse communication in inpatient installation rooms (66.7%) of Inpatient RSU Haji Surabaya was ineffective, whereas the rest of it (33.3%) was effective communication with fellow nurses or other professions.

Communication is a multi-dimensional, multi-factorial phenomenon and a dynamic, complex process, closely related to the environment in which an individual's experiences are shared<sup>8</sup>. Effective communication is an important aspect of patient care, which improves nurse-patient relationship and has a profound effect on the patient's perceptions of health care quality and treatment

outcomes<sup>9</sup>. Moreover, they can increase patient satisfaction, acceptance, compliance, and cooperation with the medical team, and improve physiological and functional status of the patient; it also has a great impact on the training provided for the patient<sup>10</sup>. Communication failures may occur in any context but there are pervasive barriers to effective communication that are specific to health care. These include a hierarchical culture that leads to authority gradients, differing professional communication styles and fragmented care delivery across multiple departments and settings<sup>11</sup>.

**Patient Safety Incidents Type of Clinical Administration:** Patient safety incident is any deviation from usual medical care that causes harm to a patient or presents a risk of harm. This term includes adverse events and near misses. A patient safety incident is defined as an incident where a patient is harmed or potentially harmed as a result of care<sup>12</sup>. Many rules have been made related to patient safety incidents. In Indonesia, the incident is distinguished to 15 types of patient safety incident<sup>3</sup>. Identification of patient safety incident types was retrieved from document report of patient safety incident in RSU Haji Surabaya. Based on this report, it was found that patient safety incident

type of clinical administration in inpatient installation occurred more frequently than other types, i.e. 14 incidents during January 2014 until May 2017 in RSU Haji Surabaya.

The following table shows the case distribution of patient safety incident type of clinical administration during January 2014 to May 2017 in Inpatient Installation of RSU Haji Surabaya.

**Table 2: The Case Distribution of Patient Safety Incident Type of Clinical Administration During January 2014 to May 2017 in Inpatient Installation of RSU Haji Surabaya**

Patient Safety Incidents Type of Clinical Administration	Frequency (n)	Percentage (%)
No Incident	2	33,3
Incident	4	66,7
Total	6	100,0

Table 2 shows that the patient safety incident type of clinical administration took place mostly in the inpatient room (66.7%) in the Inpatient Installation of RSU Haji Surabaya.

**Table 3: The Cross-Tabulations Between the Nurse Communication with Patient Safety Incident Type of Clinical Administration in Inpatient Installation of RSU Haji Surabaya in 2017**

Category of Nurse Communication	Patient Safety Incident Type of Clinical Administration				Total	
	No Incident		Incident		N	%
	n	%	n	%		
Ineffective	1	25,0	3	75,0	4	100,0
Effective	1	50,0	1	50,0	2	100,0
<b>Total</b>	<b>2</b>	<b>33,3</b>	<b>4</b>	<b>66,7</b>	<b>6</b>	<b>100,0</b>

**Correlation of Nurse Communication with the Case of Patient Safety Incident Type of Clinical Administration:** Research results in Table 3 show that the more ineffective nurse communication among fellow nurses and related professions in the application of patient safety program, then patient safety incidents type of clinical administration getting more often occurred in the inpatient installation of RSU Haji Surabaya. Cross-tabulate results in this research indicate that nurse communication related patient safety tend to have a relationship with a patient safety incident type of clinical administration.

The results of this research are consistent with research which stated that effective communication in the health care system is important to prevent errors and improve job satisfaction<sup>13</sup>. It is time for hospital administrators, physician and nurse leaders, and medical and nursing education institutions to enact permanent changes in team dynamics that support improved communication. The factor of communication with fellow nurses and health professions has a relationship with the occurrence of patient safety incidents in hospitals<sup>14</sup>.

Communication is essential to workplace efficiency and for the delivery of high quality and safe work. It provides knowledge, institutes relationships, establishes predictable behavior patterns and is vital for leadership and team coordination<sup>15</sup>. Specific communication tools have proven successful at improving communication among care providers<sup>16</sup>.

Educational resources are developed for care providers and patients and their families to increase awareness of patient safety issues and communication strategies<sup>17</sup>. The findings suggest that team members were able to clearly articulate the communication challenges that potentially led to patient safety issues and perceived that their team collaboration had been enhanced. Participants on this research recognized that communication was improved by ensuring that staff, patients, and families had relevant information and resources. This research suggests that healthcare teams can benefit from identification of their strengths and challenges and that educational interventions can raise awareness of patient safety issues that may reduce the number of near misses and adverse events for patients.

In safety-critical industries, pre-task briefing is regarded as extremely important as the implementation of communication principle in the workplace and this is now being introduced more rigorously in healthcare. This may identify agreed protocols that are intended to alert team members to changing conditions or other important information<sup>18</sup> comprehension of their meaning and projection of their status in the near future has been associated with human performance in high-risk environments, including aviation and the operating room. The influences on SA in inpatient medicine are unknown., METHODS: We conducted seven focus groups with nurses, respiratory therapists and resident physicians using a standardised semistructured focus group guide to promote discussion. Recordings of the focus groups were transcribed verbatim, and transcripts were qualitatively analysed by two independent reviewers to identify convergent and divergent themes., RESULTS: Three themes emerged: <sup>(1)</sup>. There are a number of briefing tools for healthcare, such as the WHO Surgical Safety checklist to be used with an operating team prior to a surgical procedure<sup>19</sup> with an estimated 234 million operations performed yearly. Surgical complications are common and often preventable. We hypothesized that a program to implement a 19-item surgical safety checklist designed to improve team communication and consistency of care would reduce

complications and deaths associated with surgery. Method: Between October 2007 and September 2008, eight hospitals in eight cities (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, Wa- Creating opportunities for all team members to speak up and exchange information is an important element of the briefing.

The SBAR (Situation, Background, Assessment, Recommendation) is another communication tool, SBAR (Situation, Background, Assessment, and Recommendation) is a structured communication tool that standardizes communication between health professionals<sup>20</sup>. It can be especially effective when a nurse is contacting a physician with a concern about a change in patient status. By clearly spelling out his or her concerns, observations, interpretation, and recommendations, the nurse using SBAR provides the physician with a more complete picture of the clinical situation than might be the case without the tool. In this way, the use of SBAR can prevent the scenario in which the physician underestimates the significance of a clinical finding conveyed via telephone.

Thus, it can be said that when nurse communication related to the patient safety related to the particular type of clinical administration, the nurse can do the expected effective communication to support the implementation of the patient safety program at the hospital. Similarly, it is expected that the nurse can do effective communication between fellow nurses and health professions involving in the implementation of patient safety programs. If nurses do effective communication related to patient safety in particular types of clinical administration, it will reduce the risk of patient safety incidents and ease the process of problem identification in case of patient safety incidents. Therefore, every nurse feels the need to improve communication skill and understanding the importance of communication in the implementation of patient safety programs through the following activities or specific training that can add communication skills related to patient safety.

## Conclusion

Based on the results and discussion, it can be concluded that communication between fellow nurses and health professions that are involved in the implementation of patient safety programs at inpatient rooms tend to have relationships with patient safety

incidents type of clinical administration in inpatient installation of RSUD Haji Surabaya. The problem of ineffective nurse communication is both common and complex. The strategies are needed to improve ineffective communication between nurses and physicians including culture change, use of structured communication tools, and supportive technology. It is advised that the management of the RSUD Haji Surabaya should hold socialization or seminars on effective communication techniques for all health care personnel especially nurses who directly interact with patients and other medical personnel, so that the ability of nurses in conducting communication with fellow nurses as well as between the professions related to patient safety could be done more effectively. In addition, it is advised that head room should apply the task debriefing to improve patient safety. Successful debriefing is achieved by identifying aspects of good performance, identifying areas for improvement, and suggesting what should be done differently in future. Reward system and appreciation are also important things to give to nurses who have been implementing a patient safety program that will increase the motivation of other nurses in implementing patient safety program.

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# Nurse Compliance in Implementing Standard Precaution Based on Theory of Planned Behavior

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## Abstract

**Background:** Standard Precaution is an activity applied by health care facility staff to reduce the risk of infection due to blood or body fluids that can potentially transmit disease. Survey conducted by RSUD Dr. R. Sosodoro Djatikoesoemo Bojonegoro in January - September 2018 found that the number of nosocomial infections in the inpatient room was 2.82% and from eleven aspects of standard precautions established to prevent it, it turned out that only two aspects were in accordance with the target.

**Objective:** The purpose of this study was to analyse factors related to nurse compliance in applying the standard precaution by nurses at the inpatient installation.

**Method:** This research was carried out by analytic observational approaches. Based on the time, this study included a cross-sectional research design. The independent variable of this study are attitude toward behavior, subjective norms, perceived behavior control and behavioral intention obtained from questionnaires filled out by nurses. While the dependent variable is the compliance of nurses in implementing standard precaution obtained from checklist of observation filled out by researcher.

**Result:** The result of this research are attitude toward behavior has a significance value of 0.001, subjective norm has a significance value of 0.001, perceived behavior control has a significance value of 0.129 and behavioral intention has a significance value of 0.000.

**Conclusion:** The conclusion of this study is factors related to nurse compliance in implementing the standard precaution are attitude toward behavior, subjective norm and behavioral intention. While factor that do not related with nurse compliance in implementing the standard precaution are perceived behavior intention.

**Keywords:** *Compliance, Nurse, Standard Precaution.*

## Introduction

Hospitals are one of the health facilities that have an important role in providing health services and improving the health of the community through the implementation of curative and rehabilitative efforts. In carrying out various types of services, hospitals are required to provide safe, good quality, non-discriminative and effective health services in accordance with hospital service standards. In addition, it is also stipulated that the hospital is obliged to provide health services that prioritize patient safety<sup>1</sup>.

In a ministerial regulation, it is said that there are

six indicators of patient safety that must be carried out by hospital. One of the indicator is a reduction in the risk of infection related to health services<sup>2</sup>. Nosocomial infection is an infection that occurs in patients during hospital care and other health care facilities. It also can be an infection due to work in hospital staff and health workers related to the process of health services in health care facilities<sup>3</sup>.

One of ten patients who are hospitalized will get a nosocomial infection even though most forms of nosocomial infection are preventable<sup>4</sup>. One of the prevention of nosocomial infections in hospitals that must be applied by health workers called standard

precaution. The standard precaution is designed to reduce the risk of patients and health workers being infected with infectious diseases both from known and unknown sources of infection<sup>3</sup>.

Developing countries have a risk of infection from poor health services as much as 2-6 times than a high income country<sup>5</sup>. Research conducted at 10 educational hospitals in Indonesia stated that in 2010 nosocomial infections occurred were quite high at 6-16%. From the various studies, it was found that nosocomial infections happened because of health workers did not implement standard precaution optimally<sup>6</sup>.

RSUD Dr. R. Sosodoro Djatikoesoemo Bojonegoro is a non-educational type B hospital that was established in 1928. The incidence of nosocomial infection is one of the important problems for RSUD Dr. R. Sosodoro Djatikoesoemo Bojonegoro. Occurrence of nosocomial infections in 2018 is 2.82%, which means exceeding the target <0.50%. Meanwhile through infection report it is also known that the application of the standard precaution is not optimal. From the eleven aspects determined, only two aspects have been carried out optimally<sup>7</sup>.

Behavior to do a compliance is influenced by behavioral intention. Several studies on nurse compliance in carrying out nursing care are analyzed through the theory of planned behavior<sup>8-9</sup>. In the theory of planned behavior, it is explored that the determinant of a behavior is behavioral intention. While the intention itself arises because of three aspects, namely attitudes toward a behavior, subjective norms and behavioral control<sup>10</sup>.

Based on the description above, it becomes the consideration for researchers to conduct an analysis of factors related to nurse compliance in applying the standard Precaution by nurses at the Inpatient Installation. This study aims to identify attitudes toward behavior, subjective norms, perceived behavior control, behavioral intention and compliance of standard precaution for nurses in Inpatient Installation.

**Material and Method**

This research was conducted with a quantitative analytic approach based on the objectives and types. The researcher did not provide intervention in the form of treatment to the research subjects so that this study was classified into observational research. Based on the time, this study included a cross-sectional research design. The independent variable in this study is divided into

four, namely attitude toward behavior, subjective norms, perceived behavior control and behavioral intention. While the dependent variable is nurse compliance in applying the standard precaution.

This research was conducted in June 2019 in the inpatient installation of RSUD Dr. R. Sosodoro Djatikoesoemo Bojonegoro. The population in this study were all nurses in the inpatient installation RSUD Dr. R. Sosodoro Djatikoesoemo Bojonegoro which is equal to 121 nurses. Sample calculation was done using simple random sampling technique and a research sample obtained are 54 nurses. Data retrieval is done by using a questionnaire filled out by respondents and observation checklist filled in by researchers. The results of questionnaire and observation will be processed using Chi Square test to analyze the relationship between the independent variables with the dependent variable.

**Result**

**Nurse Compliance in Implementing Standard Precaution:** Nurse compliance in implementing standard precaution obtained by using checklist of observations on some aspect such as hand hygiene, use of personal protective equipment, decontamination, environmental control, waste management, linen management, officer health protection and safe injection practices. From the results of these observations, they are assessed and categorized as follows:

**Table 1: Distribution of Nurse Compliance in Implementing Standard Precaution**

Variable	Category	N	%
Nurse Compli-ance	Complied	32	59,30
	Not Complied	22	40,70
	Total	54	100,00

Table 1 shows that 32 respondents (59.30%) or most of the nurses in inpatient installation RSUD Dr. R. Sosodoro Djatikoesoemo has complied the application of standard precaution.

**Theory of Planned Behavior Component:** Assessment carried out on attitude toward behavior, subjective norms, perceived behavior control and behavioral intention was carried out through questionnaires filled by nurses in the inpatient room. The results of the questionnaire are assessed and categorized as follows:

**Table 2: Distribution of Theory of Planned Behavior Component in nurses**

Variable	Category	n	%
Attitude Toward Behavior	Good	35	64,80
	Less	15	35,20
	Total	54	100,00
Subjective Norm	Good	31	61,10
	Less	21	38,90
	Total	54	100,00
Perceived Behavior Control	Good	20	37,00
	Less	34	63,00
	Total	54	100,00
Behavioral Intention	Good	23	42,60
	Less	31	57,40
	Total	54	100,00

Table 2 explains that most of respondents as many as 35 people (64.80%) have a good attitude toward

behavior in the implementation of standard precaution. In addition, most of the respondents, namely 33 people (61.10%) considered that Subjective Norm related to the application of the standard precaution was good.

On the factors of perceived behavior control it is known that the majority of respondents, 34 people (63.00) have less perceived behavior control in implementing the standard precaution. Besides that, it can also be seen that the majority of respondents, namely 31 people (57.40%) have less behavioral intention to do a standard precaution.

**Factor Related to Nurse Compliance in Implementing Standard Precaution:** Factors related to nurse compliance in implementing standard precautions were obtained through a 2x<sup>2</sup> table Chi Square test and read the Continuity Correction value in table with the following results:

**Table 3: Factor Related to Nurse Compliance in Implementing Standard Precaution**

Variable	Category	Compliance				Total		p value
		Comply		Not Comply		N	%	
		n	%	N	%			
Attitude toward behavior	Good	27	77,10	8	22,90	35	100,00	0,001
	Less	5	26,30	14	73,70	19	100,00	
Subjective Norm	Good	26	78,80	7	21,20	33	100,00	0,001
	Less	6	28,60	15	71,40	21	100,00	
Perceived Behavior Control	Good	15	75,00	5	25,00	20	100,00	0,129
	Less	17	50,00	17	50,00	34	100,00	
Behavioral Intention	Good	21	91,30	2	8,70	23	100,00	0,000
	Less	11	35,30	20	64,50	31	100,00	

Through the results of the tests conducted, it can be seen that attitude toward behavior has a significance value of 0.001. Then it can be said that attitude toward behavior related with nurse compliance in applying the standar precaution. Table 3 also explains that the subjective norm test shows a significance value of 0.001. This value indicates that there is a relationship between subjective norms and nurse compliance in applying standard precaution.

Besides the results of the tests conducted, it can be seen that the perceived behavior control has a significance value of 0.129. Then it can be said that there is no relationship between perceived behavior control and nurse compliance in implementing the standard

precaution. Table 3 also explains that the behavioral intention statistical test shows a significance value of 0,000. This value shows that behavaioral intention related with nurse compliance in implementing standard precaution.

**Discussion**

**Attitude Toward Behavior with Nurse Compliance in Implementing Standard Precaution:** Attitude toward behavior interpreted as a level of negative or positive feeling or opinion about certain behavior by individual. When an individual feel that a certain behavior have a positive impact on them self, they will do the behavior. And when an individual feel

that a certain behavior have a negative impact, he will not do the behavior<sup>10</sup>.

The results in this study showed that there is a relationship between attitude toward behavior with nurse compliance in applying standard precaution. From this study, nurse who see each other or their chief in inpatient installation implementing standard precaution assuming that they are a good role model. If they also did it, it has a good impact on their image and their safety too.

The other study that accordance with this study stated that nurses who have a good attitude toward behavior will be more motivated to implement standard precaution indicates by supporting or approving a certain kind of behavior. It is because the behavior will give a protection especially on patient and also the nurses<sup>11</sup>.

**Subjective Norm with Nurse Compliance in Implementing Standard Precaution:** Subjective norms are individual views of beliefs and expectations that come from other people around them and can influence the desire to behave or not<sup>10</sup>. The results of this study showed the same thing, there was a relationship between subjective norms and nurse compliance to applying the standard precaution.

The results of this study indicate that the more subjective norms felt by nurses so that they conduct standard precaution, will encourage nurses to produce high compliance. The subjective norm can be the head of the room which is the role model and the other nurses that carry out prevention of infection. The existence of hospital policies that make nurses conduct standard precaution is also an example of subjective norm.

The results of this study are in accordance with the other study which stated that subjective norms can influence to comply to a certain nurse caring procedure. Due to the existence of role models that apply standard precaution, the expectations of surrounding people to carry out standard precaution as well as a specific policies governing standard precaution, will make the nurse encourage to display high compliance<sup>12</sup>.

**Perceived Behavior Control with Nurse Compliance in Implementing Standard Precaution:** Perceived behavioral control or perception of behavior control consists of two aspects, namely how much an individual has control to behave and how strong the individual's beliefs are not to behave. People who have confidence that they do not have the opportunity factors

to carry out a behavior, allow the intentions formed are not strong even though the attitude they have is positive for a behavior<sup>10</sup>.

The results of statistical tests in this study shows that there is no relationship between perceived behavior control and the application of the standard precaution. From this study, obstacles related to the implementation of standard precaution did not prevent nurses from continuing to implement standard precaution. This is because if there are obstacles, but the nurse feels that they can handle it easily, then the implementation of standard precaution still continues. Meanwhile, if nurses have obtained the convenience and benefits of implementing standard precaution but they did not used it properly, the implementation will be low.

There is a study that show different results which states that perceived behavior control can influence nurses to comply with standard precaution procedures. This is because nurses feel facilitated, only have a few obstacles and have obstacles that can be anticipated when they want to implementing standard precaution. So that their control in carrying out the standard precaution procedure is high<sup>11</sup>.

**Behavioral Intention with Nurse Compliance in Implementing Standard Precaution;** Behavioral intention is a cognitive and conative representation of an individual's readiness to display a behavior. Intention is the determinant and disposition of behavior, so that individuals have the right opportunity and time to display the behavior in real terms. In general, if the individual has the intention to do a behavior, the individual tends to do the behavior. Conversely, if individuals do not have the intention to do a behavior then individuals tend not to do the behavior<sup>10</sup>.

The results of statistical tests show that there is a relationship between behavioral intention and nurses' compliance to applying the standard precaution. This is because the harder the intention of the individual to be involved in a behavior, the stronger the tendency of the individual to actually do the behavior.

This research is also same with the study which shows the relationship between intention and safety behavior. This is because intention to do a behavior is a large individual control contribution that that will convert a willingness to do a certain behavior to become a real behavior<sup>13</sup>.

## Conclusion

The conclusion of this study is that most nurses have complied to the implementation of the standard precaution. The majority of nurses have a good attitudes toward behaviors, good subjective norms, less perceived behavioral control and less behavioral intention. Suggestions that can be given to nurses at RSUD Dr. R. Sosodoro Djatikoesoemo is by encouraged each other to implement standard precaution and grow their awareness that standard precaution is a good thing to implement and the responsibility must be carried out by all health workers in the hospital. Hospital management can make a detail standard operating procedures as guidelines for nurses in implementing standard precautions. In addition, hospital management can also monitor and evaluate the obstacles that occur during the process of applying standard precautions such as availability of facilities and lack of training. So that the application of the standard precaution can run optimally and can reduce the incidence of nosocomial infections in hospitals.

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# Assessing Depression among Students in Malaysia

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## Abstract

**Context:** The main goal of this study is to assess depression symptoms and resilience among students in Malaysia. This study administered The Beck Depression Inventory II (BDI-II) and Resilience Scale 14 (RS-14) to 560 students from five secondary schools. Descriptive statistics were employed to calibrate the symptoms of depression according to their severity. Meanwhile, independent sample t-tests and one-way ANOVA were employed to examine differences in gender, school locations and ethnicity on depression. Pearson correlation was used to examine the relationship between resilience and depression among students. Results showed that feeling guilty was the most severe depression symptoms followed by self-accusation and punishment. In contrast, weight loss and suicidal ideation were the two least endorsed symptoms of depression by the students. The study reported significant differences in the mean score of depression between gender and no significant difference in the depression scores in terms of locations and ethnicity. The results also reported a low negative correlation between depression and resilience ( $r = -.219$ ). Symptoms of guilt, self-accusation and punishment are common among depressed students who had lower resilience.

**Keywords:** *Depression, resilience, students, gender*

## Introduction

Mental health is defined as the promotion of positive physical, mental and social well-being.<sup>33</sup> It includes the ability to accept others and to have positive attitudes towards oneself.<sup>14</sup> Mental health is an important aspect of students' development. According to<sup>21</sup>, mental health has implications on students' self-esteem, behaviour, attendance at school, as well as educational achievement. However a prolonged state of mental health problems could also cause students to become withdrawn and develop the inclination to commit suicide. Common symptoms of mental health include anxiety, depression as well as substance abuse. This study will focus on assessing depression among students in Malaysia. A depressed person without proper intervention will create the most massive burden to the sufferers. <sup>2</sup> suggested that major depressive disorder is a common and serious

medical illness that adversely affects how an individual feel, think and act.

Research by <sup>15</sup> showed that depression is the most common illness reported in Malaysia. It is claimed by the 2008 National Suicide Registry Malaysia annual report that 31% of those who committed suicide were depressed.<sup>16</sup> Depressive disorders were ranked as the third leading cause of global burden diseases in 2004 and will move into first place by 2030.<sup>32</sup> According to <sup>12</sup>, the study on 1412 selected students, the prevalence of depression was found to be 49.2%, while the prevalence of severe depression was 7.7%. The overall prevalence of depression was significantly ( $p < 0.001$ ) higher among females (55.1%) than males (45.8%). Feeling of guilt (69.48%) was one of the most prominent clinical factors associated with depression, followed by pessimism (58.14%), sadness (56.52%), and past failures (55.81%). A previous study from <sup>22</sup> among adolescents also showed a large number of females having cognitive thoughts that prevented their recovery from depression, while the males adjusted much better.

According to <sup>4</sup>, depression if left untreated among children and adolescents may lead to failure in school, conduct disorder and delinquency, anorexia and

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bulimia, school phobia, panic attacks, substance abuse, or even suicide. Depression can also create academic, disciplinary and social problems among children and adolescents.

Resilience is one of the elements that can help students to recover and bounce back while they suffer from difficulties. The inner resilience of the students plays a fundamental role in reducing depression.<sup>5,6</sup> According to<sup>17</sup>, resilience is relevant to life satisfaction among students, and it will improve the subjective quality of life and a positive perception of the educational environment. According to<sup>28</sup>, resilience is a psychological process developed in response to intense life stressors and resilience facilitates healthy functioning. Thus, resilience connotes inner strength, competence, optimism, flexibility, and the ability to cope effectively when faced with adversity. The decrease in the level of resilience is often accompanied by an increased level of depressive symptoms.<sup>27</sup> Therefore, students need to be resilient for depression to be reduced. It is in line with the study conducted by<sup>9</sup> that a higher level of resilience is associated with a lower level of psychological distress and facilitates healthy functioning.<sup>28</sup>

### Material & Method

**Sample:** The sample consisted of 560 students from five secondary schools (male = 257, female = 303). The age mode for the sample is 16 years old. The sample ethnicity consisted of 437 Malays (78.0%), 67 Indians (12.0%) and 56 Chinese (10.0%) students. Three hundred fifty-four students (63.2%) were from schools located in the urban area, whereas 206 students (36.8%) were from rural schools.

**Instrument:** To measure intensity and severity of depression, the authors adapted the Beck Depression Inventory II (BDI-II). The 21 symptoms measured by BDI-II.<sup>26</sup> Nevertheless, in this study, the last item (loss of libido) was excluded from the instrument since based on the pilot test conducted, students were not comfortable to be asked such question. The reliability coefficient (Cronbach’s alpha) for the BDI was .824 (N = 20). The higher depression score indicating greater symptom severity.

The Resilience Scale 14 (RS-14) has been used to measure students’ resilience. It is a valid and reliable instrument to measure resilience, demonstrates the brevity, readability, and ease of scoring when selecting instruments for use with adolescents.<sup>19</sup> There liability

coefficient for RS-14 was .704. The higher scores in the scale are indicative of higher resilience level.

**Data Analysis:** Descriptive statistics, namely the mean and standard deviation, were reported to provide a summary of the information as well as the variation for each item. The depression symptoms were also calibrated in terms of severity based on the mean scores. An independent sample t-test was employed to investigate the differences in depression between gender and school locations. All the tests were conducted at p = .05 level. In addition, a correlation study was conducted between depression and resilience.

**Findings:** Feelingguilt is the most severe symptoms of depression (mean = 1.21, SD = 0.71) followed by self-accusation (mean = .92, SD = 1.01) and feeling of being punished (mean = .84, SD = 0.82). Meanwhile, the three least severe symptoms of depression are weight loss (mean = .28, SD = 0.66), suicidal ideas (mean = .37, SD = 0.66) and loss of appetite (mean = .37, SD = 0.72). Meanwhile, the Malaysian sample does not endorse insomnia even though it has been reported as the most severe symptom for Korean<sup>8</sup> as well as Iranian<sup>30</sup> sample of students.

**Table 1: Descriptive statistics of the BDI items**

Symptom	Mean ± SD
D5: guilt	1.21 ± 0.71
D8: self-accusation	.92 ± 1.01
D6: punishment	.84 ± 0.92
D10: crying	.75 ± 1.13
D15: work difficulty	.74 ± 0.73
D3: sense of failure	.73 ± 0.89
D17: fatigability	.69 ± 0.78
D11: irritability	.67 ± 1.00
D1: mood	.66 ± 0.79
D20: somatic preoccupation	.62 ± 0.78
D4: self-dissatisfaction	.60 ± 0.81
D14: body image change	.59 ± 1.00
D7: self-dislike	.59 ± 0.72
D13: indecisiveness	.55 ± 0.89
D12: social withdrawal	.54 ± 0.83
D2: pessimism	.53 ± 0.80
D16: insomnia	.48 ± 0.82
D18: loss of appetite	.37 ± 0.72
D9: suicidal ideas	.37 ± 0.66
D19: weight loss	.28 ± 0.66



In Table 2 shows that the mean score of the female ( $33.76 \pm 8.12$ ) is significantly higher than male students ( $31.49 \pm 7.85$ ),  $t(558) = 3.343$ ,  $p = .001$ . Meanwhile, there is no significant difference in the mean score of depression between students from the urban ( $32.66 \pm 7.72$ ), and those from the rural schools ( $32.83 \pm 8.79$ ),  $t(558) = 0.227$ ,  $p = .828$  as depicted in Table 3. The results from the ANOVA report no significant difference between the ethnic groups [ $F(2, 557) = 1.156$ ,  $p = .315$ ].

**Table 2. Results between gender and location of the sample**

Demographic	Mean ± SD	T	p
<b>Gender</b>			
Male	31.49 ± 7.85	-3.343	.001
Female	33.76 ± 8.12		
<b>Location</b>			
Urban	32.66 ± 7.72	-.227	.828
Rural	32.83 ± 8.79		

**Table 3. Results for the Effect of Ethnicity on Depression**

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	150.697	2	75.348	1.156	.315
Within Groups	36300.735	557	65.172		
Total	36451.421	559			

Results also reported a low negative correlation between depression and resilience ( $r = -.219$ ).

### Conclusion

Results indicate that feeling guilty is the most severe symptom of depression among students, followed by self-accusation and feeling of being punished. Guilt involves feeling of regret, as well as being critical or judgmental toward themselves. Feeling guilty can lead to problems like low self-esteem that may affect students' academic achievement.<sup>1</sup> Feeling guilty will push students into a deeper and hopeless frame of thoughts. This cognitive distortion will lead to negative consequences for students' emotions and behavior. It can lead to self-blame. Excessive self-blaming will contribute to people developing negative emotions and it can be an independent risk factor in addition to having depressive symptoms. However, a study from<sup>24</sup> stated that self-blaming can function as the consequences of depression rather than causing it.

The feeling of guilt can also cause self-accusation and students tend to blame themselves for whatever failures. Another important symptom of depression among Malaysian students is the feeling of being punished. Self-accusation will lead the students to view him or herself negatively. Consistently feeling bad and negative self-esteem will lead the person to have a depressive symptom.<sup>34</sup>

Results showed that female students demonstrated higher mean score compared to males. This is consistent with many other studies documented in the literature<sup>3,7</sup>, even though it does not replicate the findings from several other local studies.<sup>10,35</sup> One possible explanation for this finding can be attributed to the constant changes in hormones, especially during puberty. In addition, premenstrual problems can also increase depression syndromes such as irritability and loss of appetite. Females also engage in more negative events and emotions.<sup>29</sup> Compared to males, females have displayed significantly higher negative cognitive distortion.<sup>36</sup> The findings are supported by Beck's theory that a person who has cognitive distortions will contribute to their negative perceptions and will view their life as hopeless.<sup>36</sup> In contrast, the male students are likely to act, by expressing anger, rather than thinking too much about the situations.

Results show that no significant difference in the mean score of depression between school locations. This is consistent as reported by.<sup>20</sup> However it contrasts from study by<sup>11</sup>.

Ethnicity is another important demographic variable even the findings are contradictory. For example,<sup>23</sup> found that the prevalence of major depressive disorder was significantly higher in whites than in African Americans and Mexican Americans. However, the finding contradicted earlier findings such as studies conducted by.<sup>25</sup> In Malaysia, the trends are similar. A study by<sup>13</sup> revealed that the Indian descendants demonstrate the highest prevalence of depression compared to other major ethnicities such as the Chinese and the Malays. This contradicts studies conducted by<sup>11,20</sup> that reported the Chinese ethnic group as having the highest depression scores. This study is essential since ethnicity is important in a country of multi-ethnicity like Malaysia.

The results also show a low negative correlation between depression and resilience. It was supported

by.<sup>18</sup> They pointed out that adolescent who has a high level of resilience will experience a low level of emotion or behavioral problem.

Depression among students is common but mostly unrecognized. Most teachers lack of knowledge to identify symptoms of depression and not aware that depression has a significant effect on academic performance. This is where schools play a critical role since schools have long-term access to the students, particularly at critical periods of their development. Delivering appropriate interventions, especially elements of resilience will help students to overcome the symptoms at an early stage and thus preventing the symptoms worsening.

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# Relationship Between Age of Exposure and Media to Pornographic Exposure to Adolescents in Gorontalo City, Indonesia

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## Abstract

**Context:** Pornography is a variety of communication media that contain elements of obscenity that are perceived as violating the norms of decency in society. Adolescents in the area of DKI Jakarta and Pandeglang have been exposed to pornography by 96.7%. Globalization and the development of science and technology, especially in the field of information and communication, has become one of the parts in the creation, dissemination, abuse and development of pornographic media. This study aims to determine the relationship between age of exposure and media with exposure to pornography in adolescents in Gorontalo City, Indonesian. This study uses primary data obtained from the standard questionnaire, namely the early detection pornography exposure questionnaire (family health directorate, Ministry of Health of the Republic of Indonesia) which is filled by respondents aged 15-17 years. Analysis shows that exposure age (p value = 0,000) and media (p value = 0,000) are related to exposure to pornography. Age of exposure and media can explain 72.2% for exposure to pornography. need to involve gender, peers, relationship status, and family to see other factors related to exposure to pornography.

**Keyword:** *Pornography, adolescent, exposure, media*

## Introduction

Various statistical evidence shows the exposure and access of children, pre-teens and adolescents to pornography. Reported that 90% of children (from ages 8 to 16 years) claimed to have seen pornography on the Internet.<sup>(1)</sup> Internationally, between 75% and 90% of teenagers living in developed countries have seen pornography on the Internet before they were 18 years old.<sup>(2)</sup> According to a screening survey conducted by the Indonesian Demographic and Health Survey in 2017, it shows that adolescents aged 15-19 years, as many as 61.36% have held hands with girlfriends,

hugged with boyfriends as much as 16.07%, kissed as many as 29.61%, fingering/ feeling boyfriend as much as 8.77% and having premarital sexual relations as much as 2.34% and as many as 96.7% of adolescents in the area of DKI Jakarta and Pandeglang have been exposed to pornography and experience pornography addiction by 3.7%.<sup>(3)</sup>

Free association of adolescents in the Gorontalo city environment results in an increase in the number of child marriages and the number of people with HIV (Human Immunodeficiency Virus). According to data on underage marriage events in the Gorontalo provincial ministry's regional office in 2018, Gorontalo city ranks third most underage marriages with 89 underage children from 356 cases.<sup>(4)</sup> The high level of marriage in young age is influenced by several factors, namely the failure of the quality of education owned by the community, religious factors and encouragement from parents, and economic factors. Even more worrying, the factor of

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early marriage is caused by pregnancy before marriage. Reported of 356 cases, 70% of cases were caused by prenatal pregnancy. Pornography is one of the causes of rape.

In Indonesia, there is a legal basis and action on pornography, namely Law Number 44 of 2008, which states that pornography is a picture, sketch, illustration, photo, writing, sound, sound, moving image, animation, cartoon, conversation, motion body, or other forms of message through various forms of communication media and / or performances in public, which contain sexual obscenity or exploitation that violates the norms of decency in society.<sup>(5)</sup>

The internet is a space with a wider range of information. Various information can be obtained easily via the internet. The topics of information presented are varied, so that one of the sources of information that is popular with the public is the internet. This is offset by increasing internet users too, so information providers are increasingly interested and incentive to disseminate their information via the internet. The positive impact obtained from internet use is very abundant, but the negative impact is also not less numerous and destructive in nature. One of the most troubling effects is pornography. This impact can slowly damage some aspects of the individual who consumes it.

The scope of the causes of exposure to pornography is still very broad. Based on the description of the background, this study aims to determine the relationship between age of exposure and media with exposure to pornography in adolescents in Gorontalo City, Indonesia.

### Method

This study used a pornography early detection questionnaire by the directorate of family health, Ministry of Health of the Republic of Indonesia. The sample used is adolescents aged 15-17 years in the city of Gorontalo. This type of research is observational analytic using cross sectional design. The research variables are exposure to pornography, age of exposure and. Data analysis was carried out using nonparametric statistical test namely chi square and multivariable logistic regression analysis using SPSS.

### Results

Gorontalo City is the capital of Gorontalo Province, Indonesia. Gorontalo City has an area of 66.25 km<sup>2</sup> (0.55% of the total area of Gorontalo Province). High school students in Gorontalo City number 6099 students. The sample used in the study amounted to 350 respondents from the total sample taken as many as 400 respondents, because 50 respondents did not meet the sample criteria in the study. This figure exceeds the minimum sample that must be used for 348 samples based on the calculation of the 1997 Lameshow formula.

Table 1 shows the respondents aged <12 years old have the highest presetase of exposure to pornography which is equal to 100%, respondents aged 12-15 years old have the highest presetase exposed to pornography that is equal to 99.5% and respondents aged 16-18 years old have the highest presetase exposed to pornography namely 93.3%. Overall the age of exposure is significantly related to pornography exposure based on the calculation of p value <0.05.

**Table 1: Age of Exposure to Exposure to Porno graphy to Adolescents in Gorontalo City**

Age of Exposure	Pornography exposure				Total		P Value
	Exposed		Not Exposed		n	%	
	n	%	n	%			
<12 years old	42	100	0	0	42	100	0.000
12-15 years old	205	99.5	1	0.5	206	100	
16-18 years old	83	93.3	6	6.7	89	100	
Never seen	0	0	13	100	13	100	

Table 2 shows the internet sites have the highest percentage of exposure to pornography which is equal to 98.6%, social media has the highest presetase exposed to pornography that is equal to 98.4%, print media has the highest presetase exposed to pornography which is

97.1% and electronic media has the highest presetase of exposure to pornography at 97%. Overall, the media used by teenagers to access pornography is significantly related to pornography exposure based on the calculation of p value <0.05.

**Table 2: Media used by Teenagers to Access Pornography on Exposure to Pornography to Adolescents in Gorontalo City**

Media	Pornography exposure				Total		P Value
	Exposed		Exposed				
	n	%	n	%	n	%	
Never seen	0	0	14	100	14	100	0.000
Print media	33	97.1	1	2.9	34	100	
Internet site	142	98.6	2	1.4	144	100	
Social media	123	98.4	2	1.6	125	100	
Electronic media	32	97	1	3	33	100	

Table 3 shows the R2 value of 0.722, which means that the ability of the independent variable to influence is the percentage of age exposed and the media to explain the amount of variation in the dependent variable, namely exposure to pornography at 72.2%, while the remaining 27.8% is explained by other variables that are not included in the variables studied.

**Table 3: Coefficient of determination pornography exposure test results**

Model	R	R Square
1	0,256	0,722

**Discussion**

The younger the age of exposure, the more often the person will often do it later on. This is because each individual experiences a period of development from year to year.

The results of statistical tests show that the age of exposure is significantly associated with exposure to pornography. The age range that is most exposed to first time when 12-15 years old is when the respondent is in the initial phase of puberty. This is consistent with research conducted by Weber (2012) that exposure to pornography was first related to child development, because children do not have maturity and sexual experience in real life, so they are very vulnerable to the internalization of portrayals of human sexuality.<sup>(6)</sup> Other studies show that the age at which pornography is exposed is related to sexuality in adulthood.<sup>(7)</sup>

The study also found that respondents were first exposed to pornographic material in the form of videos through internet sites. Most of them see pornographic material at home inadvertently with their peers.

Mass media is a tool used to convey messages from

sources to recipients using communication tools. The development of information systems and technology has led to more and more alternative mass media owned by the community. Directly or indirectly, the media is one place for the dissemination of pornographic material.

The results of the statistical test of this study indicate a significant relationship between the media used by teenagers to access pornography and exposure to pornography. Most respondents stated that they access pornographic material through social media that they access from the bedroom. This research is in line with the research conducted by Heidari (2012) who argues that sexual content circulating in the mass media will cause sexual deviations in adolescents.<sup>(8)</sup> Mass media shows that highlight aspects of pornography are believed to be very closely related to the increasing number of cases of sexual violence that occur in adolescents.

Strong stimuli from the outside in the form of sex films, soap operas, reading books and magazines with sexy images, and direct observation of sexual acts not only lead to peak sexual desire but also result in faster sexual maturity in children.<sup>(9)</sup>

Addiction to pornography can not only cause chemical changes in the brain but can cause anatomical and pathological changes that cause hypofrontal syndrome. Excessive consumption of pornography will cause consequences on the social life of adolescents. Other negative consequences may be the same as sexual addiction, thus affecting his personal life.<sup>(10, 11, 12)</sup>

Pornography is a visual representation of sexuality that is inadequate, causing an individual to have the wrong concept of a person’s sexual relationship with a sexual object that will slowly cause a change in a person’s sexual attitude and behavior. Some cases show, if someone sees pornography continuously, it will

cause mental problems / disorders especially in terms of sexuality.<sup>(13)</sup>

### Conclusion

The age of exposure and the media is significantly associated with exposure to pornography. The percentage of age exposed and the media is able to explain 72.2 percent for exposure to pornography as 27.8 percent of which are caused by other factors.

**Suggestion:** The cause of exposure to pornography needs to involve gender, peers, courtship status, and families to see other factors related to exposure to pornography..

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# Poverty or People Density Affecting Human Development? Panel Data Regression Study

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## Abstract

**Context:** The main concept of human development introduced by United Nations Development Programs (UNDP) in 1990 was to create positive growth in long term. Human development index (HDI) is formed by three dimensions, a long and healthy life, knowledge, and a decent standard of living. The purpose of this study to determine the factors affecting HDI in Indonesia in 2012-2016. We use secondary data from free publication of Central Bureau of Statistics or as known as BPS in Indonesia. The datas were from East Java in 2012-2016 with districts/ cities as unit analysis. We analyze the data with panel data regression analysis. The results is poverty significantly affect HDI in East Java, Indonesia ( $p < 0.05$ ). The higher HDI, the smaller percentage of poverty. Policy formulation multidimensionally is needed to reduce poverty.

**Keywords:** *Human development index, poverty, people density*

## Introduction

The end of Millenium Development Goals (MDGs) implemented during the period 2000-2015 has indeed made progress for Indonesia. However, there are many indicators that still have not reached the target and required special attention. Thus, there are some homework that must be completed through this era, it is Sustainable Development Goals (SDGs).<sup>(1)</sup> The United Nations officially adopted the SDGs agenda as a global development agreement on September 25, 2015. The formulation of SDGs consist of three main pillars, Human Development, Social Economic Development, and Environmental Development. Human development can be achieved if the SDGs is also achieved.<sup>(2,3)</sup> The concept of human development introduced by UNDP in 1990 was to create positive growth in the economics, social, political, cultural, and environmental fields, as well as changes in human welfare. HDI is formed by

three dimensions, a long and healthy life, knowledge, and a decent standard of living. Healthy life measurement is described by life expectancy, is the number of years a newborn baby is expected to live. Knowledge is measured by mean years of schooling and expected years of schooling. Decent standard of living is described by adjusted per capita expenditure, which is determined by the value of expenditure per capita and purchasing power parity.<sup>(2,4)</sup>

In 2017, Indonesia has HDI 0.694 which makes this country ranked 116 out of 189 countries in the version of UNDP report. HDI in Indonesia is still below South African and Egyptian which are both developing countries.<sup>(4)</sup> Indonesia's HDI is also still far behind Southeast Asian countries. Indonesia has 34 provinces divided into several islands. One of the provinces in Indonesia that is proclaiming an increase in human development is East Java on the island of Java. In 2016, East Java had HDI of 69.74.<sup>(2)</sup> It still tends to be low compared to other provinces on one island with East Java.

The research from Qiu (2018) shows that the standard of living dimension contributes more than the other dimension of HDI.<sup>(5)</sup> One of the targets that have not been achieved in the MDGs era is high national

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poverty level. Destilunna & Zain (2015) explained that increasing gross regional domestic product (GRDP) micro business, small and medium enterprises tend to be owned by region that has high population density. (6) This shows that population density is not always problems in human development, because people can help in increasing economy. This can increase the level of human development in the area.

Increasing HDI, it is need to analyze some factors that are thought to affect the dimensions of HDI that indirectly affect the HDI itself. There are many factors influencing HDI. Based on the background above, the aim of this study is to determine the factors influencing HDI, especially in East Java, Indonesia.

### Material and Method

This study was conducted in one of the provinces in Indonesia, it is East Java. This research is a non-reactive study because only carries out secondary data from free publication of Central Bureau of Statistics or as known as BPS in East Java, Indonesia. The unit analysis of this study is the districts/ cities with 38 districts/ cities. Analysis data used panel data regression analysis with effect model (FE) approach, which is analysis using

combined data between cross sectional and time series data. (7) Cross sectional data is shown by 38 unit analysis (districts/ cities) and time series data indicated by the number of periods used in this study (2012-2016). The analysis is used to determine the effect of independent variables on the dependent variables. General model from panel data regression analysis with the FE approach is:

$$Y_{it} = \alpha_{it} + \beta'X_{it} + \varepsilon_{it}$$

Where i is individual or cross sectional and t is the time of period.

Dependent variable in this study is the HDI, while the independent variables used are poverty and population density. The poverty in the percentage of poor people who are under poverty. (8) Population density is the average population per one square kilometer in a particular area. (9)

### Results

Poverty in East Java is still fluctuative. It means the percentage of poor people is still up and down in every year. Figure 1 shows the development of poverty from 2012-2016.

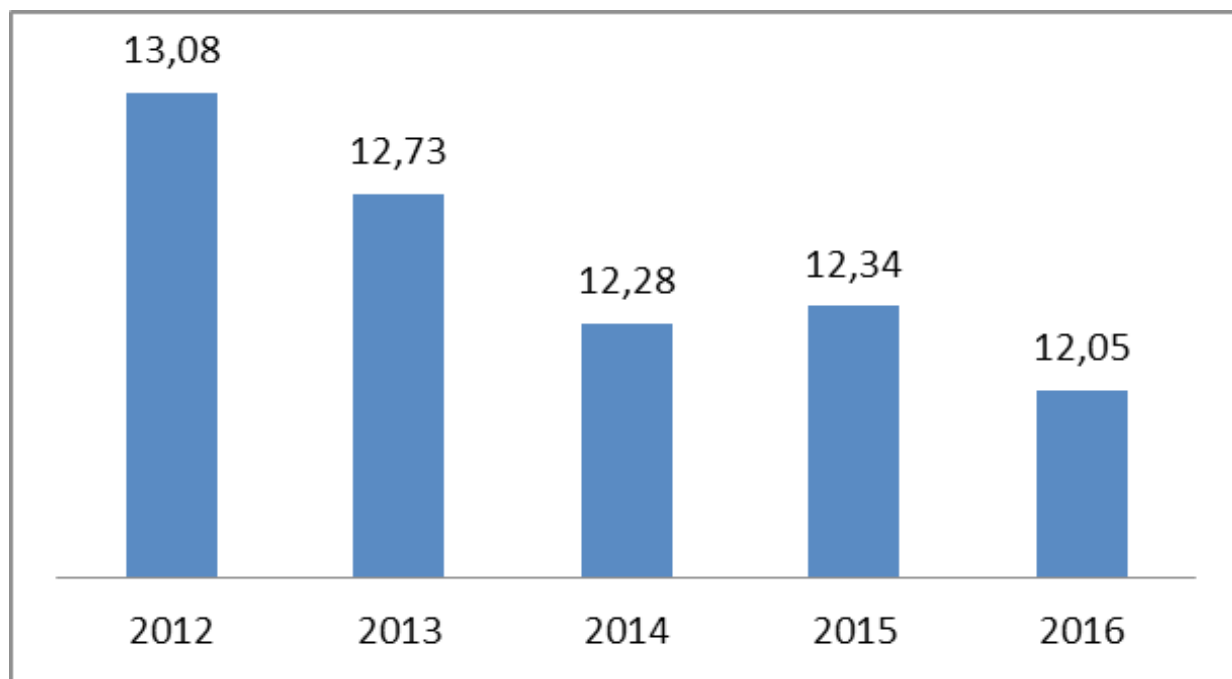


Figure 1. Poverty Development in East Java

Population density is increases continously in Indonesia and East Java (Figure 2). The region with the highest population density is Surabaya, considering that it is the capital of East Java.

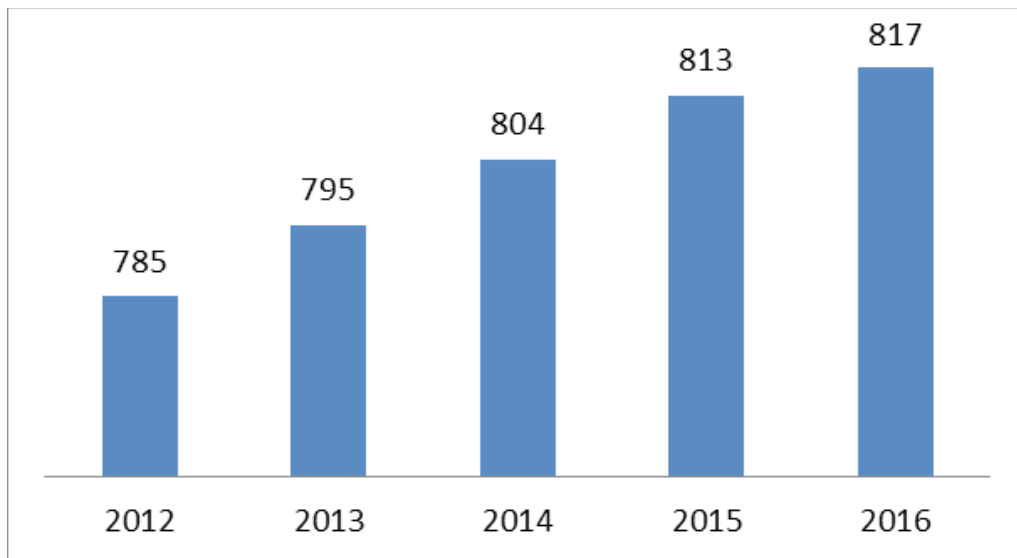


Figure 2. Population Density in in East Java

Figure 3 shows the development of HDI in East Java from 2012-2016. In that period, most regions in East Java had HDI with moderate category ( $60 \leq IPM < 70$ ). From 38 districts/ cities in East Java, there is area with low category HDI from 2012-2016. It is Sampang.

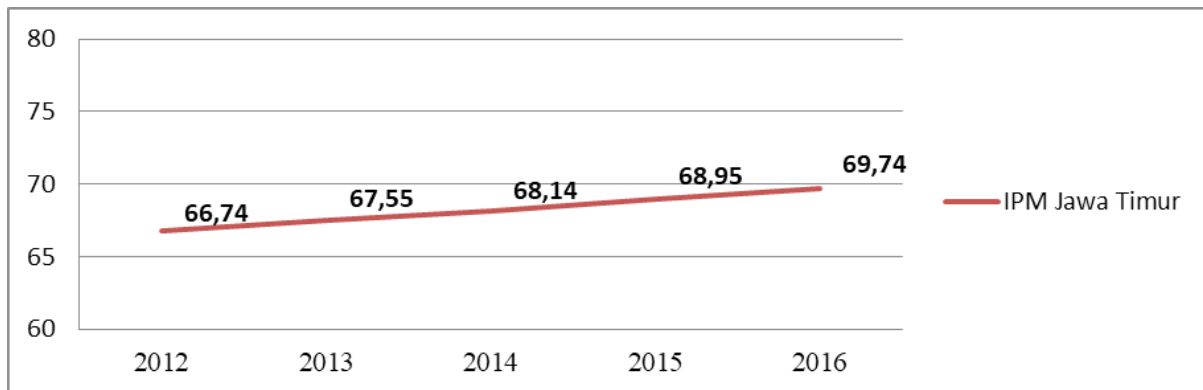


Figure 3. Human Development Index in East Java

Table 1 shows the statistics descriptive from dependent and independent variables for all districts/ cities in East Java from 2012-2016 (panel data).

Table 1. Overviewed Dependent and Independent Variables

Variabel	Min	Max	Mean	Standard deviation
Human Development	55.78	80.46	68.47	5.45
Poverty	4.33	27.97	12.32	5.08
Pop. Density	277	8606	1824.93	2136.86

In panel data regression analysis there are three approaches to estimate model seen from the type of data, common effect model (CE), fixed effect model (FE), and random effect model (RE). Testing three approaches is needed to choose which estimation technique is the best. First, F-test to choose the best model between CE

or FE model. In the test, the value of cross section F was 0.000 ( $p < 0.05$ ). It means that the FE model is better model than the CE model. Then the Hausman test, to choose the FE model or RE model. In the Hausman test, p-value generated in the cross section random was 0.000 ( $p < 0.05$ ), it means that FE model is better model

than the RE model. Because between two testing model approaches states the FE model is the best model, the study seen is the model produced by FE model approach.

The results of panel data regression analysis with

the FE model are shown in table 2. It can be seen that the poverty is significant to the HDI which has significant value 0.000 ( $p < 0.05$ ). While in this study, the population density did not have significant effect ( $p > 0.05$ ).

**Table 2: Panel Data Regression Analysis**

Model	Coefficient	Std. Error	t-statistics	Prob.
Constant	81.663	1.503	54.339	0.000
Poverty	-1.166	0.107	-10.889	0.000
Population Density	0.001	0.000	1.949	0.053

Simultaneous significance test (F-statistics) is used to see wheter the model produced simultaneously independent variables affect the dependent variable. This study obtained p-value for simultaneous test of 0.000 ( $p < 0.05$ ), it means poverty together has an influence on HDI and has a negative coefficient value.

In table 3 shows the statistical criteria of the model. The resulting coefficient of determination is 0.984, it means that the ability of independent variables simultaneously in explaining the HDI variable is 98.4%. While 1.6% is explained by other variables that not included in this study.

**Table 3: HDI Determiation Coefficient Test Results**

Model	R-Squared	Adjusted Squared	R-	Std. error
1	0.984	0.980		0.774

So, the model formed is The value of coefficient is 81.663. If the independent variable constant, HDI at this time is 81.663.

### Discussion

The measurement of human development that has been made, not all can be used as a standard measurement, can be compared with regions or countries. Achievement of human development in Indonesia, especially in East Java is higher in the cities area than to districts area. It can bring about HDI gap problems in several regions. Human development itself is actually closely related to the objectives of SDGs. Achievement of HDI value will determine the order among regions. But the the success of human development is not absolutely depend on rank or position.<sup>(10)</sup>

The success of human development can be seen from how much the basic problems in society, such as poverty. According to the World Bank, poverty is a lack of welfare, so to measure it can use welfare indicators like income or consumption per capita (Leasiwal, 2013).<sup>(9)</sup> Poverty can reduce economic value due to limited resources. Poverty reduction policies really need to be don in a multidimensional manner.

The poverty factor shows a negative correlation with HDI in this study (-1.166). When poverty in an area decreases one percent, it can increases the rate of HDI level by 1.166. It is compatible with the research conducted by Patta (2012) in using multiple linear regression analysis which shows that the percentage of poor people affect the HDI.<sup>(10)</sup> Poverty is related to economic, social, cultural, environmental, health, education, social political, and ethical dimensions that can affect development in an area. The formulation of poverty alleviation policies really needs to be done in multidimensional manner.

### Conclusion

In conclusion, factor affecting human development in Indonesia, especially East Java Province in 2012-2016, is poverty. The smaller percentage of poverty, the higher HDI.

**Suggestion:** HDI is a measurement of development in countries involves many sectors. Thus, an analysis of factors affecting HDI is expected in several dimensions such as health, education, economics, etc.

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**Ethical Clearance:** This study was approved by Ethical Commission of Health Research, number 149/EA/KEPK/2019, Faculty of Public Health, University of Airlangga, Surabaya.

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# Effect of Low Density Lipoprotein (LDL) to High Density Lipoprotein (HDL) Ratio with Stroke in Adults in Bogor City

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## Abstract

**Context:** Stroke is one of the main causes of death and neurological disability in Indonesia. Stroke is a cerebrovascular disease which increases in number every year. This study aims to determine the effect of the ratio of Low Density Lipoprotein (LDL) to High Density Lipoprotein (HDL) with the incidence of stroke in the adult population. This study used data from the PTM (non-communicable disease) cohort study in 2011. The sample in this study was adult population (25-65) years who were respondents to the PTM cohort study in Bogor in 2011 which numbered 1506 and analyzed using regression tests. logistics with statistical significance are seen based on 95% confidence intervals. Sample prevalence in adult population in the city of Bogor who suffered a stroke of 1.26%, respondents with a high ratio of LDL to HDL were 35.66%. Respondents with a age of sebesar46 years were 34.26% with the highest prevalence of sex in women amounting to 53.45% and those with low education were 54.58%, respondents who were obese were 27.42%, respondents with high total cholesterol levels were 38, 45% and respondents with high triglyceride levels of 17.07%. The results showed that there was a significant relationship between the ratio of LDL to HDL and the incidence of stroke with an adjusted prevalence odds ratio of 3.909 (95% CI 1.346-11.354). The high ratio of LDL to HDL is at risk for the incidence of stroke in the adult population.

**Keywords:** Stroke, LDL to HDL ratio, Logistic Regression.

## Introduction

Non-communicable diseases are a leading cause of death globally. WHO data shows that of the 57 million deaths in the world in 2008 as many as 26 million were caused by non-communicable diseases (PTM). In countries with low and middle economic levels, 29% of deaths occur in people aged less than 60 years and are caused by PTM. While in developed countries as much as 13% which causes death.<sup>1</sup>

Cardiovascular disease is a disease caused by a malfunction of the heart and blood vessels. Cardiovascular disease that we often know is heart disease and stroke. Stroke occurs due to a blockage of blood supply to the brain which can occur due to a ruptured or blocked blood vessel. This results in a breakdown of the supply of oxygen and nutrients to the brain which then damages brain tissue.<sup>2</sup> Cardiovascular and metabolic diseases are caused by several multifactors whose risk factors can be modified. One of the causes that can be modified

is dyslipidemia which triggers the occurrence of these diseases.<sup>3</sup>

According to the *American Heart Association* (AHA), the death rate of stroke patients in America each year is 50-100 of 100,000 sufferers.<sup>4</sup> The *American Heart Association* estimates that every year the incidence of stroke is approximately 795,000 Americans, both new strokes and recurrent strokes. About 610,000 are new strokes or first attack strokes and 185,000 recurrent stroke. While overall stroke prevalence is estimated at around 2.7%.<sup>5</sup> In the United Kingdom there are more than 100,000 stroke patients each year. There are more than 1.2 million stroke sufferers in the United Kingdom.<sup>6</sup>

Results of data from the Basic Health Research (Riskesmas) in 2007, stroke was the leading cause of death in Indonesia, with an incidence of 8.3 per 1,000 population and then increased to 12.1 per 1,000 population in 2013. This figure rose compared to the 2007 National Health Survey. Prevalence Stroke

based on diagnosis of health care was highest in North Sulawesi (10.8 %), followed by DI Yogyakarta (10.3 %), Bangka Belitung and DKI Jakarta respectively 9.7 per 1000 inhabitants. The prevalence of stroke based on diagnosed health care and symptoms is highest in South Sulawesi at (17.9%), DI Yogyakarta at (16.9 dan) and followed by Central Sulawesi at (16.6%) and East Java at 16 per mile.<sup>7</sup>

Dyslipidemia is a disorder of lipid metabolism which can be in the form of an increase or decrease in lipid fraction, namely increased cholesterol levels, increase in triglyceride levels, increase in LDL-C levels (*Low Density Lipoprotein-Cholesterol*) and decreased levels of HDL-C (*High Density Lipoprotein-Cholesterol*).<sup>8</sup> Consistently the relationship between the increased risk of stroke and dyslipidemia has been proven by various epidemiological studies. Increased risk factors for stroke associated with high levels of LDL (*Low Density Lipoprotein*), low HDL (*High Density Lipoprotein*) cholesterol and a high ratio of LDL and HDL cholesterol are then reinforced by the presence of other risk factors.

LDL has an important role in atherosclerosis which is the basis of cardiovascular and metabolic diseases among all existing lipid components. Atherosclerosis occurs because of the result of *Low Density Lipoprotein* (LDL) which has been oxidized and trapped in the subendothelial blood vessels. In Indonesia, based on the 2013 Riskesdas data, more than 40% of Indonesia's population over the age of 15 experience LDL type hyperlipoproteinemia.<sup>7</sup>

Thereport *National Health and Nutrition Examination Survey* (NHANES) from 2003 to 2006 estimated that 53% (105.3 million) of American adults had at least one Abnormal lipid level, of which 27% (53.55 million) had LDL levels -C is high, 23% (46.4 million) have low HDL-C levels and 30% (58.9 million) have high triglyceride levels. In addition, about 21% (42 million) of American adults have mixed dyslipidemia which is defined as the presence of high LDL-C levels combined with at least one other lipid disorder.<sup>9</sup>

Other studies also found the prevalence of dyslipidemia in the adult population in China as much as 41.9%, which included 17.7% hypertriglyceridemia, low HDL 11%, hypercholesterolemia 10.1% and high LDL levels 8.8%.<sup>11</sup>

In Indonesia the prevalence of dyslipidemia is still quite high. Based on the Riskesdas report in 2013 the

prevalence of total cholesterol in Indonesia was 35.9%, HDL 22.9%, LDL 15.9% and triglycerides at 11.9%.<sup>9</sup>

The ratio of LDL cholesterol to HDL is an important component as an indicator of vascular risk factors. Someone who has a high ratio of LDL and HDL cholesterol has a greater risk factor for cardiovascular disease due to an imbalance between cholesterol carried by atherogenic lipoproteins and protective lipoproteins. This occurs because of the increase in LDL levels and decreased HDL levels or both.<sup>12</sup>

## Material and Method

The study design used in this study was an analytical observational study with a study design *cross sectional*. This study uses secondary data sourced from data *baseline* the 2011 PTM cohort study carried out by the Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. The sample in this study was individual household members who were selected by *simple random sampling*, namely residents aged 25-65 years who lived in the city of Bogor. Data collected by the WHO STEPS method includes interviews of home visits, physical measurements and laboratory examinations. To establish a diagnosis of symptoms and experience of stroke, interviews were conducted with trained health personnel questionnaires. Respondents who have one of the symptoms of a stroke will be followed by confirmation of stroke by a neurologist.

Respondents for this cohort study totaled 1847 respondents. Data with a complete examination is 1506 which can be analyzed further. The data included in the analysis criteria were respondents interviewed and performed a stroke confirmation check. The dependent variable is a stroke that is divided into strokes and not strokes based on the results of a stroke confirmation by a neurologist. While the independent variable is the ratio of LDL to HDL.

**Data Analysis:** This study research was analyzed using statistical software namely STATA 13. Stroke, the ratio of LDL to HDL and other covariate variables were presented in the form of frequency and percent. Bivariate analysis in this study used the *test chi square* to determine the crude prevalence odds ratio (POR). All variables with a value of  $p < 0.25$  in bivariate analysis are candidates for further analysis. Multivariate analysis in this study used a logistic regression test with a significance level seen based on the value of 95% CI.

**Findings:** Analysis were conducted on 1506 adult respondents who had complete data. The results of the analysis showed that the prevalence of stroke was 1.26% and the prevalence of respondents with a high ratio of LDL to HDL was 35.66%. The highest prevalence of respondents is at the age of <46 years which is equal to 65.74% with the highest sex in women which is equal to 53.45% and low education at 54.58%. Based on the obesity variable the most respondents were not obese at 72.58% with high total cholesterol levels of 38.45% and respondents with high triglyceride levels of 17.07% (Table 1).

Bivariate analysis was performed to determine the crude prevalence odds ratio (POR). After all the covariate variables were analyzed there were two variables that had a value of  $p > 0.25$ , namely gender and triglyceride levels. So that there are four covariate variables that meet the criteria for entering into multivariate models namely age, education, obesity and total cholesterol levels. However, in this study all covariate variables were included in the multivariate model because in substance the two variables namely gender and triglyceride levels were associated with stroke (Table 2). The results of multivariate analysis of the effect of the ratio of LDL to HDL with the incidence of stroke can be seen in table 3.

**Table 1: Characteristics of Respondents**

Variable	Frequency (n)	Percentage (%)
<b>Stroke</b>		
Stroke	19	1.26
No stroke	1487	98.74
<b>LDL to HDL ratio</b>		
High ( $\geq 2,9$ )	537	35,66
Low ( $<2,9$ )	969	64,34
<b>Age</b>		
$\geq 46$ Year	516	34,26
$<46$ Year	990	65,74
<b>Gender</b>		
Male	701	46,55
Female	805	53,45
<b>Education</b>		
Low	822	54.58
High	684	45.42
<b>Obesity</b>		
Yes(BMI $\geq 27$ )	413	27.42
No (BMI $<27$ )	1,093	72.58
<b>Total Cholesterol Levels</b>		
High	579	38.45
Low	927	61.55
<b>Triglyceride Levels</b>		
High	257	17.07
low	1,249	82.93

**Table 2: Bivariat Analysis of Effect of LDL to HDL ratio by Genesis Stroke in Adults Population in Bogor City**

Variable	Stroke				POR	95% CI	PValue
	Stroke		Not Stroke				
	n	%	n	%			
<b>LDL to HDL Ratio</b>							
High ( $\geq 2.9$ )	12	63.16	525	35.31	3,14	1,131- 9,467	0.0118
Low ( $<2.9$ )	7	36.84	962	64.69			
<b>Age</b>							
$\geq 46$ years	13	68, 42	503	33.83	4.23	1.491- 13.664	0.0016
$<46$ years	6	31.58	984	66.17			
<b>Gender</b>							
Male	10	52.63	691	46.47	1.27	0.464-3.581	0.592
Female	9	47.37	796	53.53			
<b>Educational</b>							
Low	14	73.68	808	54.34	2.35	0.795-8.386	0.092
High	5	26.32	679	45.66			

Variable	Stroke				POR	95% CI	PValue
	Stroke		Not Stroke				
	n	%	n	%			
<b>Obesity</b>							
Yes (BMI ≥27)	8	42.11	405	27.24	1.94	0.672-5342	0.148
No (BMI <27)	11	57.89	1,082	72.76			
<b>Total Cholesterol Levels</b>							
High(≥200 mg / dl)	14	73.68	565	38.00	4.56	1.543-16.281	0,0015
Low (<200 mg / dl)	5	26.32	922	62.00			
<b>Triglyceride levels</b>							
High (≥ 150 mg / dl)	5	26.32	252	16.95	1.75	0.488-5.198	0.280
Low (<150 mg / dl)	14	73.68	1,235	83.05			

**Table 3. Multivariate Analysis Effect of LDL to HDL Ratio on Stroke in Adult Population in Bogor City (Final Models)**

Variable	p value	POR	95% CI
LDL to HDL ratio	0.012	3.909	1.346-11.354
Age	0.008	3.804	1.426-10.146
Interaction(LDL to HDL Ratio* Gender)	0.214	0.477	0.148-1.533

In the multivariate results above, compared to respondents has a low LDL to HDL ratio of respondents with LDL ratio high p HDL has an odds value of 3.909 or an 80% risk of suffering a stroke.

**Discussion**

In this study, the prevalence of stroke in the adult population in the city of Bogor was 1.26% or 12.6 per 1000 inhabitants. This result is higher than the prevalence of stroke in Indonesia based on Riskesdas data in 2013 which was 12.1 per 1000 population and in West Java Province 12.0 per 1000 population.<sup>7</sup> While the prevalence of not strokes in this study was more than half of the respondents, amounting to 98.74%. The results of this study are also in accordance with the *National Health and Nutrition Examination Survey* (NHANES) in 2010 that 6.8 million Americans over the age of 20 had suffered strokes. Overall the prevalence is 2.8%. Whereas based on research conducted by *Behavioral Risk Factor Surveillance* (BRFSS) in 2010 estimated the prevalence of stroke was 2.6% in adults over the age of 18 years.<sup>13</sup> This

Difference in the prevalence of stroke can be caused by stroke cases that continue to increase every year. Mortality and stroke prevalence also vary in developed countries. Differences can occur due to geographical variations in each region that cause differences in the

prevalence of stroke risk factors, genetic factors and stroke management factors themselves.<sup>14</sup> In Indonesia it may also occur as such, causing a difference in the prevalence of stroke between each region with a national prevalence of stroke prevalence.

This study aims to determine the effect of the ratio of LDL to HDL with the incidence of stroke in the adult population. The results showed that respondents with a high ratio of LDL to HDL had a chance of 3,909 to experience a stroke compared to respondents who had a low ratio of LDL to HDL. The results of this study are in accordance with the research conducted by Agusti et al (2014) which found that the prevalence of stroke was higher in a person with a high LDL to HDL ratio of 60%.<sup>15</sup> The results of other studies conducted by Robert H. Glew et al in adults in Nigeria showed a significant relationship between the ratio of LDL to HDL and the incidence of stroke in both men with a p value of 0.001 and women with a p value of 0.02.<sup>16</sup>

Increased risk factors for stroke are associated with high *Low Density Lipoprotein* (LDL), low *High Density Lipoprotein* (HDL) cholesterol, and a high ratio of LDL and HDL cholesterol and are strengthened by the presence of other stroke risk factors.<sup>15</sup> Abnormal cholesterol levels where LDL levels increase and HDL levels decrease have a close relationship with



cardiovascular disease because it triggers atheroma in the arteries. Where it develops into myocardial infarction, stroke and peripheral vascular disease.<sup>17</sup>The ratio of LDL cholesterol to HDL provides more prognostic levels than assessing LDL and HDL cholesterol itself separately.

### Conclusions

The prevalence of stroke in this study was 1.26% and the prevalence of a high ratio of LDL to HDL was 35.66%. In this study it can be concluded that someone with a high ratio of LDL to HDL is at risk for stroke.

**Conflict of Interest:** Both authors declare that there is no competing interest in this paper.

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**Ethical Clearance:** All data obtained will maintain the confidentiality of the subject's identity and the confidentiality of the data only for research purposes. The data usage permit was obtained from the Health Research and Development Agency (Litbangkes) of the Ministry of Health of the Republic of Indonesia written in the letter of approval and stated in the statement letter Number 28031902-025 and Faculty of Public Health University of Indonesia Ethics Committee(No.371/UN2.F10/PPM.00.02/2019).

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# lncRNAs as New Biomarkers in Systemic Lupus Erythematosus: A Prospective Study

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## Abstract

**Aim:** To investigate serum levels of two Immune-related functional lncRNAs, growth arrest-specific transcript 5 (GAS5) and metastasis-associated lung adenocarcinoma transcript 1 (MALAT1), in Egyptian patients with SLE and to evaluate their relationship with disease activity.

**Method:** The present study was a case-control study that was carried out on 39 patients with SLE and 46 age and sex-matched healthy controls. The expression levels of GAS5 and MALAT1 were measured using by real-time polymerase chain reaction (PCR).

**Results:** There were statistically significant differences between cases and controls in GAS5 ( $p < 0.001$ ) and MALAT1 expression ( $p < 0.01$ ). The mean GAS5 was significantly higher in the control; while the mean MALAT1 expression was significantly higher in SLE patients. The ROC curve revealed that GAS5 was a good discriminant with AUC 0.849 with sensitivity 93.5% and specificity 74.3%. Moreover, MALAT1 was a good discriminant to differentiate cases from controls with AUC 0.3 with 95% CI (0.162 - 0.438), the most suitable cut-off point was  $\geq 2.1$  with Sensitivity 93.5% and Specificity 72.5%.

**Conclusion:** GAS5 and MALAT1 may serve as potential biomarkers for the diagnosis and monitoring of the SLE, both lncRNAs exhibited a good diagnostic accuracy to discriminate between SLE patients and healthy controls.

**Keywords:** lncRNAs; Systemic Lupus; Biomarker; Diagnostic Accuracy

## Introduction

Systemic lupus erythematosus (SLE) is a progressive, chronic, disorder that affects multiple systems with recurrent episodes of exacerbations and remissions<sup>1</sup>. According to recent epidemiological figures, the estimated global incidences of SLE ranges from 0.3 – 23.2 per 100 000 person-years<sup>2</sup>sex, ethnicity and time. Method A systematic search of MEDLINE and EMBASE

search engines was carried out using Medical Subject Headings and keyword search terms for Systemic Lupus Erythematosus combined with incidence, prevalence and epidemiology in August 2013 and updated in September 2016. Author, journal, year of publication, country, region, case-finding method, study period, number of incident or prevalent cases, incidence (per 100 000 person-years). Although the exact pathogenesis of SLE is still unclear, it is widely believed that the disease arise as a result of abnormal autoimmune process; patients with SLE were found to have defective clearance of apoptotic cells with subsequent development of auto-antigens and dysregulated immune responses (affecting both innate and adaptive immunity)<sup>3,4</sup>. Various environmental and hormonal factors were linked to increased risk of SLE in genetically susceptible individuals<sup>5</sup>. SLE is

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characterized by wide range of clinical manifestations that mainly affects women in their reproductive age, patients with SLE often present with fatigue, weight loss, myalgias and muscle weakness, recurrent infection, and migratory polyarthropathy<sup>6</sup>retropatellar force (RPF). Moreover, a considerable proportion of the patients present with multiple systems affection such as lupus nephritis, pericardial disorders, valvular abnormalities, and cognitive dysfunction<sup>7</sup>.

Therefore, it is critical to diagnose SLE early and identify patients with increased risk of high disease activity in order to optimize SLE outcomes. Over the past few decades, a wide spectrum of biomarkers have emerged for early detection of SLE including antibodies, complement and complement split products, cytokines, chemokine biomarkers, and epigenetics-related biomarkers such as noncoding RNAs<sup>8</sup>. The noncoding RNAs are regulatory RNAs that control many biological process such cell cycles, apoptosis, and remodeling<sup>9</sup>. Long noncoding RNAs (lncRNAs) are the largest proportion of mammalian non-coding transcriptome (larger than 200 nucleotides) that are key components of many structural, activating, and/or functional roles within the body<sup>10</sup>. Previous study has shown that lncRNAs play significant role in the pathogenesis of different diseases such as cancer and neurological disorders<sup>11,12</sup>. Recently, a growing body of evidence reported increased expression of a number of lncRNAs in SLE patients. Owing to their immune-related functions and regulatory role in apoptosis, lncRNAs are proposed to contribute significantly in the molecular pathogenesis of SLE<sup>13</sup>. Thus, they may serve as accurate biomarkers of SLE development and activities.

We performed this study to investigate serum levels of two immune-related functional lncRNAs, growth arrest-specific transcript 5 (GAS5) and metastasis-associated lung adenocarcinoma transcript 1 (MALAT1), in Egyptian patients with SLE and to evaluate their relationship with disease activity.

## Materials and Method

**Study Design and Patients:** The present study was a case-control study that was carried out from November 2017 to August 2018 in the Medical Biochemistry Department, Cairo University. The study included 39 patients who were diagnosed with systemic lupus erythematosus (SLE) and 46 age and sex-matched healthy controls. Adults patients (aged >18 years old)

with diagnosis of SLE according to the 2012 Systemic Lupus International Collaborating Clinics (SLICC) criteria were included<sup>14</sup> meet stringent methodology requirements and incorporate new knowledge in SLE immunology. Method\2014The classification criteria were derived from a set of 702 expert-rated patient scenarios. Recursive partitioning was used to derive an initial rule that was simplified and refined based on SLICC physician consensus. SLICC validated the classification criteria in a new validation sample of 690 SLE patients and controls. Results\2014Seventeen criteria were identified. The SLICC criteria for SLE classification requires: 1. We excluded patients who had any other illnesses that might affect the results of the study such as chronic liver, familial hypercholesterolemia, thyroid and parathyroid diseases, and malignancy as well as any other rheumatic disease.

**Data Collection:** All patients were subjected to full history taking and clinical examination including SLE Disease Activity Index (SLEDAI). In addition, we recorded the results of complete blood count (CBC), bleeding profile, and kidney function tests. The expression levels of GAS5 and MALAT1 were measured using by real-time polymerase chain reaction (PCR).

**Expression Levels of the Studied LncRNAs:** Whole blood samples (5ml) were taken from SLE patients and controls. Serum was separated from the whole blood for quantitative expression of long non-coding RNAs by real-time PCR. RNA was extracted from serum by miRNeasy extraction kit (Qiagen, Valenica, CA) using QIAzol lysis reagent according to the manufacturer's instructions. Sixty ng of total RNA were used in the reverse transcription (RT) step in final volume 20µl RT reactions using RT2 first strand Kit (Qiagen, Valenica, CA) according to the manufacturer's instructions. Serum expression levels of the studied lncRNAs were evaluated using GAPDH as internal control and ready made primers (MALAT-1 and GAS-5) and Maxima SYBR Green PCR kit (Thermo, USA) according to the manufacturer's protocol. The primer sequences for GAPDH were as follows: F 5'-CCCTTCATTGACCTCAACTA-3',

R 5'-TGGAAGATGGTGATGGGATT-3'.

Twenty µl reaction mixtures was used in RT-PCR by mixing 10µl master mix, 1µl readymade assay primer, cDNA, and RNAase-free water using Rotor gene Q System (Qiagen).

PCR conditions were as follow: 95°C for 10min, followed by 45 cycles at 95°C for 15s and 60°C for 60s. The cycle threshold (Ct) is the number of cycles required for the fluorescent signal to cross the threshold in real-time PCR. Gene expression relative to internal control ( $2^{-\Delta Ct}$ ) was calculated. A melt curve analysis was done to ensure specificity of the corresponding RT-PCR reactions. Fold change was calculated using  $2^{-\Delta\Delta Ct}$  for relative quantification. Using the data analysis of web portal, we calculated fold change/regulation with  $\Delta\Delta CT$  method, in which  $\Delta CT$  was calculated between gene of interest and an average of reference genes, followed by  $\Delta\Delta CT$  calculations [ $\Delta CT$  (patient) –  $\Delta CT$  (control)]. Fold change is then calculated using  $2^{-\Delta\Delta CT}$  formula.

**Study's Outcomes:** The primary outcome in the present study was the association between the expression levels of GAS5 and MALAT1 with SLE. The secondary outcome was the relation between the expression of the two lncRNAs and the activity of the disease.

**Statistical Analysis:** Data entry, processing, and statistical analysis were carried out using SPSS version 22.0. Frequency tables with percentages were used for categorical variables and descriptive statistics (mean and standard deviation) were used for numerical variables. The normality of the data was assessed using the Shapiro-Wilk Test. Tests of significance (Chi-square, student's t-test, or Mann Whitney's test) were used according

to the normality of the data. The recessive operative characteristics (ROC) curve was performed to assess the diagnostic performance of studied gene expressions in discrimination between SLE patients and control group. A p-value < 0.05 is considered statistically significant.

## Results

The present study included 39 patients with SLE and 46 normal controls were included. The mean age of the patients was 29.68 ± 6.96 years; while the majority of patients were female (89.7%). The mean duration of disease of the included patients was 5.72 ± 5.53 years. The mean ESR and CRP was 51.69 ± 36.14 mm/hr and 1.81 ± 3.86 mg/L. In addition, the mean total leucocyte count was 6.70 ± 2.96 × 1000 cell/mm<sup>3</sup>. Regarding kidney function, all mean renal function parameters were within the normal range at the baseline. Only 33.3% of the patients had vasculitis, and only one patient (2.6%) had myositis. On the other hand, 33.3% and 46.2% of the patients had arthritis and pericarditis, respectively. In addition, 15 (39.1%) of patients were ANA positive and only 5 (10.9%) patients were DNA positive. The mean of C3 of the included cases was 54.13 ± 35.13 mg/dl and C4 level was 10.12 ± 10.02 mg/dl. The mean of SLE disease activity index (SLEDAI) in included cases was 5.75 ± 5.32. Table 1 shows the baseline characteristics of the included patients.

**Table 1: Baseline characteristics of the included subjects**

Variables	Patients (N =39)	Control (N =46)	P-value
Age (Years)	29.68 ± 6.96	33.5 ± 9.5	0.1
Age at onset (Years)	24.42 ± 5.08	----	----
Disease Duration (Years)	5.72 ± 5.53	----	----
<b>Gender, No (%)</b>			
1. Female	35 (89.7%)	39 (84.7%)	0.46
2. Male	4 (11.3%)	7 (15.3%)	
ESR	51.69 ± 36.14	----	----
CRP	1.81 ± 3.86	----	----
TLC	6.70 ± 2.96	----	----
PTC	248.78 ± 91.92	----	----
Vacuities	13 (33.3%)	----	----
Arthritis	13 (33.3%)	----	----
Myositis	1 (2.6%)	----	----
Pericarditis	21 (53.8%)	----	----
SLEDAI score	5.75 ± 5.32	----	----

\*Data are presented as mean (SD), median (IQR), or No. (%)

In term of the primary outcome of the present study, there were statistically significant differences between cases and controls in GAS5 ( $p < 0.001$ ) and MALAT1 expression ( $p < 0.01$ ). The mean GAS5 was significantly higher in the control; while the mean MALAT1 expression was significantly higher in SLE patients (Figure 1). The ROC curve analysis revealed

that GAS5 was a good discriminant to differentiate cases from controls with AUC 0.849 with sensitivity 93.5% and specificity 74.3%. Moreover, MALAT1 was a good discriminant to differentiate cases from controls with AUC 0.3 with 95% CI (0.162 - 0.438), the most suitable cut-off point was  $\geq 2.1$  with Sensitivity 93.5% and Specificity 72.5% (Figure 2 & 3).

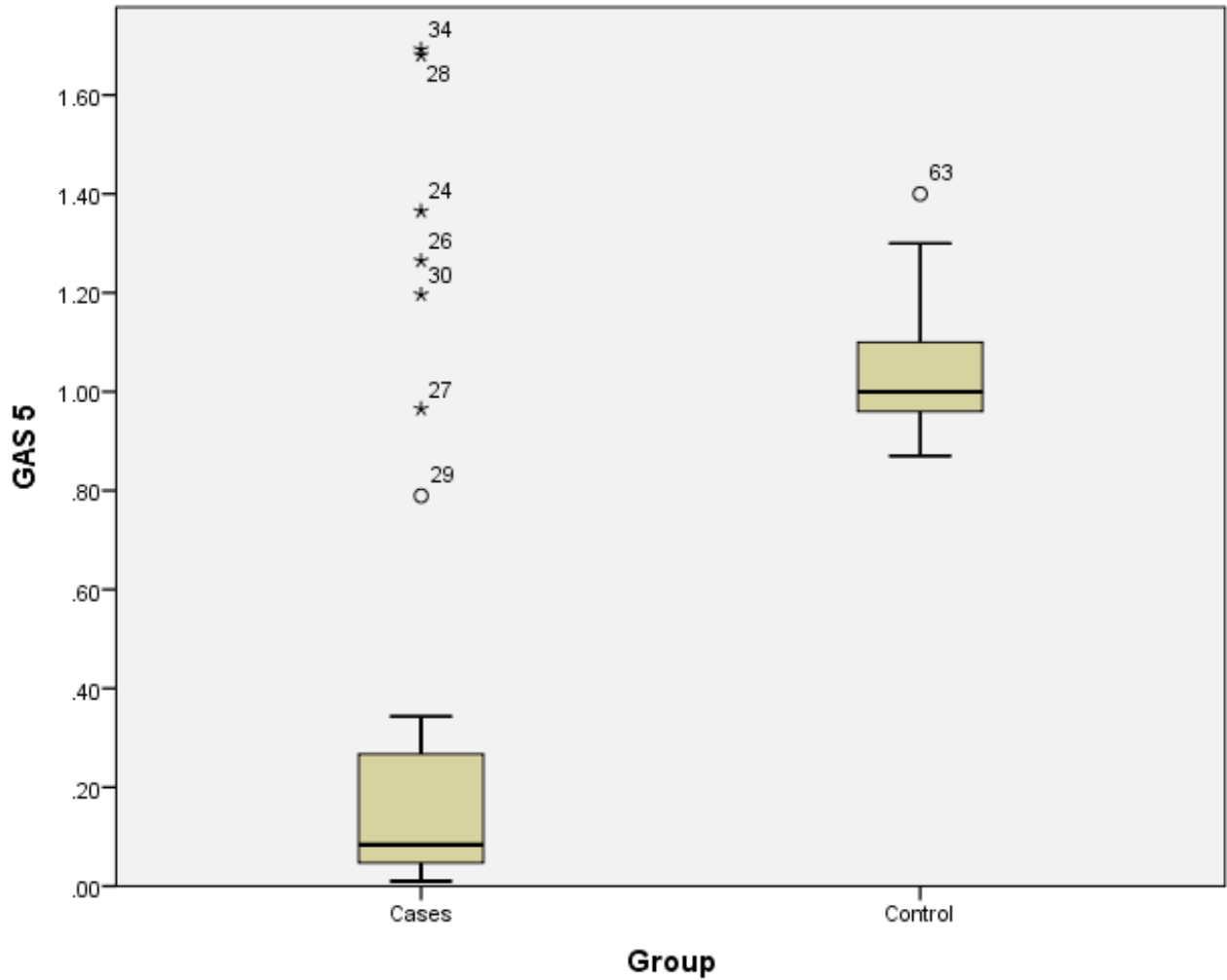
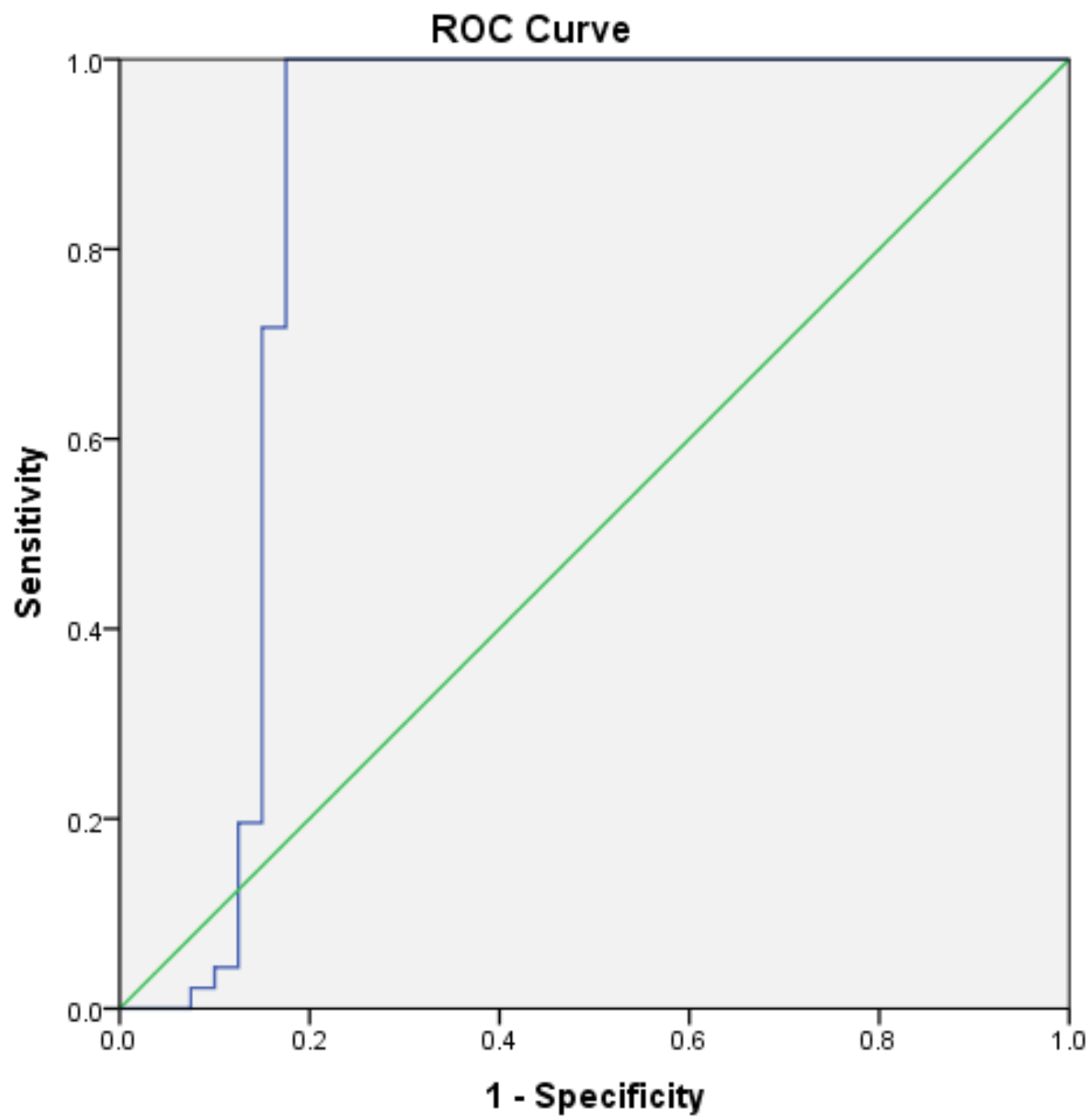
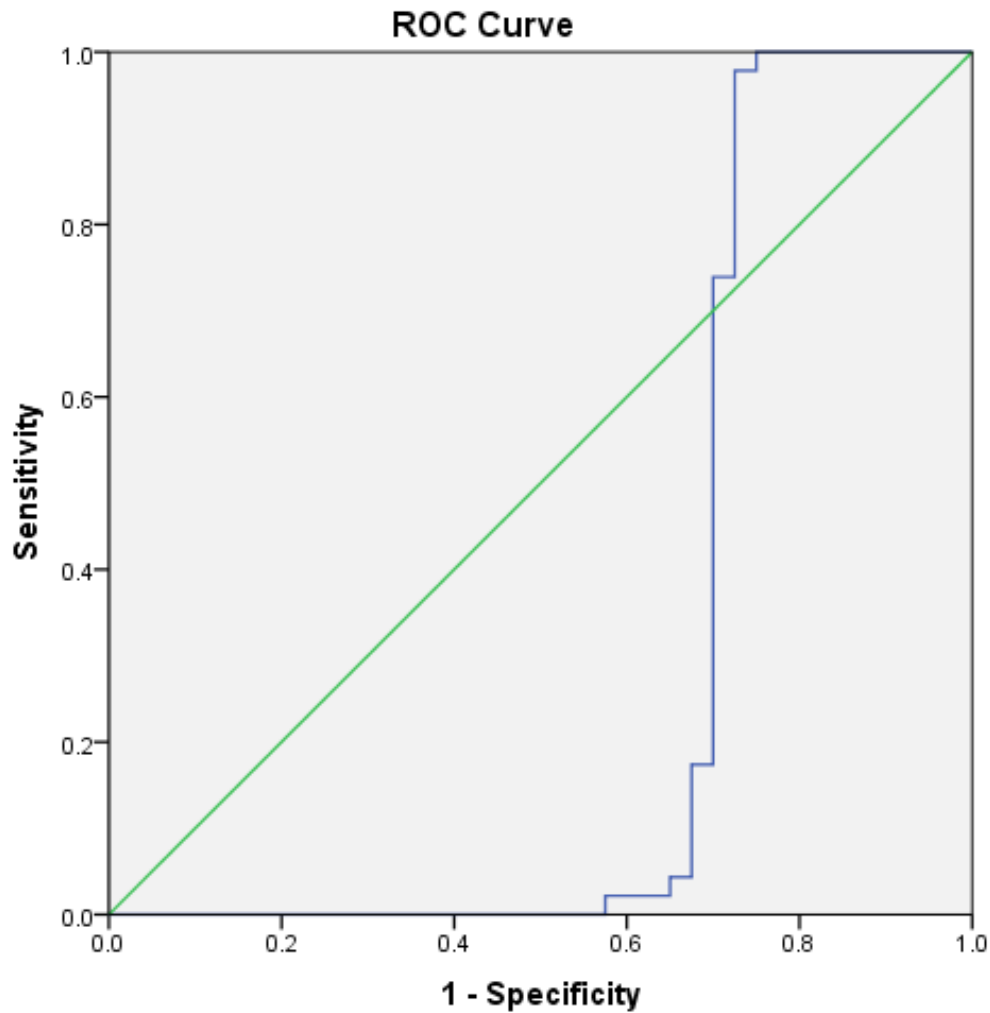


Figure 1: The difference in GAS5 expression



**Figure 2: ROC curve analysis to explore the discriminant ability of GAS5 to differentiate between cases & controls**



**Figure 3: ROC curve analysis to explore the discriminant ability of MALAT1 to differentiate between cases & controls**

Notably, patients with rash and mucosal ulcer had statistically significant higher GAS5 ( $p=0.037$  and  $0.002$ , respectively). Similarly, Patients with vasculitis had statistically significant lower MALAT1 ( $p=0.023$ ). The correlation analysis showed that there were statistically significant negative correlation between MALAT1 and GAS5 ( $r=-0.314$ ;  $p=0.003$ ). In contrary, there were no statistically significant correlations between clinical variables and GAS5 or MALAT1.

**Discussion**

In the present study, both GAS5 and MALAT1 yielded good diagnostic performances for the detection of SLE. At cutoff values of  $<0.3$ , the GAS5 had a sensitivity of 93.5% and specificity of 74.3% for the detection of SLE. Similarly, an expression of MALAT1 of  $\geq 2.1$  had similar performance. On the other hand, the expression

of both lnrRNAs correlated significantly with some of the disease activities.

Over the recent few years, lnrRNAs were implicated in the development and progression of many diseases including cardiovascular diseases, cancers, and autoimmune disorders<sup>15-17</sup>. Owing to their role in the development of immune system, lnrRNAs are promising biomarkers for many autoimmune diseases including SLE. In the present study, we demonstrated that both GAS5 and MALAT1 yielded good diagnostic performances for the detection of SLE. At cutoff values of  $<0.3$ , the GAS5 had a sensitivity of 93.5% and specificity of 74.3% for the detection of SLE. Similarly, an expression of MALAT1 of  $\geq 2.1$  had similar performance. In concordance with our findings, Wu and colleagues<sup>18</sup> performed a two-stage study to explore



the plasma levels of five lncRNAs (GAS5, linc0949, linc0597, HOTAIRM1 and linc-DC) and their potential as SLE biomarkers. Compared with healthy controls, the expression level of GAS5 was significantly down-regulated. When SLE patients were divided according to the presence of LN, the results showed that the levels of GAS5 was also significantly down-regulated in both subgroups relative to healthy controls. Furthermore, the plasma level of GAS5 could distinguish SLE from healthy controls with 65.03% sensitivity and 93.75% specificity. Similarly, Suo and colleagues<sup>19</sup> assessed the expression of GAS5 and microRNA (miR)-21 in SLE, and attempted to explore their association with clinical features. The results revealed that GAS5 was significantly lower in CD4+ T cells of patients with SLE compared with those in control subjects; however, there were no significant differences in GAS5 expression regarding the presence of nephritis. Another prospective study by Li and colleagues<sup>20</sup> included 85 SLE patients and 71 healthy controls to investigate the lncRNAs expression levels. It was found that GAS5 expression level was significantly lower in SLE patients than healthy controls.

Regarding MALAT1, Yang and colleagues<sup>21</sup> analyzed the expression of MALAT1 in 39 SLE patients and 45 matched normal controls. They found that MALAT1 was abnormally increased in the patients with SLE and predominantly expressed in monocytes. In monocytes of patients with SLE, silencing MALAT1 significantly reduced the expression of IL-21. Furthermore, their study demonstrated that MALAT-1 exerts its detrimental effects by regulating silent information regulator 1 (SIRT1) signaling.

The present study also investigated the association between clinical characteristics of SLE patients and the expression of both GAS5 and MALAT1. Patients with rash and mucosal ulcer had significantly higher GAS5. In addition, patients with vasculitis had significantly lower MALAT1. Similarly, Suo and colleagues<sup>19</sup> reported that the levels of GAS5 were higher in patients with ulceration than in those without.

There was no significant association of the SLEDAI with the GAS5 or MALAT1. However, Wu and colleagues<sup>18</sup> reported that GAS5 level was significantly lower in more active SLE patients than in less active cases. In addition, GAS5 level was negatively associated with SLEDAI-2K score in patients with SLE. Moreover, plasma level of GAS5 was also negatively correlated with the ESR.

We acknowledge that the present study has number of limitations. The sample size of the included patients was relatively small which may affect the generalizability of our findings. Moreover, the study was single-center experience. In addition, we could not control for potential confounding factors such as different clinical characteristics and different treatment strategies among patients.

## Conclusion

In conclusion, GAS5 and MALAT1 may serve as potential biomarkers for the diagnosis and monitoring of the SLE, both lncRNAs exhibited a good diagnostic accuracy to discriminate between SLE patients and healthy controls. Moreover, GAS5 and MALAT1 were significantly higher in patients with rash and mucosal ulcer; while there was no statistically significant correlation between disease activity and lncRNAs expression. However, due to the descriptive nature of the present study, further studies on the exact role of lncRNAs in SLE pathogenesis are still needed.

**Conflict of Interest:** All authors confirm no financial or personal relationship with a third party whose interests could be positively or negatively influenced by the article's content.

**Funding Source:** None (authors confirm they did not receive any funding to do this work)

**Ethical Clearance:** The protocol of the present study was registered by the local ethics committee of Cairo University Teaching hospital.

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# Dynamics of Micro-Rheological Properties of Red Blood Cells in Animals on the Background of Hypothermia

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## Abstract

**Context:** Purpose: to find out age-related changes in the micro-rheological characteristics of red blood cells in rats after hypothermia. The study included 88 healthy outbred male rats at the age of 6 months. Prior to inclusion in the study, all rats were healthy and did not participate in the studies. Animals experienced an episode of hypothermia - within 1 hour at a temperature of -10°C. The control group consisted of 32 healthy outbred male rats of a similar age. The study was conducted using biochemical, hematological and statistical research method. In rats subjected to hypothermia, an increase in the activity level of free radical oxidation processes in plasma lipids and red blood cells was found. Over time, a decrease in the level of erythrocyte-discocytes was observed in the blood of the observed rats, which was most pronounced in rats one month after hypothermia. This was accompanied by an increase in their level of changed reversibly and irreversibly erythrocyte forms and an increase in spontaneous aggregation of red blood cells. In rats, after an episode of hypothermia, a gradual weakening of the plasma antioxidant defense develops. In these rats, aggregation readiness and the degree of change in the surface properties of red blood cells progressively increased. Apparently, this creates a risk in animals of a progressive increase in morbid burden and weakening of the whole organism in relation to resistance to negative environmental influences.

**Keywords:** Rats, hypothermia, red blood cells, cytoarchitectonics, aggregation.

## Introduction

Experiments in biological science help to solve many problems of the reaction of the mammalian organism to environmental factors<sup>1,2</sup>. It is clear that the deployment of various processes in the body is associated with the

implementation of the genetic<sup>3,4</sup> program under the influence of external factors<sup>5,6</sup>. This allows the body to adapt adequately, while maintaining functional potential, to maintain viability in different conditions<sup>7,8</sup>. The dynamics of the rheological parameters of the blood and especially the formed blood elements, capable of changing under many functional conditions and effects on the body, is of great importance for maintaining life support<sup>9,10</sup>.

A significant element of the microcirculation process is cells - red blood cells, which, changing their cytoarchitectonics and aggregation activity, significantly affect hemodynamics and metabolism in tissues and determine the course of all adaptive processes in the body<sup>11,12</sup>. It is known that their rheological parameters are capable of changing against the background of

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physiological and pathological processes<sup>13</sup>. It is clear that excessive influence on the body can affect microcirculation in organs, sometimes exacerbating the course of pathology<sup>14</sup>.

In the process of searching for therapeutic approaches in assessing various environmental effects on humans<sup>15</sup>, it is difficult to do without studying biological processes in experimental models on laboratory animals, especially rats. Due to the importance of erythrocyte rheological parameters in the development of many dysfunctions<sup>16</sup>, including under the influence of the environment of blood disorders, it is necessary to develop options for overcoming them<sup>17</sup>. Therefore, it is important to study the aspects of aggregation and cytoarchitectonics of red blood cells in those who have fallen into adverse environmental conditions<sup>18</sup>. This information can serve as a basis for a further search in experimental approaches to optimize the rheological characteristics of red blood cells in hazardous industries and to overcome the effects on the body of harmful environmental factors in the development of habitats, including the Arctic<sup>19,20</sup>.

Given these circumstances, the goal of the work was to find out the effect of a hypothermia episode on the micro-rheological characteristics of red blood cells in rats.

## Materials and Research Method

This study was carried out in full compliance with the ethical standards outlined by the European Convention for the Protection of Vertebrate Animals, which are used for experimental and other scientific purposes (adopted in Strasbourg on 18.03.1986 and confirmed in Strasbourg on 06.15.2006).

The study included 88 healthy outbred male rats at the age of 6 months. They experienced an episode of hypothermia for 1 hour at a temperature of -10°C. Prior to inclusion in the study, all rats were healthy and did not participate in the studies. The control group consisted of 32 healthy outbred male rats at six months of age.

Animals were weighed on electronic scales of the

BM1502M-II brand (Vesta, Russia). They evaluated their endurance in a swimming test using a load of 10% of the body weight of each rat, which was fixed to the base of the tail<sup>21</sup>.

Blood from all rats was taken from the tail vein. In all rats, the level of lipid peroxidation in plasma was determined by assessing the content of thiobarbituric acid-active products using the Agat-Med kit (Russia), the amount of acyl hydroperoxides with registration of the plasma antioxidant activity value<sup>22</sup>. The erythrocyte level of lipid peroxidation was estimated by the amount of malondialdehyde and acyl hydroperoxides in them, taking into account the antioxidant capabilities of catalase and superoxide dismutase<sup>23</sup>.

Using an Olympus CX-41 light phase-contrast microscope (Olympus, Japan), which gives a magnification of 1200 times, red blood cells were divided into discoid, reversible and irreversible.

The state of erythrocyte aggregation was assessed by light microscopy using a Goryaev's camera to determine the number of red blood cell aggregates, and the values of red blood cells aggregated and not entered into aggregation after washing and resuspension. The digital values obtained were processed using Student's test using the StatSoft STATISTICA for Windows 6.0 program.

## Research Results

The initial and control values were comparable in experimental rats after hypothermia, an increase in the external manifestations of a deterioration in their general condition – dulling and thinning of the coat, a decrease in their physical activity and appetite – was revealed. Also, rats had a weakening interest in the surrounding reality. As the period after hypothermia increased, a decrease in body weight was found in rats, which amounted to 212.6±6.22 g by the end of the observation. At the same time, a gradual decrease in their endurance level was noted during the forced swimming test when weighed by cargo - a month after hypothermia by 76.5% compared with the control (table).

**Table: The rats examined**

Recorded Indicators	Rats after hypothermia, M±m			Control, n=32, M±m
	Exodus, n=88	2 weeks, n=88	4 weeks, n=88	
Body weight, g	230.6±6.17	221.0±5.36	212.6±6.22*	232.4±4.96
Swimming time, s	159.2±2.35*	134.0±3.17*	90.2±2.95**	161.2±3.62
Plasma acyl hydroperoxides, D <sub>233</sub> /1 ml	1.47±0.012	1.69±0.019*	1.88±0.037**	1.45±0.009
Thiobarbituric acid products, mcmol/l	3.40±0.014	3.90±0.025*	4.16±0.032**	3.42±0.014
Antioxidant activity,%	35.2±0.32	30.5±0.26	28.0±0.22*	35.1±0.07
Acyl hydroperoxides erythrocyte, D <sub>233</sub> /10 <sup>12</sup> red blood cells	2.86±0.019	3.46±0.015*	3.99±0.022**	2.82±0.015
Malon dialdehyde erythrocyte, nmol/10 <sup>12</sup> red blood cells	1.12±0.010	1.34±0.016*	1.53±0.009**	1.11±0.010
Catalase erythrocyte, ME/10 <sup>12</sup> red blood cells	8900.0±11.6	8100.0±10.9*	7400.0±21.3**	8960.0±16.2
Superoxide dismutase erythrocyte, ME/10 <sup>12</sup> red blood cells	1580.0±11.82	1490.0±9.75*	1340.0±10.62**	1650.0±13.15
Discocytes,%	83.9±0.12	76.0±0.14*	70.2±0.10**	84.1±0.14
Reversibly altered red blood cells,%	9.6±0.17	12.1±0.06*	14.6±0.12**	9.5±0.11
Irreversibly altered red blood cells,%	6.5±0.08	11.9±0.15**	15.2±0.14**	6.4±0.12
The sum of red blood cells, included in the units	31.0±0.13	37.6±0.12*	40.8±0.09**	30.2±0.06
Number of units	6.0±0.07	6.9±0.10*	8.1±0.12**	6.1±0.05
The number of free red blood cells	289.9±0.20	250.1±0.29*	222.6±0.18**	292.8±0.22

In rats subjected to supercooling, an increase in the activity level of free radical oxidation processes in plasma lipids was found (the level of acylhydroperoxides and thiobarbituric acid-active products increased by 27.9% and 22.3%, respectively) with a decrease in antioxidant activity by 25.7%.

Comparable changes in lipid peroxidation in the rats studied were noted in erythrocytes - the number of acyl hydroperoxides and malondialdehyde in them increased. Their number in rats 4 weeks after hypothermia prevailed compared with the outcome by 39.5% and 36.6%, respectively. The activity of erythrocyte enzymes of catalase and superoxide dismutase in rats after hypothermia generally decreased by 20.3% and 17.9%, respectively (table).

After hypothermia in the blood of experimental rats, a decrease in the level of erythrocyte-discocytes to 70.2±0.10% after a month of observation was observed, which led to a gradual increase in their level of changed reversibly and irreversibly erythrocyte forms by 52.1% and 2.3 times .

In rats tested, with an increase in the period after hypothermia, an increase in the ability to aggregate red blood cells was noted with an increase in their total inclusion in the composition of aggregates and the number of aggregates with a decrease in the level of non-aggregated red blood cells (222.6 ± 0.18), compared

with the control level and outcome (table).

## Discussion

Many parameters of an organism that realize its viability strongly depend on the influence of unfavorable factors on it from the external environment<sup>24</sup>. Of great importance in this is the reaction in the body to the effects of the environment of hemostatic and rheological characteristics of the blood<sup>25</sup>. They determine the amount of nutrients and oxygen entering the cells of the whole body<sup>26</sup>. Of great importance for the success of microcirculation are the parameters of the shaped elements, which are exposed to the side of the vessel walls and the influence of lipid peroxidation processes<sup>27</sup>.

It was established that in rats after hypothermia, the antioxidant activity of plasma weakens, leading to an increase in the level of acyl hydroperoxides and thiobarbituric acid-active products in it. Excessive lipid peroxidation in plasma damages the walls of blood vessels and receptors on erythrocyte membranes, negatively affecting their state. At the same time, antioxidant defense weakens in red blood cells, which enhances lipid peroxidation processes in them<sup>28</sup>.

Excess lipid peroxidation in plasma and erythrocyte membranes violates the structural and functional characteristics of membranes and protein cytoskeleton of red blood cells. Against the background of enhanced

lipid peroxidation in erythrocytes, weakening of the synthesis of adenosine triphosphate occurs, lowering the activity of ion pumps, which under these conditions can no longer cope with the release of an increasing influx of  $\text{Ca}^{2+}$  and  $\text{Na}^{+}$  and maintaining the optimum  $\text{K}^{+}$  level.

Under these conditions, a gradual increase in the number of red blood cells that do not have a biconcave shape develops. The arising changes in red blood cells provides an increase in the blood content of reversibly and irreversibly altered their varieties<sup>29</sup>.

The increase in erythrocyte aggregation found in rats after hypothermia is strongly provided by the occurring changes in the level of charge on their membranes due to the degradation of a certain amount of glycoproteins on them under the influence of excess lipid peroxidation. Strengthening the synthesis of reactive oxygen species creates conditions in aging rats for oxidative membrane alteration and damage to plasma proteins, which have the ability to bind red blood cells as bridges during their aggregation.

The increase in the number of free aggregates after hypothermia in rat blood caused damage to the vascular endothelium, which contributed to the contact of the subendothelium and blood and activation of hemostasis, which significantly worsened the blood microreology in the capillaries<sup>10</sup>. An increase in the number of aggregates in the blood of rats can block part of their vasa vasorum, which can lead to degeneration of the vessel walls and weakening in the vessels of the synthesis of substances that provide control and control over the aggregation of red blood cells<sup>13,14</sup>.

### Conclusion

In rats after hypothermia, a gradual weakening of the antioxidant protection of plasma was found. This is accompanied by an increase in its levels of lipid peroxidation products. This contributed to the alteration of the outer membranes of red blood cells, negatively affecting their functions. After hypothermia, the aggregation readiness and the degree of violation of the erythrocyte properties also increased in rats. This is of great importance for lowering the resistance of the organism of animals subjected to hypothermia, which makes them very sensitive to the influence of other negative environmental factors.

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# Study of the Link between the Audit (Alcohol Use Disorders Identification Test) and the PDQ-4+ Test (The Personality Diagnostic Questionnaire) in a Group of Alcohol Consumers in Morocco

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## Abstract

**Background:** Alcohol is one of the psychoactive products that causes health and social problems. Scientific research helps to correct consumption disorder.

**The Objective:** is to establish the epidemiological profile by updating knowledge about alcohol consumption levels and patterns.

**Materials and Method:** prospective and random survey was conducted on 137 participants, of whom 79.6% (n=109) man and 20.4%(n=28) woman. The evaluation tests are the AUDIT (10 questions) and DPQ-4+.

**Results:** The results show a dominance of the male sex. The distribution of respondents according to the AUDIT classification shows that 75.9%(n=104) have a score lower than 8 (to 7 for women) which makes it possible to qualify these people at risk. So they must be monitored while 11, 7% (n=16) had a score between 8 and 12 (7 and 11 for woman) are probably people addicted to alcohol.

Multiple regressions shows that academic level, depressive and obsessive - compulsive personalities are factors that significantly explain the high degree of dependence on alcohol consumption.

**Conclusion:** The result of this study is to establish a national prevention program against the morbid use of alcohol especially among young adults.

**Keywords:** Alcohol - AUDIT - DPQ-4+ - epidemiology - risk factor – Morocco.

## Introduction:

Alcohol is a psychoactive substance that affects mental activity, sensations, perceptions and behavior. It

causes specific diseases that affect patients' quality of life. Excessive consumption of Alcohol is a public and societal problem<sup>1</sup>.

In addition to health, alcohol can have serious economic and social consequences such as absenteeism at work and social isolation<sup>2</sup>. Another substance of alcohol has a significant impact in terms of mortality, morbidity and social damage<sup>3-4</sup>. Its toxicity also leads to the development of cardiovascular diseases such as high blood pressure or stroke<sup>5-6</sup>. Excessive alcohol consumption may be a risk factor for developing to Pajorvi, and al.<sup>7</sup>. In contrast, low to moderate alcohol

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consumption protects against ischemic vascular disease and diabetes<sup>8-9</sup>.

Factors that promote alcohol consumption include age, smoking, household income, depression and anxiety, and gender<sup>10-11</sup>. According to report of 2016 who has estimated the number of deaths worldwide at 3 million people due to alcohol abuse, the highest level of alcohol consumption observed in Europe population.

49 countries of the world listed by the World Health Organization who, Morocco ranks 43rd, with 0.45 liters of alcohol in the year.

Our job is to establish the epidemiological profile of alcohol consumption through the alcohol-related disorder identification test (AUDIT) and to investigate the determinants of this behavior.

## Materials and Method

**Population and Method:** This study was conducted in three Moroccan cities, Rabat, Kenitra and Meknes. The study lasted two months in 2019 and involved 137 participants, of whom 79.6% (n = 109) were men and 20.4% (n = 28) were women. The participants became aware of the nature, purpose and ethical interest of the survey. The choice of participants was simple and random.

### Sampling Instrument:

- **The Alcohol Use Disorder Identification Test (AUDIT):** It explores the behaviors of the last twelve months<sup>12</sup>. This questionnaire contains 10 questions, the first 8 of which describe the relationship between the person and alcohol consumption.
- **Personality Diagnostic Questionnaire (DPQ-4 +):** The second measuring instrument is the French version of the personality diagnostic questionnaire (DPQ-4 +). It intended to evaluate the ten personality disorders of DSM-IV and PDQ-4+ in addition to both passive-aggressive and depressive personality disorders (Hyler, 1994).<sup>13</sup>

**Statistical Analysis:** The collected data are subject to descriptive and analytical analysis (chi-

square test, unidirectional ANOVA, correlation). The internal consistency of the AUDIT test is evaluated by the Cronbach  $\alpha$  test<sup>14</sup>, which is a good measure of the correlation of each item with the overall total of the test. The results of the qualitative variable expressed in frequency and those of a quantitative variable in mean  $\pm$  SD.

## Results

**Socio-demographic characteristics of respondents:** Through the results of the descriptive analysis of the demographic characteristics of the survey participants, it was found that 79.56% (n = 109) of the participants are men against 20.44% women (unbalanced sex ratio). In fact, the average age of the respondents is  $32.10 \pm 5.39$  years (between 24 and 50 years of age, average age for men = 32.33 years and average age for women = 31.21 years). Moreover, 67.9% of these respondents are between 24 and 34 years old and 27.7% are between 34 and 44 years old, while 56.2% are married versus 43.8% are single.

The distribution by level of education shows that 51.8% have a bachelor's degree and 48.2% are university graduates, while 48.9% reported working in a public compared to 40.1% declared working in private sector.

### Analysis of the Alcohol Use Disorder Identification Test:

**Internal Consistency:** The reliability test of the AUDIT questionnaire shows a high internal consistency ( $\alpha = 0.898$ ). The analysis of variance shows a very significant difference (Fisher = 94.219,  $p < 0.000$ ).

Table 1 presents the results of the descriptive analysis of the consistency of Cronbach's alpha. It shows that Cronbach's alpha for 8 out of 10 questions decreased when one of these items was removed. However, item 6, "How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?" and item 9, "Have you or someone else been injured as a result of your drinking?" showed the opposite. These two items therefore have near-zero averages, which for item 6 corresponds to "never" or "once a month" and for item 9 corresponds to "no".

**Table 1: Internal consistency analysis, Cronbach  $\alpha$  coefficient**

Question	Mean	SD	N	Correlation of the item with the overall score	Cronbach's Alpha when deleting the item
Audit1	,53	,738	137	0,84	0,87
Audit2	1,46	,831	137	0,78	0,88
Audit3	,60	,827	137	0,88	0,87
Audit4	,26	,515	137	0,68	0,89
Audit5	,33	,631	137	0,76	0,88
Audit6	,04	,205	137	0,47	0,902
Audit7	,34	,635	137	0,71	0,88
Audit8	,20	,483	137	0,59	0,89
Audit9	,08	,455	137	0,29	0,905
Audit10	,48	1,001	137	0,62	0,87

standardised  $\alpha = 0.898$ , SD : standard deviation, N : effective

**Alcohol Dependence:** According to the appropriate calibration: greater than or equal to 5 points indicates risky consumption; greater than or equal to 8 points (7 for women) indicates harmful use; greater than 12 points (11 for women) indicates probable alcohol dependence. The average score obtained is  $4.31 \pm 4.82$ , with a minimum score of 1 and a maximum of 21. The student test shows a significant difference between the average scores of the two sexes (Female average = 2.11 and Male average = 4.88,  $t = 7.73$ ,  $p < 0.006$ ).

The analysis of variance "age effect" shows a very significant difference (Fisher = 2.37,  $p < 0.044$ ). Comparison of the averages per tukey allowed to classify the categories as follows: respondents aged 44-54 had the highest average score of 11.33 (between 6 and 21), followed by age categories 24-34 and 34-44, with average scores of 4.31 (between 1 and 18) and 3.87 (between 1 and 16). In the last position, respondents under 24 years of age have an average score of 3 (between 1 and 7).

The distribution of respondents according to the AUDIT classification shows that 75.9% ( $n = 104$ ) have a score strictly below 8 (7 for women), which qualifies these people as being at risk, so it is necessary to monitor them. While 11.7% ( $n = 16$ ) had a score between 8 and 12 (7 and 11 for women), they therefore express harmful use. Finally, 12.4% ( $n = 17$ ) of cases scored above 12 (11 for women) are therefore probably alcohol-dependent.

**Distribution by gender:** According to the The results of the class association AUDIT / Gender. The chi-square test shows that these two variables are significantly

associated ( $\chi^2 = 6.23$ ,  $p < 0.009$ ). Moreover, the rate of men whose alcohol consumption is assumed to be at risk is 71.67% compared to 92.86% for women. On the other hand, among men the rate of alcohol dependence is 13.76%, while among women it is 7.14%. A prevalence in our sample of 12.41% was deduced, with a prevalence of 10.95% for men and 1.46% for women.

**Distribution by age class:** The distribution of respondents by age class and by AUDIT class shows that the most incriminated classes are those with ages between 24 to 34, with an alcohol dependence rate of 11.82% (11/93) and between 34 and 44, with a rate of 13,15% (5/38). For those who have had harmful use, 11 of 16 people are aged between 24 and 34, compared with only 3 aged between 34 and 44. However, among the class of respondents where alcohol consumption is at risk, we find that 97.11% are young adults (24 to 44 years).

**Correlation between AUDIT and DPQ-4 + questionnaire:** To study the relationship between the AUDIT test and the DPQ-4 + questionnaire, a multilevel regression was used, where the dependent variable was the AUDIT score and the explanatory variables (the dimensions of the DPQ-4 +, age). The results of this analysis allowed us to draw the following conclusions: The results showed a negative correlation between the AUDIT score and grade level ( $p < 0.02$ ). Indeed, Alcohol addiction is much more advanced among respondents with a low level of education. Thus, a positive correlation associates the AUDIT score with the "depressive" and

“obsessive-compulsive” dimensions with p values of 0.010 and 0.05, respectively (Table 2).

**Table 2: Analysis of Multiple Regression, Dependent Variable “Audit Score”**

Variable	Unstandardized coefficients	t	Significant
	A		
(Constant)	2,06	2,054	,0294*
Age	0,076	0,901	0,369
School Level	-2,207	-2,352	,020*
Paranoid	-0,28	-0,7	0,485
Histrionic	-0,398	-0,936	0,351
Antisocial	0,254	0,668	0,505
Obsessional	0,793	1,958	,050*
Negativistic	-0,646	-1,439	0,153
Schizoid	-0,632	-1,647	0,102
Narcissistic	-0,279	-0,914	0,363
Avoidant	0,085	0,207	0,836
Too Good	0,39	0,75	0,455
Depressive	1,189	2,604	,010*
Schizotypal	0,159	0,413	0,681
Borderline	-0,134	-0,341	0,734
Dependent	0,122	0,285	0,776
Suspect	0,496	0,486	0,628

**Discussion**

The pertinence of the present study resides in the diversity of the variables included, particularly those of a socio-demographic nature. The analysis of the data collected will obviously provide a clear and detailed view of this study sample. Indeed, the sociodemographic characteristics concern age, gender, level of education and occupation. The reliability analysis shows that AUDIT has a high internal consistency (Cronbach’s alpha= 0.898) and all items were positively correlated with the total scale. Question 2, followed by questions 1 and 3, had moderately high values. These items tend to determine the quantity and frequency of alcohol consumption. This result is coherent with those found by the AUDIT validation study conducted by the Contel Guillamon team<sup>15</sup>.

The results of this behavior as a function of age show that the most incriminated category is between 24 and 44 years of age and then decreases in both directions. This result corresponds to that described by a cross-sectional probabilistic survey conducted by telephone on a sample residing in France<sup>16</sup>. Alcohol consumption is becoming

more masculine as the frequency of drinking increases, with men being three times more likely than women to drink alcohol daily. This has also been confirmed in other studies done in Europe<sup>17-18</sup>. In Morocco, and with reference to religious and cultural considerations, the use of alcohol remains largely reserved for men, although recently there has been a slight increase in this habit, particularly among young girls.

The prevalence found in our investigation remains slightly lower than that found in European or American countries as described in Accietto Cataldo’s doctoral thesis<sup>19</sup>. The World Health Organisation, in its report entitled “Mental health: new understanding, new hope”<sup>20</sup>, explains that alcohol use disorders and depression are among the leading causes of death worldwide.<sup>21-22</sup>

**Conclusion**

The AUDIT test has shown a high sensitivity and specificity towards our respondents for the detection of alcohol problems. Alcohol dependence remains a public health problem that can have major health and socio-economic consequences. Certainly, a prevalence of more than 12% for society is still quite high, if we cannot multiply efforts to combat this disorder of conduct which according to our results affects the category of young adults.

The results of this study will also provide scientific added value to the prevention programmes of health officials to combat alcohol consumption disorders. This work could also serve as a starting point for deep reflection centred on the inclusion of a diagnostic approach based on the psychological profile in the detection of all addictive behaviours.

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**Ethical Approval:** The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Center for Doctoral Studies, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco. This procedure was examined and approved by the Committee.

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# Study of the Link between Personality Disorders and Burnout in Moroccan Call Center Agents

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## Abstract

**Background:** Burnout is a syndrome that can affect all social categories including those who practice in call centers. This job requires many efforts depending on the activity undertaken. Our job is to develop a Burnout profile and look for its correlation that might exist with personality disorders.

**Materials and Method:** The study conducted in the call centers of Rabat over a period of two months. It concerned 127 tele-counselors, including 97 women (76.4%) and 30 men (23.6%). two assessment tests were chosen burnout and PDQ-4+.

**Results:** The average age of the respondents was  $27.20 \pm 6.9$  years (minimum age = 20 years and maximum age = 48 years). The results show that the prevalence of pathological individuals with high emotional exhaustion, high depersonalization and low performance is 8.66% (n = 11). A strong bond associates people in exhaustion and having a schizoid personality, negativist, depressive, antisocial and histrionic.

**Conclusion:** Faced with this urgent situation, the responsible authorities must redouble their efforts to identify this scourge and to look for major risk factors.

**Keywords:** *Burnout - PDQ-4+ - prevalence - survey - risk factor- Morocco*

## Introduction

Stress is an adaptive response to the requirements and constraints. It is essential for the proper functioning of the body<sup>1-2</sup>. Nevertheless, burnout is one of the most serious complications of occupational stress<sup>2</sup>. It characterized by a varied symptomatology around three major components: emotional exhaustion, depersonalization and self-fulfillment. In fact, the relationship between the individual and the environment is important<sup>3</sup>. Furthermore, professional stress can

be the cause of psychosomatic and cardiovascular disease. Work stress can be caused by organizational, occupational and / or personal factors<sup>4-5</sup>

Burnout is a stress-related condition with the potential for serious implications in the work. Left unrecognized, burnout could erode the framework<sup>6</sup>,

From a psychological point of view, burnout can be explained by a perceived imbalance between professional environmental demands and the individual's adaptive resources. According to the international literature review, some of these explanatory factors are generic, including professional and emotional demands: lack of autonomy; ethical conflicts; lack of social relationships; adverse social behaviors and insecurity at work<sup>7</sup>.

In psychology, work is the object of various sources of motivation and satisfaction, in relation to the conditions in which the task is accomplished<sup>8,9</sup>. For

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Jimenez (2003)<sup>10</sup>social, economic and cultural aspects are relevant for burnout both in its genesis and in its impact.

Indeed, data on the prevalence of burnout remain more available in Europe and North America than in the countries of Africa and the Arab region, where studies in this area are still rare<sup>11</sup>.

In Morocco, few studies give importance to this problem, also this syndrome remains poorly evaluated and very limited. For this purpose, our work consists of assessing the prevalence of a group of tele-counselors at Morocco and to identify the contextual and personal psychosocial factors (or predictors) of the health of tele-counselors,

### Material and Method

**Population and Study Area:** The target population for this study is tele-counselors with 127 persons. In fact, the study carried out among people aged between 20 and 48 years, working in level of four call centers located in Rabat during the months of November and December 2016.

**Procedures and Scales:** A descriptive questionnaire with characteristics of the sample (socio-demographic characteristics, lifestyle habits, etc.) accompanied with Maslach Burnout Inventory and **DPQ-4 + test** distributed to tele-counselors of different subjects. A meeting held with the tele-counselors to explain the purpose and interest of our study, as well as the ethical aspects including the volunteering and anonymity of this survey.

**Maslach Burnout Inventory (MBI):** The Maslach Burnout Inventory (MBI) is used to assess burnout tele-counselors<sup>12</sup>, it is composed of 22 items divided into three dimensions: Emotional Exhaustion (EE) evaluated using nine items, the dehumanization of the relationship (DR) or "Depersonalization" (DP) (five items) and Personal Accomplishment (PA) (eight items). Each item is rated from 0 to 6. A high level of burnout manifested through high scores for the EE and DP sub-scales, combined with a low score on the PA sub-scale, with a reversal for a low burn-out level<sup>13,14</sup>.

**Personality Diagnostic Questionnaire (DPQ-4 +):** The second measuring instrument is the French version of the personality diagnostic questionnaire (DPQ-4 +). It intended to evaluate the ten personality disorders of DSM-IV and PDQ-4 + in addition to both passive-aggressive and depressive personality disorders (Hyler, 1994).

### Results

**Socio-Demographic Characteristics of tele-counselors:** Our study based on 127 tele-counselors, including 97 women (76.4%) and 30 men (23.6%). The average age of the respondents was 27.20 ± 6.9 years (minimum age = 20 years and maximum age = 48 years). The student's test did not show an average age difference between the two sexes (t = 0.14, p < 0.89, M female = 27.5 years and SD female = 6.27 years; M male = 27.07 years and SD = 5.59 years). Singles are strongly represented (73.2%) compared to 26.8% of married couples. About the level of education attained, 45.7% (n = 58) have a bachelor's degree and 54.3% (n = 69) have a university level (table 1).

**Table 1: Sociodemographic characteristics of respondents**

Variable	Modality	Gender		Khi2
		Female	Male	
Age in years ± SD		27.5± 6.27	27.07±5.59	Student=0,14 (p<0,82)
Marital status	Singles	69	24	Khi2= 0,94 (p<0,34)
	Married	28	6	
School level	Bachelor's Degree	44	14	Khi2= 2,54 (p<0,64)
	University Level	53	16	

SD: standard deviation

**MBI Scale (Maslach Burn out Inventory):** The study of fidelity and reliability by the calculation of Cronbach's alpha shows that the latter is much more important, it reaches 0.79. It should be noted that the Cronbach index has decreased in case of suppression, of one of the elements and this for all questions. The table (2) presents the results of the survey distribution according to the degree of exhaustion.



**Table 2: Representability of surveys based on the level of exhaustion.**

Dimension	Gender	Low	Moderate	High	Total	P Value	Prevalence
SEP	F	33	29	35	97	0,95 (p<0,623)	36,08%
	M	13	7	10	30		33,33%
DP	F	31	18	48	97	3.35 (p<0.049)*	49,48%
	M	14	7	9	30		30%
SAP	F	37	13	47	97	1,71 (p<0,43)	38,14%
	M	10	7	13	30		33,33%

\*: Significant difference with 5% margin of erro, SEP: Emotional Exhaustion; SD: depersonalization, SAP: Accomplishment

**Study of the total score of the dimension “emotional exhaustion”:** The mean score for this dimension is  $24.96 \pm 9.22$  points, the intra-group dispersion is 36.94%, which shows that the responses were very heterogeneous. The classification of scores according to the degree of emotional exhaustion (Table 1) shows that 35.43% (n = 45) of these respondents are in a state of high emotional exhaustion, 28.34% (n = 36) are a moderate degree and 36.22 (n = 46) questioned showed a weak or non-existent state of emotional exhaustion.

**Study of the total score of the “depersonalization” dimension:** The mean score is  $16.94 \pm 10.64$  points, with a dispersion coefficient of 62.81%, this value is much higher, which reflects a great heterogeneity in the respondents’ responses. The results of the categories of depersonalization summarized in Table (2) show that 44.88% (n = 57) of these respondents are in a state of high depersonalization, 19.68% (n = 25) with a moderate degree of depersonalization and 35.43% (n = 45) were in a poor state.

**Study of the total score of the self-fulfillment dimension:** The average score is  $33.57 \pm 10.82$  points with a coefficient of variation of 32.23%. The results of the classification according to the degree of exhaustion show that 47.24% (n = 60) of these respondents are in a high state of self-fulfillment, 15.75% are at an average degree and 37.01% at the end (n = 47) are in a poor state of self-fulfillment.

The analysis of the multiple correlation between the three dimensions shows that emotional exhaustion and depersonalization evolve significantly in the same direction, with a correlation coefficient of +0, 38 (p <0.030). However, achievement is negatively correlated with depersonalization and emotional exhaustion with r

= -0.07 (p <0.76) and r = -0.25 (p <0.043) respectively. This confirms the concern for instability or balance in people exposed to burnout and depersonalization. The analysis of the three dimensions shows that the prevalence of pathological people (high emotional exhaustion, high depersonalization and low self-fulfillment), is 8.66% (n = 11). While, 6.30% (n = 8) of respondents are in a normal state (would ensure a balance in their profession) while the rest of the respondents are in an intermediate situation and therefore require permanent monitoring to not become a pathological state.

**Personality Diagnostic Questionnaire (DPQ-4 +):** The value of Cronbach’s alpha (0.81) shows a high fidelity and compatibility. The analysis of the 10 dimensions that constitutes the test shows a great variation within and between dimensions. The principal component analysis (PCA) shows that the two axes explain more than 60% of the total variation. The projection of the modalities into the space delimited by the two axes allowed groups of variables studied in two groups:

- \* The first group located on the positive side of Axis 2, it is made up of older people and having a high degree of emotional exhaustion and a paranoid, narcissistic personality.
- \* The second group located on the positive side of axis 1, it is composed of people with low self-fulfillment and moderate emotional exhaustion characterized by a schizoid personality. Negativists, depressive, antisocial and histrionic.

### Discussion

Our study consisted of checking the correlation that can exist between burnout and personality disorders. Marked by a female majority, our Sample showed in 8, 66% of the cases a high exhaustion

(high depersonalization, high emotional and low self-fulfillment). This result reflects the demands faced by the employees and especially the emotional requirements as was proven in the study done by Kristensen and all. (2005)<sup>1</sup> and which showed that a high score on emotional demands is one of the factors associated with a high level of burnout<sup>15</sup>. Thus, the decrease in achievement among these professionals is characterized by a negative assessment of competence and work efficiency. Emotional exhaustion is most often perceived as the key element of burnout<sup>16</sup>

This moderate burnout behavior is mainly due to the fact that a tele-counselor must remain friendly with everyone, colleagues, superiors, clients and regardless of his emotional state, which requires a great mastery effort and self-control, whence a complete exhaustion of one's energy<sup>17</sup>. The values observed can thus be linked to the high exposure in this profession to different emotional demands, which are psychologically expensive such as: having to control oneself, simulating one's emotions, hiding one's true feelings and maintaining one's smile; be patient, sociable, and adapt to any new situation and condition; having to repeat monotonously the same tasks most of the time at a high pace without complaining and getting bored<sup>14</sup>.

Regarding the relationship between burnout syndrome and personality disorders, the analysis of the results by Principal component analysis shows significant associations especially between achievement, emotional exhaustion and personality type (schizoid, negativist, depressive, antisocial and histrionic) this can be explained by the observation of some common criteria between depressive personality and burnout syndrome such as low self-esteem, worry and feeling of pessimism. The study found a significant difference by gender due to the high female representativeness in the sample; the pathological scores in all three dimensions of burnout syndrome more registered in women

### **Conclusion**

Our study aimed to find the correlation between burnout syndrome and personality disorders. Apart from the depressive personality, the results obtained gave significant values that can confirm this hypothesis. However, the burnout syndrome is observed in the tele-counselor population and differs according to the sociodemographic and occupational parameters that constitute potential risk factors, especially according to family situation and psychiatric history.

Although the results of our study confirmed the presence of burnout syndrome in the tele-counselor population, it would be desirable to target a larger population in future studies to confirm the values obtained. In addition, review the incidence of risk factors as well as look for other elements that might affect the prevalence of this syndrome.

This work could serve as a starting point for a deep reflection centered on the means of prevention and management in order to guarantee a healthy, confident work environment with better rates of return and efficiency.

**Conflict of Interest:** No

**Source of Funding:** No

**Ethical Approval:** The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Center for Doctoral Studies, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco. This procedure was examined and approved by the Committee.

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# Psychosocial Risks of Moroccan Teachers: Study by the Karasek Questionnaire

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## Abstract

**Objective:** The aim of this work is to evaluate the prevalence of psycho-organizational constraints among teachers in Morocco.

**Method:** A descriptive cross-sectional survey of teachers in public education schools, essentially in ouezzane city (Morocco, North West), was carried out. The study was based on a questionnaire exploring their socio-professional characteristics and on the Karasek questionnaire.

**Results:** The number of teachers participating in the study was 170. Mean age was  $38.3 \pm 8.9$  years. Sex ratio was 1.6. 62.3% are male and are in the majority compared to female teachers who represent 37.6%.

Decisional latitude was low in 51.7% of the cases, ie 60.9% of women and 46.2% of men. The psychological demand was high in 42.3% of the cases, ie 41.5% of the female and 42.9% of the male.

Tense work (job-strain) was found in 18.2% of the cases, or 18.2%. Its prevalence was high among women 21.5% compared to men 16.2%.

Social support was low in 51.7% of the cases, ie 63.1% of women and 48.6% of men; ( $p=0,04$ )

The isostrain was found in 10.5% of the cases, ie 17.2% ( $n=11$ ) of women and 6.6% ( $n=7$ ) of men; ( $p=0.03$ ).

**Conclusions:** Almost two in ten employees, mainly women, were in a job-strain situation. The implementation of strategies to train and inform the targeted population is necessary to reduce stress factors at work and related pathologies. The occupational physician's implication to prevent this risk is essential.

**Keywords:** *Psychosocial, Risks, Karasek, Teachers, Morocco.*

## Introduction

Mental health is an essential component of health, it is a state of well-being in which a person can be realized,

overcome the normal tensions of life, perform productive work and contribute to the life of his community, its degree is determined by social, psychological and biological factors<sup>1</sup>. In the workplace, it is related to psychosocial risks (PSR) that evoke various situations of malaise, negative feelings about work<sup>1-2</sup>.

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The evaluation of PSR in the workplace is very important, their identification allows to take preventive measures having objective effects on absenteeism, the performance, productivity and health of workers and the organization<sup>2</sup>. In this sense, the objective of this work is to evaluate the prevalence of psycho-organizational

constraints related to work according to the Karasek model in a population of teachers exercising in Ouezzane (North West of Morocco).

## Material and Method

**a. Type and population of study:** This is a survey transversal, which took place between the two January and May 2016. The data of this survey was collected from a population of 170 teachers in elementary, college secondary and qualifying secondary school. Respondents were informed in advance of the purpose of the survey and the anonymity of the data. These are teachers, men and women of all ages, with different levels of education, different cycles, different teaching specialties and different levels of experience.

**b. Measuring instruments:** The questionnaire was composed of two parts: The first concerned the identification of the teacher, socio-demographic characteristics, socio-professional and clinical characteristics. The second was made by the 29-items Karasek questionnaire in its translated French version validated in Canada<sup>3</sup>. This questionnaire, consisting of 29 items, evaluates three dimensions of the psychosocial environment at work<sup>4</sup>.

1. **The psychological (9items)** demand corresponds to the psychological load associated with the accomplishment of the tasks, with the quantity, the complexity of the tasks, unforeseen tasks, time constraints, interruptions and contradictory demands
2. **The decision latitude (9items)** covers two notions: The decision latitude (9items) covers two notions: decision-making autonomy or control and the use skills.
3. **The social support at work (11items)** defined by the help and recognition of colleagues and supervisors.

The proposed answers are: “Strongly disagree, Disagree, Agree, Strongly agree”, which allows to score from 1 to 4 and calculate a score for each of the three dimensions. Then we calculate the value of the median of each of the scores. The job strain is defined as a situation where the psychological demand is higher than the median and the decisional latitude is lower than the median, which constitutes a risky situation for health. The tense work situation or job-strain corresponds to a situation that combines

a low decision latitude and a strong psychological demand. When low social support is added to tense work (job-strain), a new situation appears “isostrain”.

**The scores obtained are calculated according to the following formulas<sup>3</sup>:**

- The Psychological Demand (D.Psy.) =  $Q10 + Q11 + (5-Q12) + (5-Q13) + (5-Q14) + Q15 + Q16 + Q17 + Q18$ .
- Decisional Latitude (L.D.) =  $Q1 + Q2 + Q3 + (5-Q4) + Q5 + Q6 + Q7 + Q8 + Q9$ .
- Social Support. (S.S.) =  $Q19 + Q20 + (5-Q21) + Q22 + Q23 + Q24 + Q25 + Q26 + (5-Q27) + Q28 + Q29$ .

## Results

**A. Socio-démographic, Socio-professional and clinical characteristics of the respondents:** The study population is composed of 170 teachers of general education, whose 62.3% (n = 106) are male and are the majority compared to female teachers who represent 37.6% (n = 64). Sex ratio is not so balanced (chi-square = 4.878; p < 0.845). 38, 8% (n = 66) exercising in primary teachers, 28.2% (n = 48) in the college secondary teachers and 32.9% (n = 56) in the qualifying secondary teachers. Middle age of the respondents is  $38.3 \pm 8.9$  years, with a minimum age of 24 years and a maximum age of 59 years. 17% (n = 29) of respondents had Baccalaureate, the rest had a university degree: 9.4% (n = 16) had a general university degree (GUD); 54.1% (n = 92) had a bachelor's degree and 19.4% (n = 33) were at the master's level. 18.8% (n = 32) of respondents reported having conflicts at work. 41.1% (n = 70) had bank credit and 27% (n = 46) had a cardiovascular disorder.

### B. Dimensions of the Karasek JCQ questionnaire:

1. **The decision latitude:** The decision latitude had a median of 66. It was low in 51.7% (n = 88) of the cases (figure 1), ie 60.9% (n = 39) of women and 46.2% (n = 49) of men; women suffer more from low decision latitude than men. It was declared by 51.9% are under 56 years old and 42.9% are over 56 years old. According to the education cycle, the low decision latitude was found in 50% (n = 33) of primary teachers; 56.3% (n = 27) of college secondary teachers

and 50% (n = 28) of qualifying secondary teachers (p-value = 0.76). It was significantly correlated with cardiovascular disorders (p-value = 0.002), and bank credit (p-value = 0.05) (Table 1).

2. **The psychological demand:** The psychological demand had a median of 25, She was raised at 42.3% (n = 72) of cases (figure1); 42.9% (n = 27) of women and 41.5% (n = 45) of the males. According to Pearson’s correlation, it was negatively correlated with age (r = -0.038). According to the education cycle, the high psychological demand was found in 45.5% (n = 30) of primary teachers; 47.9% (n = 23) of college secondary teachers and 33.9% (n =19) of qualifying secondary teachers. It was significantly correlated to bank credit (p-value =0.03) and to conflict at work (p-value = 0.031) (Table 1).
3. **The job-strain or tense work:** The job-strain was found in 31 cases, or 18.2% of the surveyed population (figure1). The prevalence of tense labor was high among women 21.5% (n =13) than among men 16.2% (n=18). According to the education cycle, the tense work was 18.2% (n=12) of the primary teachers; 27.1% (n=13) of the college secondary teachers; and 10.7% (n= 6) of the qualifying secondary teachers. The link is significant between the”jobstrain” and the conflict at work (p-value = 0.042); between the “jobstrain” and having a bank

credit (p-value=0.034);and between “jobstrain” and cardiovascular disorders (p-value = 0.002)

4. **The social support:** The social support had a median at 28; It was low in 54.1% of the population (n = 92) (figure1). The proportion with low social support was 48.6% (n =51) for males and 63,1% (n= 41) for females. The difference between the two sexes in social support is significant (P-value = 0.04) (Table 2); Women suffer more from a lack of social support than men. It varies by education cycle, but there is no statistically significant difference; It is low in 64.3% (n =36) of qualifying secondary teachers; 51.5% (n = 34) of primary school teachers and 45.8% (n =22) of secondary school teachers. It is statistically significantly correlated with cardiovascular disorders (p-value = 0.01); 69.6% (n = 32) of respondents with cardiovascular disorders reported low social support.
5. **The Isostrain:** Our study shows that 18 teachers, or 10.5% of the total (figure1), and 58.0% of the tension, were in isostrain. The latter was found in 17.2% (n=11) of women and 6.6% (n=7) of men; the difference between the two sexes is significant (p=0.03). Isostrain decreases with age but no significant difference. It is statistically significantly correlated with cardiovascular disorders (p-value = 0.001);workplace conflict (p=0.02) and having a bank credit (p=0.005) (Table 1).

**Table 1: Distribution of the study population according to socio-professional characteristics and psycho-organizational dimensions (N = 170)**

		DL low%	P	DP strong%	P	SS low%	P	J o b Strain%	P	Isostrain	P
Gender	F	60.9%	0.06	42.2%	ns	64.1%	0.04	21.1%	ns	17.2%	0.03*
	M	46.2%		42.5%		48.1%		16%		6.6%	
Age (years)	<à 25	0%	ns	0%	ns	0%	ns	0%	ns	0%	ns
	[25 et 46[	51.8%		43.6%		58.2%		17.3%		11.8%	
	[47 et 56[	51.9%		38.5%		50%		19.2%		9.6%	
	More than 56	42.9%		57.1%		28.6%		28.2%		0%	
Teaching cycle	Primary	50%	ns	45.5%	ns	51.5%	ns	18.2%	ns	12.1%	ns
	Middle School	56.3%		47.9%		45.8%		27.1%		12.5%	
	Lyceé	50%		33.9%		64.3%		10.7%		7.1%	

		DL low%	P	DP strong%	P	SS low%	P	Job Strain%	P	Isostrain	P
Conflicts at work	Yes	62.5%	ns	59.4%	0.03	62.5%	ns	31.3%	0.04	21.1%	0.02*
	No	49.3%		38.4%		52.5%		15.2%		8%	
Credit	Yes	60%	0.05	51.4%	0.03	54.3%	ns	27.1%	0.03	18.6%	0.005*
	No	46%		36%		54		12%		5%	
Cardiovascular disorders	Yes	71.7%	0,00	41.3%	ns	69.6%	0.01	32.6%	0,002	23.9%	0.001**
	No	44.4%		42.7		48.4%		12.9%		5.6%	

n.s: Not significant; \*pvalue<0.05 : Significant; \*\*pvalue<0.001:Highly signfica

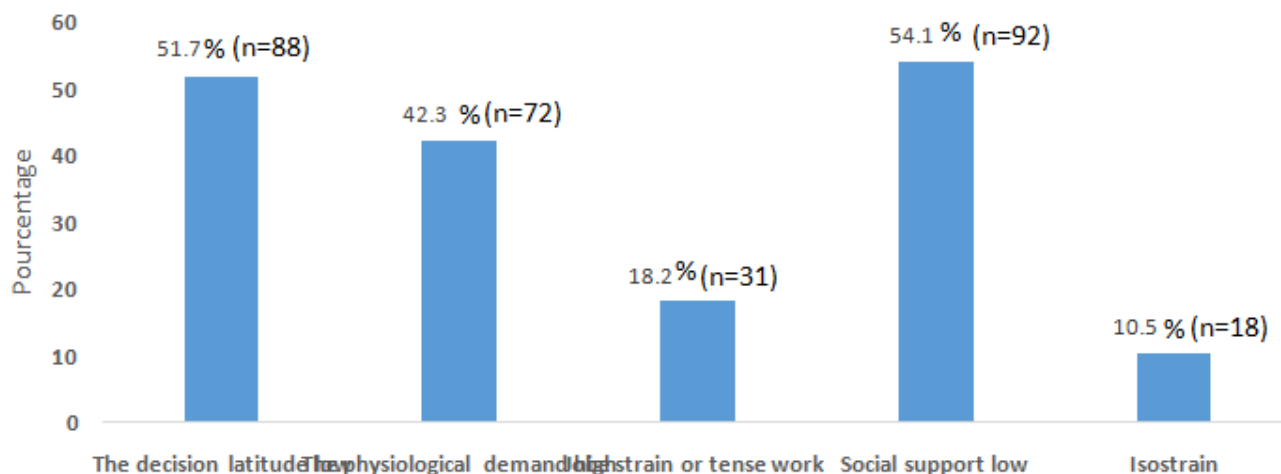


Figure 1 : Prevalences of pathological dimensions according to the model of Karasek

### Discussion

The evaluation of psychosocial factors to work has now become a major health, social and economic issue. It is at the center of the preventive approach and management of health in work. In this study, women were more exposed to low decision latitude than men, these results are similar to the study of Lindeberg et al, in Switzerland<sup>5, 2</sup>. similarly this study revealed that the psychological demand was high among 42.3% of teachers. The percentages of women and men reporting high psychological demands are 42.9% and 41.5% respectively. these results were found both in the SUMER survey in France<sup>6</sup>.The prevalence of job strain was 18.2%. It is high among women (21.5%) than among men (16.2%).The literature shows that job strain varied greatly from one study to another, Sipos in a survey conducted in Belgium Sipos reports that 14% of 251 professional people were in tense work<sup>8,2</sup>. D>Souza et al. Reported that 23% of the 1888 Australian workers surveyed had a job-strain<sup>9,2</sup>. In the education sector, in Tunis, a study «Quality of life at work among teachers » conducted by Lamti in 2013, reported that 18% of

college teachers were in job-strain<sup>10</sup>. In Morocco, Zinoun and Bahoussa found that 22% of the teachers of the Higher School of Technology of Mohamed V University are stressed<sup>11</sup>.These differences could be explained by differences between countries and sectors of work<sup>2</sup>.In our study, the job strain varies by gender. In fact, women were the most at risk, with 21.5% of women versus 16.2% of men. These results are consistent with those of several studies such as the Belstress study<sup>7</sup> and the Choi et al study<sup>12</sup>. In the education sector, our results corroborate with those of the SUMER survey which stated that 23% of private sector teachers females are exposed to job strain by contributing to 5.3% of teachers men<sup>6</sup>, and with a Moroccan study conducted by Zinoun and Bahoussa among university teachers. For this last study, 68.8% of women are stressed compared to 31.1% of men with a significant chi-square (p = 0.01)<sup>11</sup>.Our study showed that tense teacher work was significantly correlated with cardiovascular disorders (p = 0.001). It corroborates with several studies that have found a correlation between stress and cardiovascular disease<sup>7,2</sup>. The profession of teacher, given its specificity, it

considers itself as stressful and generating many cases of stress or exhaustion<sup>13</sup>. Several authors draw attention to the importance of stress among teachers and its severity. According to some, teachers report one of the highest levels of work-related stress compared to other professions<sup>14</sup>. This can be explained by a range of professional factors such as the high level of social interaction, the climate in which people work, the profession of teachers<sup>15</sup> and individual factors such as sex, personality traits ... These determinants would intervene in the occurrence and maintenance of work stress with increased absenteeism, reduced quality indicators and repercussions economic<sup>16</sup>.

### Conclusion

The stress of some teachers can persist and become chronic, these cases can no longer adapt to the work environment and eventually develop a burnout that has negative repercussions both on the health of the educator and on the organization of work. In this regard, it is therefore desirable to deepen and diversify research perspectives focused on modifying and better adapting the psychosocial and physical environment to the needs Moroccan teachers

**Conflict of Interest:** The authors declare that there are no conflicts of interest

#### Contributions of the Authors:

- ZR, AOTA and AS: Scientific supervision, and revision of the article.
- ZA and MB: Statistical analysis.
- SM: Translation because our country is a French-speaking Arab country
- AA: Lead author in charge of data collection and final drafting of the article.

All authors contributed equally to this work.

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# Aerodigestive Tract of Foreign Body in 12 Indonesian Academic Hospital

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## Abstract

**Objective:** To explore the profile of patients with aerodigestive tract of foreign bodies, who had performed bronchoscopy and esophagoscopy in 12 Otorhinolaryngology centers

**Method:** A descriptive research with a retrospective approach. Data samples were obtained from the recapitulation of medical services in the Broncho-Esophagology Division at 12 centers of Otorhinolaryngology education throughout Indonesia. All the extraction was carried out in the operating room of the emergency room at each education center.

**Results:** We obtained 487 cases of the laryngo-tracheo-bronchial foreign body, and 1499 of esophageal, then 1177 patients male and 809 female as subjects. The number of patients with aerodigestive foreign body was dominated by male n=1177 (59%) than female by n=809 (41%). The highest percentage of organic object was found in peanuts by n=84 (74%) and inorganic objects was needle n=180 (48%). The highest number of organic objects was meat n=271 (51%), and inorganic objects was coins n=481 (49%).

**Conclusion:** There was no significant difference in sex in male and female. The highest foreign body in the feeding process was a coin, while in the airway flow was a needle. The types of unknown objects can be related to educational background, cultural culture, and dietary in every country.

**Keywords:** *Aerodigestive, foreign body, bronchoscopy, esophagoscopy, academic hospital.*

## Introduction

Foreign body of the aerodigestive tract are all objects either in the form of food boluses, or other hard objects that are ingested intentionally, or not so that

they can cause blockages and injury in the aerodigestive tract. The foreign body aspiration process occurs when there is an object in the laryngotracheobronchial tract. The ingestion of foreign body occurs when the object enters through the esophagus.<sup>1</sup> Aspiration and ingestion of foreign body is still a cause of significant morbidity and mortality.<sup>1-3</sup>

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The main symptoms that appear in an foreign body aspirations can mainly be shortness of breath and stridor.<sup>2</sup> In cases of ingestion, the symptoms that appear can be a permanent sensation that is persistent or arises when swallowing.<sup>3</sup> Mental retardation and disorders in children generally come with complaints of choking feeling, unwillingness to eat, vomiting, excessive salivation and saliva mixed with blood.<sup>1</sup> Along with the development of

bronchoscopy and esophagoscopy technique has reduced morbidity and mortality due to complications from the act of expulsion of foreign bodies in the aerodigestive tract.<sup>4</sup>

Research in India shows at least 25,000 cases of aerodigestive foreign bodies have been handled by local government hospitals.<sup>5</sup> Cases of aerodigestive foreign bodies can occur in adults and children. Types of foreign bodies that are ingested in children and adults are different. In adults, the most ingested species are cuts of meat, bones, and dentures.<sup>1</sup> In children, generally small toys and coins.<sup>2,3</sup> References from India suggest that most foreign bodies, especially those aged 1-10 years with percentages by 44.98% of the total cases.<sup>6</sup> Predisposing factors include not growing molar teeth that able to chew and swallow well, coordinating the process of swallowing and imperfect laryngeal inlet in the age group 6 months to 1 year, mental retardation, growth disorders, and other neurological diseases.<sup>6,7,8</sup>

Rigid bronchoscopy and esophagoscopy are the main choices for foreign body extraction in the aerodigestive tract, while they can be used to diagnose cases of suspicion.<sup>1-3,9</sup> A study in Tunisia reported that in less than 10 years at least 333 (53.2%) foreign bodies extraction with esophagoscopy and 215 (34.3%) extraction with bronchoscopy.<sup>7,8</sup> Other studies taken at third-level health facilities in India stated, in the past 7 years 1,125 cases of aerodigestive foreign body. The most cases in esophagus were located at cricopharyngeal (78.92%). Most foreign airway objects were found in the right-sided main bronchus (61.94%).<sup>5</sup>

The aim of this study was to explore the profile of patients with aerodigestive tract of foreign bodies, who had performed bronchoscopy and esophagoscopy in 12 Otorhinolaryngology centers throughout Indonesia during the period 2011 to 2015.

## Materials And Method

**Types of Research:** The type of research was descriptive with a retrospective approach.

**Sample, Place and Time of Research:** Data samples were obtained from the recapitulation of medical services in the Broncho-Esophagology Division at 12 centers of Otorhinolaryngology education throughout Indonesia. The 12 education centers are Universitas Brawijaya (UB), Universitas Gajah Mada (UGM), Universitas Indonesia (UI), Universitas Airlangga

(UNAIR), Universitas Andalas (UNAND), Universitas Diponegoro (UNDIP), Universitas Hasanuddin (UNHAS), Universitas Padjajaran (UNPAD), Universitas Sebelas Maret (UNS), Universitas Udayana (UNUD), Universitas Sriwijaya (UNSRI) and Universitas Sumatera Utara (USU). All the extraction was carried out in the operating room of the emergency room at each education center. The data were taken from 2011 to 2015.

**Research and Analyze Data:** The data of foreign body of the aerodigestive tract consists of laryngo-trachea-bronchial, and esophageal foreign body. Each data was divided into organic and inorganic group. The sample in this study included patients who had carried out foreign body extraction procedures by using rigid bronchoscopy and esophagoscopy at the emergency department at each education center. The samples that were not successfully extracted the foreign body and had incomplete data were not included in the calculation. Furthermore, the sample was processed using the Microsoft Excel 2013 program.

## Results

**Demographic Characteristics:** In the period from January 2011 to December 2015, there were 1986 cases of aerodigestive foreign body which were successfully extracted with complete data. There were 487 cases of the laryngo-tracheo-bronchial foreign body, and 1499 of esophageal, then 1177 patients male and 809 female as subjects. (Table 1)

The highest number of laryngo-tracheo-bronchial foreign body was in the Universitas Padjajaran by  $n=164$  (34%), while the lowest case was in the Universitas Sebelas Maret by  $n=15$  (13%). The highest number of esophageal foreign body was in the Universitas Airlangga by  $n=241$  (16%), while the lowest case was found in the Universitas Sriwijaya by  $n=54$  (4%).

**Characteristics of Subject:** The number of patients with aerodigestive foreign body was dominated by male  $n=1177$  (59%) than female by  $n=809$  (41%). The dominance of the esophageal in male was  $n=944$ , while the dominance of laryngo-tracheo-bronchial in female was  $n=254$  and has the highest in the 0-10 year age group by  $n=827$  (42%). Then, the number of patients decreased in the next decade  $n=280$  (14%). While the number of patients with the oldest aerodigestive in the age group  $>90$  years was  $n=1$  (0%). The highest number of patients of laryngo-tracheo-bronchial in the first

decade age group was n=259, then decreased in the next decade by n=199.(Table 2)

The highest percentage of organic object was found in peanuts by n=84 (74%), while the lowest was cinnamon by n=1 (1%).The highest number of inorganic objects was needle n=180 (48%), followed by whistle n=92 (25%), and then corrosive battery by n=6 (2%). (Table 3)

The highest number of organic objects was meat n=271 (51%), followed by bone n=184 (35%), and meatballs by n=24 (5%). The highest number of inorganic objects was coins n=481 (49%). Followed by teeth n=295 (30%) and the last battery by n=14 (1%). (Table 4)

**Table 1: Recapitulation of laryngo-tracheo-bronchial and esophageal foreign body.**

University	Laryngotracheobronchial				Esophagus			
	Orga-nic	Inorga-nic	Total	Percents (%)	Orga-nic	Inorga-nic	Total	Percents (%)
Universitas Brawijaya	5	12	17	3	61	56	117	8
Universitas Gajah Mada	3	18	21	4	57	72	129	9
Universitas Indonesia	7	49	56	11	17	82	99	7
Universitas Airlangga	27	60	87	18	90	151	241	16
Universitas Andalas	13	22	35	7	16	65	81	5
Universitas Diponegoro	1	16	17	3	58	89	147	10
Universitas Hasanudin	10	23	33	7	13	113	126	8
Universitas Padjajaran	30	134	164	34	68	134	202	13
Universitas Sebelas Maret	11	4	15	3	69	49	118	8
Universitas Udayana	8	12	20	4	62	36	98	7
Universitas Sriwijaya	2	20	22	5	9	55	64	4
Universitas Sumatera Utara	2	15	17	3	7	70	77	5
Total	114	373	487	100	527	972	1499	100

**Table 2: Sex of the patient**

	laryngo-tracheo-bronchial	Esophagus	Total	Percents (%)
<b>Sex</b>				
- Male	233	944	1177	59
- Female	254	555	809	41
<b>Age (yr)</b>				
- 0-10	259	568	827	42
- >10-20	199	81	280	14
- >20-30	6	85	91	5
- >30 – 40	5	98	103	5
- >40 – 50	8	194	202	10
- >50 – 60	6	216	222	11
- >60 – 70	3	148	151	8
- >70 – 80	1	94	95	5
- >80 – 90	0	14	14	1
- >90	0	1	1	0

**Table 3: Organic and Inorganic objects in laryngo-tricho-bronchial**

	Total	Percents (%)
<b>Organic</b>		
- Peanuts	84	74
- Fruit Seeds	14	12
- Bones	6	5
- Cake	6	5
- Fruit	3	3
- Cinnamon	1	1
<b>Inorganik</b>		
- Needle	180	48
- Whistle	92	25
- Elastic Toy	23	6
- Pin	19	5
- Spake	10	3
- Sequins	10	3
- Teeth	7	2
- Pen	6	2
- Battery	6	2
- Other	20	5

**Table 4: Organic and inorganic object of esophagus foreign body**

	Total	Percents (%)
<b>Organic</b>		
- Meat	271	51
- Bones	184	35
- Meat Ball	24	5
- Rujak	16	3
- Fruits Seed	10	2
- Union	7	1
- Casava	3	1
- Squid	2	0
- Peanuts	2	0
- Other	8	2
<b>Inorganik</b>		
- Coin	481	49
- Teeth	295	30
- Needle	36	4
- Toys	27	3
- Earring	19	2
- Batre	14	1
- Pin	11	1
- Blister	8	1
- Whistle	8	1
- Other	73	8

## Discussion

The revolutionary management of patients with foreign body in the aerodigestive tract using rigid bronchoscopy and esophagoscopy was pioneered by Chevalier Jackson in 1904. This management reduced mortality from 20% to 2%.<sup>10</sup> Rigid bronchoscopy and esophagoscopy are options for the diagnosis and extraction of foreign body in the aerodigestive tract. The use of rigid esophagoscopy is more advantageous for extraction because the flow airway is more patent. The use of extractor instruments such as forceps and telescopes can be entered in large sizes object.<sup>9</sup> Selection of rigid bronchoscopy is also the main choice in cases of laryngo-tricho-bronchial foreign body because it is easier to control the flow of oxygen, carry out secret extraction and ease of extraction.<sup>11</sup>

Based on the results study, there were 487 cases of laryngo-tracheo-bronchial and 1499 esophageal foreign body. These results were consistent with studies at tertiary health facilities in India that there were 878 foreign body in the digestive tract and 247 cases in the respiratory tract.<sup>6</sup> Based on the results of the study, foreign body in the laryngo-tracheo-bronchial were found consisting of 114 organics and 373 inorganic objects. This result different from the study in India which showed respiratory organic object (n=189, 527 cases) was higher than inorganic (n=58, 927 cases).<sup>6</sup> This result was opposite from the study in Nepal which stated that 72.22% of cases were organic and 27.77% inorganic.<sup>12</sup> Quoted from Rajashekhar T, the type of unknown object can be related to educational background, culture, and dietary in every country.<sup>13</sup> Sex distribution of patient obtained by male (n = 1177) was higher than female (n = 809). This was in consistent with other studies that showed a non-significant comparison between male (n = 137) and female (n = 110).<sup>6</sup> Other studies also showed that there were no significant differences in sex distribution.<sup>13,14</sup> The results of the comparison were insignificant that caused by the number of sample cases that were still lacking.

The results was found that the highest cases were in the 0-10 year age group (n = 259). This was in accordance with several other studies which stated the highest average age in the group was 0-10 years.<sup>5,6</sup> Predisposing factors in children are congenital anomalies, not yet growing molar teeth, coordination of swallowing processes, imperfect laryngeal sphincter in the 6 months to a year, mental retardation, growth disorders, and

underlying neurological diseases. Predisposing factors in adults are the use of dentures accompanied by loss of palpable sensation, neural disorders, and psychosis.<sup>9</sup>

Based on the results of the study, the highest number of organic object was obtained n=84 (74%), and the lowest was cinnamon by n=1 (1%). While the highest number of inorganic objects was needle n=180 (48%), followed by whistle n=92 (25%). This result is similar to that of Showkat et al., which stated that the highest unknown organic objects were peanuts (18.51%). The high incidence of needles can be caused by the habit of biting it by patients when wearing clothes.

The highest number of unknown organic esophageal object was meat n=271 (51%), followed by bones n=184 (35%). The highest number of inorganic objects was coin n=481 (49%), followed by teeth n=295 (30%). These results are in accordance with research by Shawat, where bone, coins, meat, and teeth are the highest 4 large unknown object in the digestive tract.<sup>6</sup> The results of the study also found corrosive objects, namely batteries by 2% on airway flow and 1% on the esophageal tract. Batteries are dangerous materials and must be immediately evacuated and treated as life-threatening unknown objects. The electrochemical composition has the potential to damage the surrounding mucosal area extensively.<sup>15</sup> Quoted by Thabet et al, the consequences of damage to the mucous area depend on the position of the battery, the duration, size, power and mechanism of absorption of heavy metals by the body.<sup>15</sup>

### Conclusion

An foreign body in the highest aerodigestive tract occurs at less than 10 years. This case depends on predisposing factors, such as congenital anomalies, the absence of molar teeth that to be able to swallow properly, coordination of the process of swallowing and laryngeal sphincter that was not perfect, mental retardation, growth disorders, and underlying neurological diseases. Predisposing factors in adults were dentures who have lost sensation from the palate, neural disorders, and psychosis. There was no significant difference in sex in male and female. The highest foreign body in the feeding process was a coin, while in the airway flow was a needle. The types of unknown objects can be related to educational background, cultural culture, and dietary in every country.

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**Informed Consent:** Obtained.

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# Effect of Cinnamon Supplement to Laying Hens Diet in Blood and Egg Cholesterol Concentration

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## Abstract

**Context:** The aim of this study was decrease the cholesterol concentration in egg yolk by feed additives(cinnamon). 100 hen was used strain ESA Brown in age 60 week were been grouped randomly into two groups: control group(50 hens) and eat basic diet according to age and production and treatment group(50 hens)it ate the basic diet plus the cinnamon 350 gm/kg feed. Results were show decrease concentration of cholesterol and LDL with increase in concentration of HDL in egg yolk and the blood in treatment group than control groups.

**Keywords:** Cinnamon,hens,HDL,LDL.

## Introduction

the eggs are characterized by high nutritional value because it contains proteins and fats, This makes it one of the most protein- foods compared to poultry and livestock<sup>1</sup>.it had amounts of Linoleic acid(18% of the egg contant of fatty acid)Which is important in protecting against coronary artery disease<sup>2</sup>.the cholesterol was synthesis in human body and in animals, and it found in fats and meats<sup>3</sup>.the human body absorbed amounts of cholesterol do not pass 400 mg \ day, The excess amount of the need of the body is deposited in the walls of blood vessels, causing the narrowness of these vessels and the incidence of high blood pressure and atherosclerosis<sup>4</sup>. So doctors advise that you do not increase the amount of cholesterol 300mg \ day, Note that one egg contains approximately 200 mg of cholesterol Which is high compared to other foods<sup>5</sup>. In the field of poultry, plants and parts were used to treat various diseases as afeed additives<sup>6</sup> Cinnamon is available in either its whole quill form (cinnamon sticks) or as ground powder<sup>7</sup>. cinnamon is considered a remedy for digestive, respiratory, and gynecological ailments. Recent studies emerging from western countries have shown many potentially beneficial health effects of cinnamon such as anti-inflammatory properties, anti-microbial activity, blood glucose control, reducing cardiovascular disease, boosting cognitive function, and reducing risk of colonic cancer<sup>8</sup> anther study found that cinnamon increase productivity qualities, immunity and blood for poultry

when used food supplement<sup>9</sup>..

## Materials and Method

The research was carried out in a poultry breeding hall and 50 x 10 m containing all the requirements of raising the laying chickens. Was used 100 hen strain ESA Brown in age 60 week were been grouped randomly into two groups,a period of one week was left before the experiment was a preliminary period to reflect on the conditions of the experiment and was put under control in terms of general health activity throughout the trial period.The groups were distributed as follows:: control group(50 hens) and eat basic diet according to age and production and treatment group(50 hens)it ate the basic diet plus the cinnamon 350 gm/kg feed. Cholesterol was measured in the egg yolk according to its method <sup>10</sup>, while the estimate of the amount of HDL,LDL in egg yolk method<sup>11</sup>. The method of measuring cholesterol concentration in serum was determined by<sup>12</sup> and the amount of HDL according to<sup>13</sup>,LDL according to<sup>14</sup>. Statistical data were analyzed using full random design and T- test<sup>15</sup>.

## Results and Discussion

**Egg Yolk Cholesterol:** The results of the current study showed that the addition of fodder to cinnamon has a clear effect on the concentration of total cholesterol of egg yolk. The results of the statistical analysis showed significant differences in the concentration of cholesterol



between the two groups in the weeks following the start of the experiment, its the weeks 2, 4, 6, (Table 1). The cholesterol concentration in the cinnamon group was reduced in weeks 2, 4,6 weeks compared with the control group. This was due to a deficiency in the synthesis of cholesterol and the synthesis of lipoprotein molecules LDL and molecules vitlogenin (VTG) in the liver cells which was the chive part for cholesterol synthesis and than excreted it to blood steam with LDL and VTG. That is, lowering the mechanism of cholesterol production in liver cells is the best way to reduce the level of yolk cholesterol<sup>16</sup>.

**Table 1: effect of cinnamon on cholesterol concentration in yolk(mg\ gm).**

Treatment group means± SD	Control group means± SD	Week
15.2 ± 0.04 <sub>b</sub>	16.07 ± 0.043 <sub>a</sub>	2
14.6 ± 0.85 <sub>b</sub>	16.09 ± 0.051 <sub>a</sub>	4
12.77 ± 0.031 <sub>b</sub>	16.03 ± 0.072 <sub>a</sub>	6

The results of the study also showed the effect of adding cinnamon to the diet resulted in changes in the levels of lipoprotein concentration, low density and high density lipoprotein. Significant differences were recorded in these rates as of the second week. This effect continued during the fourth and sixth weeks compared with control group.

**Table 2: effect of cinnamon on HDL in yolk(mg\ gm).**

Treatment group eans± SD	Control group means± SD	Week
± 0. 35 <sub>b</sub> 35.33	27.35 ± 0.21 <sub>a</sub>	2
35.03 ± 0.25 <sub>b</sub>	25.2 ± 0.22 <sub>a</sub>	4
38.16 ± 0.73 <sub>b</sub>	25.03 ± 0.17 <sub>a</sub>	6

**Table 3: effect of cinnamon on LDL in yolk(mg\ gm).**

Treatment group means± SD	Control group means± SD	Week
± 0. 45 <sub>b</sub> 38.3	61.34 ± 0.31 <sub>a</sub>	2
41.4 ± 0.25 <sub>b</sub>	62.2 ± 0.52 <sub>a</sub>	4
35. 6 ± 0.23 <sub>b</sub>	58.77 ± 0.37 <sub>a</sub>	6

Of the results achieved we see the effect of cinnamon, which led to the reduction of the level of total cholesterol or that found in the low-density lipoprotein and cholesterol, which is high in cholesterol, unlike

high-density lipoprotein, which contains a low rate of cholesterol<sup>17</sup>.The low concentration of total cholesterol and / or low-density lipoproteins in food intake significantly reduces the chance of atherosclerosis and its development<sup>18</sup>.

**Serum Cholesterol:** The results of this study showed a significant decrease in the concentration of serum cholesterol compared to the control group. The results showed a significant increase in the concentration of high-density lipoprotein, which transfers the cholesterol from the arteries and returns to the liver to be expelled outside the body, accompanied by a significant decrease in concentration Low-density lipoprotein (LDL), which deposits cholesterol in artery walls.

This is consistent with a study conducted on type 2 diabetics patient found that, cinnamon reduced serum glucose, triglyceride, total cholesterol, and LDL-cholesterol levels in people with type 2 diabetes. Because cinnamon would not contribute to caloric intake, those who have type 2 diabetes or those who have elevated glucose, triglyceride, LDL-cholesterol, or total cholesterol levels may benefit from the regular inclusion of cinnamon in their daily diet. In addition, cinnamon may be beneficial for the remainder of the population to prevent and control elevated glucose and blood lipid levels<sup>19</sup>.

**Table 4: effect of cinnamon on cholesterol concentration,HDL, LDL in serum(mg\ dl).**

Treatment group means± SD	Control group means± SD	In serum
± 2. 55 <sub>b</sub> 126	212.3 ± 3.01 <sub>a</sub>	cholesterol concentration
75.4 ± 1.15 <sub>b</sub>	58.7 ± 1.40 <sub>a</sub>	HDL
38. 5 ± 1.33 <sub>b</sub>	75. 7 ± 2.07 <sub>a</sub>	LDL

**Conclusion**

From this results, we can give cinnamon in food of lying hens to decrease in concentration Low-density lipoprotein (LDL), cholesterol and increase. high-density lipoprotein HDLin serum.And yolk egg.

**Conflict of Interst:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Nil

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# Perspectives From Key Stake Holders on Child Sexual Abuse in Pakistan: Glimpse of Potential Facilitators and Barriers

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## Abstract

**Context:** One of the emerging concerns and challenges to fundamental human rights appear to be the Child Sexual Abuse. There are adverse repercussions of child sexual abuse as this has surged in recent times not only as a public health concern rather as human rights dilemma.

**Aim:** This research attempts to encompass a rigorous view, evidential facts and figures regarding child sexual abuse in Pakistan from key stakeholders' perspective.

**Setting and Design:** Mix method research design was used; encompassing both quantitative and qualitative content analysis.

**Method:** The sample comprised of parents, psychologists, NGOs' Social workers, dealing with child sexual abuse cases and teachers from primary/ elementary schools serving in Lahore, Pakistan. In-depth interviews were conducted with the key stakeholders of child rearing (n=5 from each domain-category).

**Results:** A systematic attempt to embrace the etiology, predisposing and maintaining factors in addition to suggestion for curbing child sexual abuse is catered. A due focus is leveled on barriers and challenges as reported by carers to prevent CSA.

**Conclusion:** There are specific facilitators and barriers to child sexual abuse (CSA) prevention program in Pakistan. By increasing awareness and by dispelling misconceptions, preventive efforts could be made more beneficial and efficacious.

**Implications:** The findings from current study implicate that there is dire need to impart education regarding child sexual abuse, its forms, recent trends, and various means of preventing them to reduce (CSA).

**Keywords:** *Child sexual abuse; gender; psycho-social measures; sexual abuse prevention programs; survivor experiences*

## Introduction

Child sexual abuse (CSA) is emerging as callous menace for children in vulnerable ages. This is widely

realized that one of the serious worldwide public health concerns is child sexual abuse<sup>[1]</sup>. This necessitates collective, as well as individual, pro-active efforts for protecting children's rights, including physical, emotional, and sexual abuse, and neglect<sup>[2]</sup>. Out of all these forms, child sexual abuse, being most prominent, is defined as forcible age inappropriate, sexual acts with unprepared child victim<sup>[3]</sup>. There is certain in-contact and non-contact form during CSA, including sexual or undesirable touching (genitals, under-legs, underarms, breast etc.) as well as penetrative oral, vaginal and anal sex or may involve non-contact abuse such as exposure

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to pornographic situations, camera capturing of children indulging in sexual acts<sup>[4]</sup>.

In most of the child sexual abuse cases, there is massive physical harm in addition to psychological repercussions, incurred to the victim in terms of violent scratches, bruises, wounds, tearing, shredding of skin, tissues, manifested bleeding, prolonged aggravated infections. Birdthistle et al. reveals that 92% of child sexual abuse involved in-contact penetrative sexual abuse <sup>[5]</sup>.

Psychological aftermaths of child sexual abuse are equally atrocious as this incurs indelible effects on one’s mental health; extending from mild fear to phobias to posttraumatic disorders to suicidal thoughts <sup>[6]</sup>. Far reaching impact in form of substance abuse, discomfort during sex, eating disturbances, sleep disorders, conduct issues and externalized reactions are also common. Sometimes this frustration during overcoming of trauma is expressed by running from their homes, retreating into seclusion, escape from schools and normal patterns of life<sup>[7]</sup>. In order to understand the psychosocial aftermaths of child sexual abuse and preventive efforts that could be adopted to prevent child sexual abuse, theoretical framework is provided by Theory of Reasoned Action. This theoretical framework appears to yield a convincing umbrella of understanding for the study constructs as this is assumed that pragmatic efforts in devising persuasive interventions could result in making public in general and parents in particular to change their attitudes, knowledge, and behavior concerning sexual abuse or assault <sup>[8]</sup>.

**Rationale:** Empirical evidence from Pakistan indicates that there is dearth of research in domain of child sexual abuse prevention programs; thus raising the dire need to explore this. Thus, this endeavors to eliminate the number of CSA cases in Pakistan by highlighting the social context of CSA, as well as the experiences and challenges faced by professionals, the community and parents.

**Method**

This mix-method research has been designed to glean leading and recurrent themes through content analysis procedures. In-depth interviews were executed with teachers, primary care taker, parents, psychologists, (5 from each subcategory).

<b>Quantitative Analysis</b>
Audiotaped information is transcribed verbatim, translated and checked for consistency through back translation of a sample of transcribed data by experts in the field
Derive meaning units from the text, condensing them
Assigning codes to meaning units, comparing and developing subcategories
Oscillate between the text the condensed meaning units, codes, sub-categories and categories making comparison to identify a central theme(s) that describes the research question thus identifying relevant text units by open coding. Devising core category.
Develop a thematic summary to show linkages between codes, subcategories, categories and the core category in explaining the research question or develop cumulative theme and subtheme out of collated saturated theme units.

**Figure 1: Portrayal of the analytical processes used in qualitative content analysis**

**Ethics Consideration:** In addition to seeking departmental or institutional permissions, all of the respondents were informed about their individual informed consent.

**Results**

This exploratory research has handled the intricate phenomenon of perceptions towards child sexual abuse and child sexual abuse prevention perspective from all major stake holders’ views, that are involved in rearing of the children in middle childhood.

- a. What general awareness lies regarding child sexual abuse and its various forms; its possible perpetrators; physical, psychological, and psychosocial outcomes involved?
- b. What awareness cum education to be imparted to children to safeguard themselves and prevent such incidents?
- c. What suggestions cum key considerations for devising preventive program for child sexual abuse professional suggest and what possible barriers may lie?

**Major Themes from Respondents’ Views (n=20)**

**Warm up Question:**

1. **How common is child sexual abuse?:** Very common 22%; Common 12%; Uncommon 35%; Rare 31%.

**2. What is child sexual abuse?:** Forcible sexual against a child. Molestation 45%; Developmentally unprepared, inappropriate forcible sexual act 65%; Commercial sexual exploitation of children such as prostitution, dark web porn videos for commercial and material gains or child as porn material 35%; Exposing children to inappropriate sexual content through printed or digital media, termed as porn exposure 40%; Inappropriate touches 50%; Incest: sexual interaction in blood relations, prohibited by Islam 40%; Completed or attempted sexual act 10%; Penetrated sexual activity 95%; Sexting 40%; Sexualized talk 45%.

**3. What are major types of child sexual abuse?:** Perpetrator based CSA types: i) Pedophilic 25%; ii) Non- Pedophilic 75%

**Dimensional Types:** Physical 98%; Verbal 65%; Emotional 45%; Planned Child sexual abuse 60%; Dispositional Child Sexual Abuse 40%

**4. Who are likely to be possible perpetrators?:** Relatives; first degree or extended 65%; From within family (intra-family) 85%; Step-parents 80%; People from inner circle such as neighborhood; school staff, home staff, child care) 70%; Strangers 98%

**5. What are physical, psychological, and psychosocial outcomes involved in child sexual abuse?**

- i. Physical: mutilation of genitals; bruises, cuts, laceration, abrasions, infections, somatic problems etc. 85%
- ii. Psychological: anxiety, stress, depression, frustration, demotivation, pessimism, hopelessness, mental health issues/psychopathology, shock, confusion, PTSD 65%
- iii. Emotional: denial, anger, withdrawal, guilt, grief, remorse, shame, doubt, low self-esteem; dissociative symptoms 45%
- iv. Psychosocial: asocialization, problematic social relations; maladjustment, delinquent acts, avoidance, social anxiety etc. 45%

**6. What awareness cum education to be imparted to children to safeguard themselves and prevent such incidents?**

**Religious:** Awareness regarding their body parts

and their self-respect as scribed in Islam 60%

**Social:** By teaching boundaries of social relations and trust 70%

**Moral:** Concept of right and wrong; normal and acceptable societal behaviors and unacceptable behaviors 40%

**Self-Defense Training:** How to safeguard personal self with small vigilant acts! 60%

**7. What suggestions cum key considerations for devising preventive program for child sexual abuse you suggest?**

- i. State based efforts: Staunch and firm legal framework involving strict, timely and prompt punishment to perpetrators 95%
- ii. Institutional efforts such as school based programs; madrasah based campaigns; Mosques based weekly training discussion sessions as part of khutbba and waaaz 90%
- iii. Community based efforts: Media based awareness campaigns 85%; Seminars by civil society 65%

**8. What are the barriers to child sexual abuse prevention programs?**

- i. Religious barriers: Commercialization of Islam by some religious scholars or its manipulation for their own mean ends 80%
- ii. Environmental, contextual, cultural and social barriers: Sex as a tabooed topic to be discussed; likewise debates on sex-related topics assumed as potentially damaging to morals; myths regarding child sexual abuse as caused due to victim based factors 90%
- iii. Institutional barriers: Poor legislatures, policies, legal infrastructure to materialize the penalties to perpetrators in CSA cases 90%
- iv. Personal barriers: Individualistic life patterns as no matter is regarded serious as it personally happens with one 70%

## Discussion

This exploratory research purported to unravel the dynamics and dimensions of child sexual abuse in Pakistan with special focus on highlighting the potential effects of abuse, and facilitators and barriers in implementation of sexual abuse prevention programs.

The goal was to collate the perspective on child sexual abuse from key stakeholders'/ child carers' perspectives such as parents, teachers, psychologists and community social workers.

Thematic analysis approach was adopted. The themes inferred in the current research were based on social constructivists' perspective in which understanding of human experienced is determined through cultural, anthropological and psycho-graphical patterns of child sexual abuse as the ultimate goal is to construct reality of child sexual abuse as this is experienced in the psychosocial fabric of living. Epistemological position within this perspective is that knowledge is constructed through enliven reality of everyday life and language work as effective tool to gain knowledge and understanding<sup>[9]</sup>.

The participants were inquired foremostly for perception of child sexual abuse. Most of them construed it as a forcible penetrative or non-penetrative sexual act, without the minor's consent. Respondents' understanding of the term sex was better than the word abuse<sup>[10]</sup>. Abuse conventionally lied in participants' mind. Sexual abuse was understood as more of penetrative/ contact sexual invasive acts. This misconception needs to be dispelled out and wider avenues of information through various forms of media, highlighting intricate forms of child sexual abuse should be made public.

Somehow, dominant patriarchal ideology somehow appears to play more crucial role in defining child sexual abuse as this is observed that almost all of the perpetrators of child sexual abuse were identified or labeled as male, typically of younger or middle age group, illiterate, neighborhoods living or from within homes, in most of the cases they were familiarized with victim and carried significant attachment with the victim to persuade him or her to a deserted place for the heinous act of child sexual abuse. Still First theme and its nodes subthemes lead us to infer that coercion to make child indulge in some sexual act (contact or non-contact) for perpetrators' gratification or for commercial gains, is subsumed as child sexual abuse. These derived themes are also substantiated by empirical findings from some of the previous literature<sup>[11]</sup>.

These findings are also in alignment with the findings wherein CSA was reported due to misconception as bound to penetrative sexual act. In this study, the respondents failed to recognize non contacts forms of child sexual

abuse<sup>[12]</sup>. Religion and culture were reported to play significant role in this regard as conservative people assume that only blatant acts of sexual contact are form of abuse. This was also due to the fact that in Pakistan, people hold poor regard for human rights and they are somehow fulfilling their duties towards Allah almighty but are oblivious of fulfilling their duties towards their fellow beings and do not regard it as important in their religion or faith system which contradicts the objective Islamic guidelines.

The participants also reported that adolescents and children in early childhood are likely to fall as victim to Child Sexual Abuse (CSA). There are multifarious factor to substantiate this; topmost being the children were assumed as innocent, vulnerable, easy to intimidate; easy to persuade, coerce, cajole. Abeid et al.,<sup>[13]</sup> reports the similar findings in his inquiry that younger children were more vulnerable to child sexual abuse as they were innocent, easy to influence, easy to bargain their trust, easy to pressurize, and all these could serve as greatest advantages to the atrocious perpetrators of child sexual abuse. Children carry frail understanding of right and wrong and they are made to adhere to elders and this make them more prone to fall as victim to sexual abuse and since they have limited expression to disclose the wrongs incurred to them. Parents should indulge in active frequent discussion with children on topics of whom to trust and whom not to trust. They must train their children how to withdraw, refuse and decline for unpleasant demands of those around; they should be trained to recognize the safe touch and safe social distancing. Photos, talks and acts all need to be briefed to them in order to forewarn hem against child sexual abuse and all this should be done in non-threatening and non-alarming ways.

Perpetrators who indulge in sexual abusive acts against children were least identified as pedophilic due to limited awareness. Predominantly majority could not identify harassment as sexual abuse; physical harm was identified as requiring professionals 'help thus giving least scope to psychological and emotional abuse as concerning; Aboul-Hagag & Hamed reports same on the basis of their empirical findings<sup>[14]</sup>. Pivotal facilitators to child sexual abuse prevention were care, nurturance and tending by the parents, insightful supervision by school staff, reciprocated communication between child and the parents, and media based awareness campaigns to educate parents in safeguarding children. A community based preventive approach in close liaison with state

based policies and legal frameworks could yield promising results in curbing the menace of child sexual abuse.

Inability to monitor, supervise children or incapability to maintain a watch on child emerged as significant subtheme of risk factor for being the victim. Major barriers that were reported as barriers to child sexual abuse prevention were tabooed status of the topic of sex, forbidden to be discussed; likewise debates on sex-related topics assumed as potentially damaging to morals, poor legislatures, policies, legal infrastructure to materialize the penalties to perpetrators. Ystgaard et al., have suggested in their study of sexual abuse of children in disabilities that preventive efforts could be vitiated by both community and the state in order to limit this nuisance [15].

This research is likely to be promising in raising awareness and insight on grave dimensions of child sexual abuse. A wider array of perspective in child carers is accumulated so that preventive efforts/ strategies could be laid down on empirical grounds. On one hand the prevailing myths and misconceptions are exposed; on the other community based perspective in curtailing child sexual abuse is quarried. These findings can act as baseline for developing the public mass level awareness campaign to reduce child sexual abuse and ensure better safety and well-being of children at large. This is also suggested that certain limitation of current research such as limited sample size, qualitative means of data collection, implying limited generalizability may be compensated in future researches.

## Conclusion

**Conflict of Interest:** Nil

**Ethical Clearance:** Ethics Review Committee, Office of Research, Institute of Applied Psychology, University of the Punjab, Lahore

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# The Relationships of Environmental Sanitation with Stunting among Toddlers Aged 12-36 Months in Bogor Regency, West Java Province, Indonesia

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## Abstract

**Background:** About 8.8 million (36%) toddlers in Indonesia was stunted and is ranked as the fourth largest in the world. Stunting is a sign of chronic malnutrition as a result of the state of not meeting the nutritional needs for a long period of time between conceptions to children aged 24 months. The cause of stunting is a multi-causal factor grouped into three cause namely immediate cause, underlying cause and basic cause. Therefore, the study of the problem of nutritional stunting in Indonesia is a very positive thing.

**Method:** Cross-sectional study design from primary data collection with a sample of toddlers aged 12-36 months conducted on 500 toddlers under five in Tamansari District, Bogor Regency, West Java Province, Indonesia. The stunting status is determined based on the height-for-age z-score  $< -2$  standard deviations (SD), while the categorization of environmental sanitation variables is scored from the total sanitation questions. Analysis of the relationship between environmental sanitation and stunting in this study expressed in the prevalence ratio (PR) and 95% confident interval (CI) using multivariate cox regression analysis.

**Result:** Based on the results of this study the prevalence of toddlers aged 12-36 months who suffered from stunting in Bogor Regency was 39.20%. The proportion of stunting in unimproved environmental sanitation was 44.93% higher than that with improved environmental sanitation. Multivariate cox regression analysis showed a significant relationship between toddlers with environmental sanitation and stunting. Toddlers who experienced unimproved environmental sanitation had a stunting prevalence of 1.36 (95% CI: 1.01-1.82, P: 0.040) times higher than that with improved environmental sanitation, after controlled by covariate variables.

**Conclusion:** Environmental sanitation is a factor in stunting among toddlers aged 12-36 months in Bogor Regency, West Java Province, Indonesia. Efforts to prevent stunting are very important, because stunting is caused by a multiple causation of diseases. Therefore, prevention and countermeasures must involve all relevant cross sectors. Implementation of program planning related to sanitation is very important, especially health promotion about proper sanitation.

**Keywords:** *Stunting, 12–36 months, Toddlers, Sanitation, Bogor Regency.*

## Introduction

Stunting is a sign of chronic malnutrition as a result of the state of not meeting the nutritional needs for a long period of time between conceptions to 24-month-old children which is an indicator of chronic malnutrition<sup>(1)</sup> <sup>(2)</sup>. Children are categorized as short when the length or height-for-age z-score (HAZ) is below minus two

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standard deviations (-2 SD) median of child growth standards from WHO, nutritional status indicators based on the height-for-age index give an indication of nutritional problems that are chronic in nature as a result of long-standing conditions<sup>(3)(4)(5)</sup>.

Stunting reflects a failure to get adequate nutrition for a long time and can be affected by chronic and recurrent diseases<sup>(3)</sup>. Malnutrition leads to serious public health problems and economic risks. Improving nutrition will contribute significantly to reduce poverty, and to achieve health, education, and employment goals. Damage that occurs resulting in the development of an irreversible child<sup>(3)(5)</sup>. Study conducted by Cetthakrikul, et.al. (2018) showed that poor sanitation, poor nutrition, and infection are other important contributors to the burden of stunting<sup>(6)</sup>

About 8.8 million (36%) toddlers in Indonesia was stunted and is ranked as the fourth largest in the world<sup>(7)</sup>. The prevalence of stunting in the world in children under five years reaches 22.2% or about 151 million toddlers<sup>(8)</sup>. The prevalence of stunting toddlers in Indonesia is the second largest in the Southeast Asian region under Laos which reached 43.8%. In 2018 the prevalence of stunting toddlers in Indonesia reached 30.8%, meaning that 1 out of 3 children under 5 years old (toddlers) experienced stunting/failure to grow due to lack of protein or malnutrition<sup>(9)</sup>. Based on Monitoring Nutrition Status survey data conducted by the Director of Public Nutrition of The Indonesian Ministry of Health showed that the prevalence of stunting in Indonesia has increased from 29% (2015) and 27.5% (2016) to 29.6% (2017)<sup>(2)</sup>. West Java is a province in Indonesia that still has a high prevalence of stunting, with a significant increase from 25.1% in 2016 to 29.2% in 2017. One of the regency is in West Java with high stunting cases is Bogor Regency 28.5%<sup>(9)</sup>.

The causes of stunting are multi-causal factors grouped into three causes, namely, immediate cause, indirect cause, and underlying cause. The immediate cause of stunting is insufficient nutrition and infectious diseases in toddlers. One fundamental cause is household access to quantity and quality that leads to an unhealthy environment that will have an impact on the infectious diseases which is a direct cause of stunting<sup>(10)</sup>.

## Method

This study used a cross-sectional design, with primary data sources taken from Tamansari District

because it has the highest prevalence of stunting (28.5%) in Bogor Regency<sup>(11)</sup>. It has three community health centers with 111 posyandu (integrated service post). The population was 10,447 toddlers aged 12-36 months<sup>(12)</sup> with a sample of 500 toddlers aged 12-36 months that were randomly selected by probability proportional to size from 46 selected posyandu fulfilling these inclusion criteria: active posyandu schedule according to the study time, toddlers lived with parents, at the research site for at least one year. Exclusion criteria: toddlers with abnormalities (disabilities) that inhibit the process of anthropometric measurement process and mothers who refuse to participate.

Data collection was conducted from July 2 to 18, 2019 using questionnaires by recruiting enumerators of Nutritionist and Epidemiology Masters Students who were trained first, the data collected was edited by checking the filled instruments, coding the data, entering the data into the processing system and checking the completeness and correctness of the data.

The dependent variable is the stunting status while the independent variable is sanitation with mother's years of education, number of family members, family income, calorie and protein intake, diarrhea, and URI covariates. Stunting data were obtained by anthropometric measurements, namely the recumbent length of a toddler less than 24 months of age using the Length Measuring Board (LMB) and the height of a toddler over 24 months using a microtoise performed by trained Nutritionists. The toddlers was measured age by reading a birth certificate or a child's MCH book. Other data were obtained by filling in the questionnaire.

Data analysis was performed using the STATA program (v.13, StataCorp). To assess the nutritional status of stunting toddlers based on height-for-age, a z-score standardized value using the WHO anthropometric standard 2005 was processed using WHO Anthro software<sup>(13)</sup>, while for the categorization of environmental sanitation variable data, a method of adding the sanitation variable questions to the questionnaire was used controlled for covariate variables, namely mother's years of education, number of family members, family income, calorie intake, protein intake, diarrheal disease, and upper respiratory tract infection (URI). The relationship between environmental sanitation and stunting in this study was assessed by the prevalence ratio (PR) and 95% confident interval (CI) using multivariate cox regression analysis.

## Results

**Table 1: Characteristics of the study sample**

Variabel	Frekuensi	Proportion
	n=500	(%)
<b>Stunting</b>		
Yes	196	39.20
No	304	60.80
<b>Environmental Sanitation</b>		
Unimproved	276	55.20
Improved	224	44.80
<b>Mother's years of education</b>		
< 12 years (High School)	376	75.20
≥ 12 years (High School)	124	24.80
<b>Number of Family Members</b>		
> 4 ppl	99	19.80
≤ 4 ppl	401	80.20
<b>Family Income</b>		
< 2 M IDR	177	35.40
≥ 2 M IDR	323	64.60
<b>Calorie Intake</b>		
Poor	287	57.40
Satisfactory	213	42.60

Variabel	Frekuensi	Proportion
	n=500	(%)
<b>Protein Intake</b>		
Poor	293	58.60
Satisfactory	207	41.40
<b>Diarrhea</b>		
Yes	138	27.80
No	361	72.20
<b>URI</b>		
Yes	213	42.60
No	287	57.40

Based on the results of univariate analysis in Table 1. The proportion of toddlers aged 12-36 months with stunting was 39.20%. The proportion of toddlers with unimproved environmental sanitation was 55.20%. The proportion mothers with education duration <12 years was 75.20%. The proportion household members ≤4 people was 80.20%. The proportion family income ≥ 2 million rupiah 64.60%. The proportion of poor calorie intake was 57.40%. The toddlers with less protein intake was 58.60%. The proportion of toddlers with diarrhea was 27.80% and proportion toddlers with URI was 42.60%.

**Table 2: Analyses of Risk Factors for Stunting in toddlers aged 12-36 month**

Variable	Stunting		Normal		Total	PR	95%CI	P-value
	n=500	%	n=500	%				
<b>Environmental Sanitation</b>								
Unimproved	124	44.93	152	55.07	276	1.39	(1.11-1.76)	0.0036
Improved	72	32.14	152	67.86	224	1		

Based the bivariate analysis in Table 2. It is the proportion of stunting among toddlers in unimproved environmental sanitation was 44.93%. It is higher than the proportion of stunting with improved environmental

sanitation 32.14%. Toddlers with unimproved environment sanitation had a stunting prevalence of 1.39 times (95% CI:1.11-1.76; P:0.0036) higher than toddlers with improved environmental sanitation.

**Table 3: Full Model Risk Factors for Stunting in toddlers aged 12-36 month**

Variable	PR	95%CI	P-value
Environmental Sanitation	1.32	0.99-1.78	0.057
Mother's Education	1.47	0.99-2.18	0.055
Number of Family Members	1.38	0.99-1.91	0.052
Family Income	0.99	0.99-1.00	0.197
Calorie Intake	1.06	0.70-1.58	0.775
Protein Intake	0.78	0.52-1.18	0.247
Diarrhea	1.27	0.94-1.72	0.114
URI	1.32	0.99-1.76	0.057

In Table 3. a full model of the results of the bivariate analysis is included in the multivariate cox regression analysis. To control the effect of confounding variables from the results of the full model, the selection is done

by looking at the difference in PR for the main variable by removing the confounding candidate variables individually.

**Table 4. Final Model Risk Factors for Stunting in toddlers aged 12-36 month**

Variable	PR	95%CI	P-value
Environmental Sanitation	1.36	1.01-1.82	0.040
Diarrhea	1.29	0.96-1.74	0.092
URI	1.28	0.97-1.70	0.086

From the multivariate test, the results of the cox regression analysis in Table 4 showed a significant relationship between toddlers who experienced unimproved environmental sanitation had a stunting prevalence of 1.36 (95% CI: 1.01-1.82, P: 0.040) times higher than that with improved environmental sanitation, after controlled by mother's years of education, number of family members, family income, calorie intake, protein intake, diarrhea, and URI variables. Although statistically there is no confounding effect of covariate variables, it is necessary to consider important priority variables according to the literature, so diarrhea and URI variables are included in the final model.

**Discussion**

The analysis shows that household sanitation is a factor in the occurrence of stunting in toddlers aged 12-36 months in Bogor Regency, West Java Province, Indonesia. Because children's nutritional problems, especially stunting, occur at the age of the first 1000 days of a child's life, so prevention efforts do not occur is very important, stunting is caused by multiple causation of diseases so to prevent it must involve all relevant cross-sectors.

This study found the prevalence of stunting among toddlers aged 12-36 months in Bogor Regency was 39.2%. The final model of multivariate analysis showed that toddlers with unimproved environmental sanitation had a stunting prevalence of 1.36 times (95% CI: 1.01-1.82) higher than those with improved environmental sanitation. Water, sanitation, and hygiene in a conceptual framework are direct or closest risk factors for stunting<sup>(14)</sup> broader efforts are needed that reach beyond the nutrition sector to tackle the underlying determinants of undernutrition. There is growing interest in how water,

sanitation and hygiene (WASH. The results of the 2013 Basic Health Research from the 2013 Community Health Development Index indicator indicates that the short nutritional status of children under five is influenced by environmental health factors, health services, population behavior, reproductive health, economic and educational status<sup>(5)</sup>.

The causes of stunting nutrition problems are caused by multiple causes, one of which is environmental (physical, biological, and socioeconomic) factors<sup>(15)</sup> <sup>(16)</sup>. A cross-sectional study by Torlesse, et.al (2016) regarding determinants of stunting in Indonesia showed a significant relationship (OR 1.71; 95% CI: 1.37-2.15; P <0.001) between poor sanitation and stunting<sup>(17)</sup>. According to Badriyah's research (2016) toddlers living in households that use unimproved drinking water sources are at risk of stunting (OR: 1,176; 95% CI: 1,023-1,353) compared to those living in households with improved drinking water sources and those living in households that do not have latrine at risk of stunting (OR: 1,329; 95% CI: 1,216-1,452)<sup>(18)</sup>.

Other research in Indonesia that supported our results was the research of Cahyono and Manongga's (2016) which showed that the determinant of stunting in Kupang Regency are environmental sanitation (OR: 2.3; 95% CI: 0.12-0.72: P: 0.002)<sup>(19)</sup>. Research by Oktarina and Sudiarti (2014) regarding risk factors for stunting in toddlers aged 24-59 months in Sumatra is that unprotected drinking water sources have a relationship with stunting (P: 0.01; OR: 1.35; 95% CI: 1.05-1.72)<sup>(20)</sup>.

One indicator of good sanitation is the use of drinking water sources that meet quality standards and the health requirements of drinking water<sup>(9)(21)</sup> approximately 50 million people develop colitis or extraintestinal disease,

with over 100,000 deaths annually [2]. Extraintestinal manifestations include amebic liver abscess and other more rare manifestations such as pulmonary, cardiac, or brain involvement; these are discussed separately. (See "Extraintestinal *Entamoeba histolytica* amebiasis"<sup>17</sup>). Research on stunting in toddlers in Tanzania showed the use of drinking water sources adjusted odds ratio (aOR) to stunting among children aged 0-23 months (1.37; 95% CI: 1.07-1.75); aOR for severely stunting children aged 0-23 months (1.50; 95% CI: 1.05-2.14)<sup>(22)</sup>. The results of stunting research on children aged 6-23 months in the Sore Damot District, Southern Ethiopia, showed sanitation indicators that drinking water from unsafe sources (aOR: 4.08, 95% CI: 1.33-12.54) was a factor significantly related to stunting<sup>(23)</sup>. According to the research of Kusumawati et. al., the stunting control model is through increasing family empowerment related to infectious disease prevention, utilizing the yard as a source of family nutrition, and improving environmental sanitation<sup>(24)</sup>.

### Conclusions

For further research it would be better if the variables to be studied were enriched and with different research designs so that it could illustrate richer results. The findings of this study add national and global evidence about the relationship between environmental sanitation and stunting in toddlers, and this is an indication that policy makers and the application of programs must pay great attention to the problem of stunting. The implementation of program planning related to sanitation, especially in the field of public health, one of which is the promotion of health about proper sanitation so that the community can implement good environmental sanitation.

**Ethical Considerations:** This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Indonesia University (Ket- 566/UN2.F10/PPM.00.02/2019).

**Competing of Interests:** The authors declared that no competing interests exist.

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# Evaluation of Laparoscopic Colectomy for Colonic Cancer in Minia University Hospital (Two Years Follow Up)

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## Abstract

**Purpose:** To determine oncologic outcomes after laparoscopic complete mesocolic excision (CME) for colonic cancer in our locality in Minia governate.

**Method:** The clinical and follow-up data of 40 colon cancer patients who were subjected to CME in our institution from August 2015 and September 2019 were prospectively analyzed. Forty patients were included in the study minimum follow up period was two years . oncologic outcomes were evaluated .

**Results:** The aim of present study is to determine health related quality of life, short term oncologic outcomes after laparoscopic colectomy for colonic cancer in our locality in Minia governate.

benefits including less intraoperative blood loss, faster postoperative recovery, and shorter hospital stay. There was no significant difference in the incidence of 30- day postoperative complications, the incidence of major complications, and the pathological results between the two groups. The intraoperative and postoperative 30-day mortality rates in both groups were 0%. There was no significant difference in the tumor recurrence rate, 5-year overall survival (OS), and 5-year disease-free survival (DFS) between the two groups.

**Conclusion:** Oncologic outcomes were good with laparoscopic CME for colonic cancer and safe in selected patients .

**Keywords:** Complete mesocolic excision, laparoscopy, minimally invasive surgical oncology, prognosis, transverse colon cancer, minia university.

## Introduction

Minimally Access surgery is becoming one of the acceptable treatment options for patients in the field of surgical oncology [1]. Since the first reported case of laparoscopic colectomy for a colon tumor that

was conducted by Jacobs et al. in 1941 [2], several multicenter, large-sample, randomized controlled trials (RCT) have indicated that laparoscopic surgery for colon cancer can be very beneficial for patients [3]. However, all of the above studies excluded TCC due to the difficulty experienced with laparoscopic surgery for this condition [4-8]. The concept of CME was first proposed by Hoheberger et al. in 2009 [9]. Currently, only a few studies have examined laparoscopic CME Morbidity and mortality for the treatment of TCC, and these studies have drawbacks such as small sample sizes and no long- term follow-up results [10-12]. This study aimed to evaluate the short-term and long-term outcomes between laparoscopic and open CME for the treatment of TCC using PSM.

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## Method

**Patients:** This prospective study include 40 patients with colonic cancer. The informed consent was taken from all patients.

from August 2015 and September 2019, a total of 40 patients with primary CC were subjected to radical surgery in our hospital based on specified inclusion and exclusion criteria. TCC was defined as cancer located between the ileo caecal valve to rectosigmoid junction. Inclusion criteria were: (1) the pathological type was colon adenocarcinoma; (2) clinical stage was T1-3N0-2M0; (3) patients were subjected to surgery only, no neoadjuvant therapy was prescribed; (4) no other organs were resected; and (5) clinical and follow-up data were available and complete. Exclusion criteria: (1) patients received emergency surgery due to colon perforation or intestinal obstruction; (2) patients had combined synchronous or metachronous colorectal cancer or other organ tumors; (3) other organs were resected during surgery; (4) recurrent tumors.

All patients were undergone laparoscopic complete mesocolic excision and. R software was used for PSM, and based on age, sex, BMI, clinical stage and ASA score. Ultimately, 40 patients were included in the study. Patients were examined routinely including electronic colonoscopy, pelvic magnetic resonance imaging (MRI), chest and abdominal computed tomography (CT), tumor marker testing, pulmonary function testing, electrocardiography and echocardiography, and any other tests deemed necessary to determine the clinical stage and patient tolerance to surgery [13-19]. If needed, examinations including positron emission tomography-computed tomography (PET-CT) and bone scans were used to exclude tumor metastasis. The tumor TNM stage was based on the 7th edition of the TNM classification of colorectal cancer.

Morbidity, defined as postoperative complications occurring within 30 postoperative days, was classified using the Clavien–Dindo classification [20-26]. Minor complications were classified as 1 and 2. Mortality was defined as death from any cause occurring within the 30 postoperative days.

**Follow-up:** All patients were followed-up after hospital discharge. Patients were followed-up once every 3 months in the first year, once every 6 months in the second year, and then once every year afterward. The follow-up examination included a routine physical examination, tumor marker testing, and chest and abdominal imaging. An annual electronic colonoscopy was performed [27-30]. When tumor recurrence was suspected, patients were subjected to timely diagnosis in the hospital. OS was calculated from the date of radical resection to the last follow-up visit or death from any cause. DFS was assessed from the date of radical resection until the date of cancer recurrence or death from any cause. The follow-up was closed in November 2017.

**Statistics:** Categorical variables are presented as frequencies and percentages, and continuous variables are presented as median values with range. Statistical analyses were performed with the Chi-square test, Fisher's exact test, and Mann–Whitney U test for categorical and continuous variables, respectively. OS and DFS rates were estimated by the Kaplan–Meier method, with differences in survival between groups compared by the log-rank test. The Cox proportional hazard model was used to identify significant predictive factors for patient survival outcomes. Results are expressed as odds ratios (OD) with 95% confidence intervals (CI). All analyses were performed using the Statistical Package for Social Sciences (SPSS) 13.0 for Microsoft Windows version.  $P < 0.05$  was considered to be statistically significant.

## Results

**Short-Term Outcomes:** Thelaparoscopic CME had benefits that included less intra-operative blood loss, faster postoperative recovery, and a shorter hospital stay (Table 1). There was no significant difference in the incidence of postoperative complications and the incidence of major complications.



**Table 1: Short-term outcomes**

Outcomes	Laparoscopic group (n=40)	p value
Type of resection		5.928 0.7
Right hemicolectomy	16	
Left hemicolectomy	8	
Transverse colectomy Sigmoidectomy Extended right hemicolectomy	2 8 6	
Conversion to open surgery	-	-
Operative time (median, min; range)	187.5 ± 49.5(120 – 290)	0.030
Blood loss (median, ml; range)	130 (80-240)	0.038
Time to pass first flatus (median, d; range)	3 (1-5)	0.040
Time to resume liquid diet (median, d; range)	4 (2-7)	0.032
Hospitalization (median, d; range)	10 (7-19)	0.034
Patients with postoperative complications	7	0.579
Patients with major complications	1	1.000
Intraoperative mortality	0	-
Postoperative 30-day mortality	0	-

**Table 2: Pathological outcomes of the two groups**

Outcomes	Laparoscopic group (n=40)	p value
<b>Pathological TNM stage</b>		<b>0.810</b>
I	5	
II	20	
III	15	
<b>Tumor differentiation</b>		0.489
Well	10	
Moderate	14	
Poor	8	
Harvested lymph nodes (median, range)	13.1 ± 2.7(8 – 18)	0.587
<b>Lymphovascular invasion</b>		0.479
Yes	14	
No	26	
Residual tumor (R0/R1/R2)	40/0/0	1.000

## Discussion

Laparoscopic colo-rectal surgery has now evolved from being accepted only for benign colo-rectal diseases to apply for malignant colo-rectal diseases not only with the same efficacy compared to open surgery but also with all advantage of laparoscopy. Now, whenever laparoscopic surgery is feasible, it is the operation of choice<sup>(17)</sup>

Nevertheless only the MRC CLASSIC trial provide the highest level of evidence for laparoscopic resection for rectal cancer<sup>(18)</sup>

In our study the operations performed were sigmoid

colectomy 4, right hemi colectomy 7 cases, left hemi colectomy 5 cases, extended right hemi colectomy 3 cases, transverse colectomy one case .

The mean operating time was 187.5 ± 49.5 min. The duration of the operation is influenced by many factors such as: intra-operative complications, extent of resection, prior abdominal surgery, surgeon's experience and the operating team .

Laparoscopic colorectal surgery takes invariably longer duration than its corresponding open surgery. Probably, the negative effect of prolonged operating time in laparoscopic surgery is overrun by advantages such as decrease in hospital stay, wound infection, postoperative

ileus and postoperative pain. However, there is lack of well designed studies evaluating the influence of the operating time on postoperative outcome as a primary endpoint<sup>(20)</sup>.

In our thesis, recovery of intestinal function was assessed by measuring the time to pass 1st flatus and the time to bowel motion.

In our study, long-term oncological safety was assessed by examining postoperative results, such as the resection margin and the number of harvested lymph nodes as well as the recurrence and the survival rates of patients who were available for long-term follow up.

The average number of harvested lymph nodes was  $13.1 \pm 2.7$ , rang 8 – 18 . Histological examination revealed that proximal and distal margins were free of tumor cells in all surgical specimens in both groups. The proximal and distal margins for colonic resections were > 5 cm in all specimens.

In the results of most studies reported recently, the recurrence rate after laparoscopic surgery for colorectal cancer was shown to be comparable to or better than that of open abdominal surgery.

In our study, median follow up was 31.45 months ranging from 48 to 18 months. one patient (5%) had recurrence.

In the CLASICC trial, which studied patients who were available for longer than 3 years of follow up after a colorectal resection, the local recurrence in colon cancer patients was 7.3%, and in rectal cancer patients, it was 9.7%; the distant recurrence rates were 11.3%, and 18.6% in colon cancer and rectal cancer patients, respectively. Results that are comparable with our study results<sup>(30)</sup>

### Conclusion

In conclusion, the use of laparoscopic CME in the treatment of colonic cancer leads to better short-term outcomes than laparotomy, but comparable long- term outcomes.

**Ethical Clearance:** The study protocol was approved by the ethical committee of Faculty of Medicine, Minia University, Egypt.

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# The Crucial Dentist Role Toward Stunting Prevention in Indonesia

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## Abstract

**Introduction:** Stunting is considered as one of the main indicators of children's welfare and socioeconomic conditions. Stunting in children can cause health and mental development problems also decreased productivity and intellectual capacity. Stunting growth was found to have a significant correlation with various dental health problems, such as dental caries.

**Aims:** This study was done to summarize and describe the dentist crucial role toward stunting prevention and its control in Indonesia.

**Method:** This independent literature search was made by the team from different databases which are: PubMed, NCBI, Hindawi, Oxford Academic, Scopus, PLoS One, ScienceDirect, and ResearchGate with the keywords: Stunting, Nutrition, Oral Health, Pregnancy, Low Birth Weight, and Early Childhood Caries. The criteria for data collection including (1) cross-sectional study, an observational study, cohort study, clinical trials and reviews, (2) in English and Bahasa, (3) from the past 7 years from 2012 to 2019.

**Results:** Twenty seven studies that related to the keyword were studied.

**Conclusion:** Stunting in Indonesia has a relationship with the health conditions of the oral cavity in the mother and child through the influence of the provision of diet and nutrition by the mother which relatable to education, behavior, and socioeconomic circumstances of the family. Furthermore, dentists have an important role in reducing stunting in Indonesia

**Keywords:** *Early Childhood Caries, Low Birth Weight, Nutrition, Oral Health, Low Birth Weight, Stunting.*

## Introduction

Stunting is a chronic deficiency nutritional status condition in a critical period of child development which affects the child's height that is not appropriate for the child's age. Stunting is considered as one of the main

indicators of children's welfare and socioeconomic conditions. Stunting in children can cause health and mental development problems also decreased productivity and intellectual capacity.<sup>1</sup> Based on WHO, 162 million children under 5 years old were stunted, whereas, according to the Indonesian Basic Health Research (RISKESDAS), the prevalence of stunting children in Indonesia in 2018 (30.4%) had decreased compared to 2013 (37.2%), however the number still in high prevalence according to indicator from included World Health Organization.<sup>2-4</sup>

Stunting growth was found to have a significant correlation with various dental health problems. Global Burden of Disease Study in 2016 estimates that

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approximately 3.58 billion people worldwide has oral health problem with 486 million children suffering from deciduous dental caries. The number of deciduous dental caries was found to be high in children with underweight and stunting. Dental caries in children can cause eating and sleep disorders which result in disruption of nutrition consumption and growth hormone secretion.<sup>5,6</sup>

Oral health is an important component in comprehensive body health. Healthy oral cavity can facilitate the consumption of a nutritious diet properly, maintain quality of life, and maintain productivity. Children's oral health is a complex concept and involves various factors, such as genetic, biological, behavioral, social, and environmental.<sup>7</sup> Maintaining the health of the child's oral cavity is one of the vital steps parents must take in maintaining children's health and growth comprehensively.<sup>8</sup>

Disease prevention can be done not only after the child is born, but also done while the child is still in the womb. Nutrition consumed by the mother during pregnancy can affect the process of fetal development. Pregnant women need more nutrition and diet to accommodate the energy and nutritional needs of the baby's growth and maternal health.<sup>9</sup> Indonesian dentists can contribute in realizing the reduction in the number of stunting based on the Regulation of Minister of Health Regulation of the Republic of Indonesia (PERMENKES RI) No. 39 of 2016 by contributing to integrated antenatal care (ANC), first 1000 day interventions, and assisting in early detection of disease in Indonesia.<sup>10</sup> This study was done to summarize and describe the dentist crucial role toward stunting prevention and its control in Indonesia.

## Materials and Method

This independent literature search was made from different databases which are: PubMed, NCBI, Hindawi, Oxford Academic, Scopus, PLoS One, ScienceDirect, and ResearchGate. It was conducted with the keywords: Stunting, Nutrition, Oral Health, Pregnancy, Low Birth Weight, and Early Childhood Caries. The criteria for data collection including (1) cross-sectional study, an observational study, cohort study, clinical trials and reviews, (2) in English and Bahasa, (3) from the past 7 years from 2012 to 2019.

## Results

Twenty seven studies, including six cross sectional study, five systematic analyses, four retrospective study,

two Ministry of Health Republic of Indonesia regulation article, one longitudinal study, three case control study, one thesis paper, one path analysis study, one commentary and opinion from expert, three cohort study, and two article from World Health Organization website were studied. In all mentioned studies, malnutrition, low birth weight, early childhood caries, stunting, pregnancy, dentist role for stunting prevention and control were investigated. The studies and interventions presented in this investigation are as follows: educational programs related to stunting, healthy pregnancy, oral hygiene, low birth weight early childhood caries.

## Discussion

**Stunting:** Stunting is a chronic problem of child growth and development that causes a comparison of the development of height-and-age of the child being two points (moderate stunting) and three points (severe stunting) below the median standard deviation calculation numbers (height-for-age-score) established by WHO. The etiology of stunting divided into external factors such as family socio-economic conditions and internal factors such as nutrition and maternal oral health conditions.<sup>11</sup>

**Nutrition:** Mother has a critical role in the occurrence of stunting in children. Inadequate maternal nutritional conditions can cause growth and development delayed.<sup>12</sup> Nutrition for children in Indonesia is still inadequate. WHO states that only 34.8% of babies in the world receive exclusive breast milk. The prevalence of exclusive breastfeeding in Indonesia was only 54.3% and 33.7% in the province of West Java.<sup>13</sup> The study concluded that 71.4% of stunting patients did not get exclusive breastfeeding. In addition, a study in Yogyakarta also found that children who did not receive exclusive breastfeeding had a risk of stunting 1.74 times higher.<sup>14</sup> Studies in Surakarta in children aged 24-59 months also found a significant correlation between the incidence of stunting with non-exclusive breastfeeding, which can conclude that breastfeeding in children is crucial in the development of children.<sup>15</sup>

The high correlation between stunting and non-exclusive breastfeeding is caused by very high nutritional requirements in children. Breast milk contains bioactive substances such as cells, immune factors, hormones, anti-infective agents, anti-inflammatory agents, growth factors, and prebiotics that can protect children from infection and inflammation and play a role in the

development of the immune system and organs.<sup>16</sup> Mothers with malnutrition are found to have a possible risk of having a child with a stunting state.<sup>17</sup> Poor nutritional conditions can affect oral tissue balance, such as the occurrence of late tooth eruption, periodontal disease, and caries.<sup>6</sup>

**Golden period:** 1000 days Consumption of adequate nutrition plays an important role in children's functional health, especially in the first 1000 days of life, including when in the womb and the first 2 years since birth. This period is a vulnerable period in child development hence adequate nutrition is needed.<sup>18</sup> Growth in this period is very sensitive to the state of nutrition, hormonal and metabolism, which plays an important role in the development of body organs. Organ growth is known to take place briskly until it reaches its peak in the 20<sup>th</sup> week of pregnancy. Inadequate fulfillment nutrition in this period causes stunting, where children with stunting have a state of poor growth and health, and are prone to infectious, cardiovascular, metabolic, hypertensive, diabetes mellitus and low cognitive abilities.<sup>16</sup> Lack of nutrition during pregnancy and the environment around the mother can affect epigenomic regulation through changes in gene and protein expression, which can increase the risk of disorders related to body metabolism.<sup>18,19</sup>

**Low Birth Weight:** Children born with the condition of Low Birth Weight (LBW) indicate the nutritional condition and health of both the baby and the mother disturbance. Nutritional deficiencies during pregnancy can cause the child to be born with LBW. The children with LBW have the risk of stunting 3:12 times higher than children of normal weight at birth. LBW occurs due to nutritional deficiencies in pregnant women that supported with various factors such as family conditions, socio-economic conditions, parental education, and examinations during pregnancy and after childbirth.<sup>20,21</sup> Poor oral conditions in pregnant women can affect the fetus. The pregnant women with chronic apical periodontitis associated with the occurrence of LBW because this situation will produce pro-inflammatory cytokines that affect systemic conditions that can flow into the womb and fetus.<sup>22</sup>

**Behavior:** Mother's education also has an important role, mothers with higher education care more about nutrition, holistic and oral cavity hygiene, and the health care of their children.<sup>1</sup> Meanwhile, based on various studies conducted in Dale Woreda, Southern Ethiopia,

East Java and North Sumatra, Indonesia mentioned that mothers with low education tend to have stunting child.<sup>23-25</sup> A low socioeconomic condition is a risk factor for caries and stunting.<sup>26</sup>

**Early Childhood Caries:** Early Childhood Caries (ECC) is a health problem of the oral cavity in the form of one or more deciduous teeth which are decay, filling, or missing in children aged 71 months (5 years) or younger.<sup>27</sup> The incidence of ECC in children with primary teeth reaches 1.76 billion worldwide and the prevalence of ECC in Indonesia is still very high, reaching 81.7% in 2013. ECC develop rapidly and occur in teeth shortly after the tooth erupts even in areas of teeth that have a low risk of caries. ECC is related to various other health problems, such as pain, infection, abscesses, mastication disorders, malnutrition, digestive disorders, and sleep disorders.<sup>28</sup>

ECC is a multifactorial disease that occurs due to various factors, such as cariogenic microorganisms, carbohydrate exposure through improper feeding, and poor oral hygiene practices. The prevalence of caries in children was 22.5 times higher in mothers with caries. This is related to the level of education and understanding of the mother's health of the child's oral cavity. Errors in the provision of nutritional food to children, such as milk at night and the addition of sugar to milk, are the main risk factors for ECC. 50.6% of mothers ate child food before it was given to children, 29.9% blew the food and 14.3% kissed children on the lips. These things can cause transmission of cariogenic bacteria from mother to child, which triggers ECC.<sup>29</sup>

**Dentist Role and Future Plans:** The Indonesian government has determined various activities as an effort to reduce the occurrence of stunting in the PERMENKES RI No. 39 of 2016. Efforts are made aimed at various categories, namely: pregnant women, toddlers, school-age children, adolescents, and young adults. As a dentist, there are a number of things that can be done to take part in reducing the number of stunting in Indonesia, such as participating in contributing to ANC, the first 1000 days of interventions, and helping in early detection of disease.<sup>10</sup>

According to WHO in 2016, nutrition intervention during pregnancy is one of the top priorities in ANC. Poor nutrition in pregnant women will cause interference with the mother and fetus. Oral cavity is the first entrance to food into the body before it is further processed in the

gastrointestinal tract (GIT), therefore poor oral health will cause a decrease in nutrient absorption and can cause the mother to lack nutrition hence it can affect the fetus. In addition, diseases in the oral cavity, one of which is periodontitis, can cause fetal problems such as preeclampsia. This has encouraged Indonesian dentists to maintain good oral health in pregnant women. After the child is born, the dentist can endure in contributing to the first 1000 days of intervention by maintaining the state of the child's oral cavity to create a healthy oral cavity thus the nutrients given to the baby can be absorbed properly. The dentist can also play a role in helping detect diseases based on the characteristics that appear in the oral cavity of the mother and child, thusly treatment can be done before the situation worsen. This indicates that dentist plays an important role in maintaining oral health as the main pathway for the entry of nutrients into the body hence nutrients can be absorbed by both mother and child.<sup>2,30</sup>

### Conclusion

Stunting in Indonesia has a relationship with the health conditions of the oral cavity in the mother and child through the influence of the provision of diet and nutrition by the mother which relatable to education, behavior, and socioeconomic circumstances of the family. Dentists have an important role in reducing stunting in Indonesia through roles that are adapted with Minister of Health Regulation of the Republic of Indonesia. Meanwhile, Further study is still required.

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# Correlation of Presbycusis with Demensia Based on Hearing Handicap Inventory for the Elderly-Screening and the Mini Mental State Examination

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## Abstract

**Background:** Presbycusis or commonly called sensory deafness in the elderly is a hearing loss due to the degeneration process of the hearing organ. Decreased hearing ability is often associated with a decrease in cognitive abilities in elderly people with dementia. Dementia is a syndrome that is generally chronic or progressive which also occur due to aging process. This study aims to determine the correlation associated with presbycusis with dementia.

**Method:** This type of research was observational analytic using a cross sectional research design type with total 28 patients with mean age of  $71 \pm 8.2$ ; 95% CI: 67.8-74.3 on ENT Department, Dr. Soetomo General Hospital, Surabaya. Retrieval of data using the HHIE-S questionnaire to determine whether the elderly have a handicap or not and to test dementia using MMSE to determine whether or not there is dementia in these patients is then carried out an audiometry test to see the presbycusis degree of the patient. Then the data is analyzed with SPSS software to know the correlation between presbycusis and dementia.

**Results:** 28 patients on ENT Department was measured to know the dementia with MMSE and presbycusis with HHIE-S questionnaire. The chi-square test results obtained a significance value of 0.003 ( $p < 0.01$ ) between the correlation of presbycusis and dementia. This shows that by using the error rate of 1%, HHIE-S affects the MMSE.

**Conclusion:** Patients who experience presbycusis have a risk of dementia 13,00 times compared to patients who do not experience presbycusis due to the HHI-ES questionnaire and MMSE

**Keywords:** Presbycusis, Dementia, HHIE-S, MMSE

## Introduction

Presbycusis is a disease that often occurs in the elderly. According to the Ministry of Health in 2017, the population of elderly people in Indonesia has

reached 9.03% or as many as 23.6 million people. Therefore presbycusis is one of the priorities for hearing loss that has been recommended by the World Health Organization (WHO) to be addressed.<sup>1</sup>

Presbycusis or commonly called sensory deafness in the elderly is a hearing loss due to the degeneration process of the hearing organ. The degeneration process results in side effects on the cochlea and vestibulococcal nerve (VIII). In the cochlea there is a significant change in the form of cochlear atrophy and degeneration of hair cells supporting the cortic organs. The presbycusis examination can be done using several instruments,

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for example using audiometry and the HHIE-S questionnaire.<sup>2</sup> Disorders in cognitive function are often accompanied and preceded by decreased emotional control, social behavior, or motivation.<sup>3</sup> The impact of dementia on caregivers, families and communities can be physical, psychological, social and economic.<sup>2</sup>

The prevalence of dementia increases with age. The worldwide prevalence of dementia reaches 46 million and 22 million of them are in Asia<sup>1</sup>. Until now, in Indonesia there is no exact number of elderly people who have dementia. The survey conducted in Yogyakarta in 2016 showed a figure of 20.1% of elderly people aged 60 years or more who suffer from dementia. This survey involved 1,976 elderly and 1,415 assistants. At the age of 60 years, 1 in 10 elderly people experience dementia, at the age of 70 years, 2 out of 10 elderly people experience dementia and at the age of 80 years, 4-5 out of 10 elderly people experience dementia. This data shows that with increasing age the possibility of someone experiencing dementia increases.<sup>4</sup>

This study aims to determine the correlation associated with presbycusis with dementia.

## Method

The study was conducted at the Outpatient Poly Geriatric Installation and at the Department of Medical Sciences at the ENT Hospital Dr. Soetomo Surabaya in November 2018. Respondents who were sampled in this study were patients over the age of 60 who could communicate well, never used hearing aids and were willing to take part in the study. Patients who were sampled in this study were 28 patients. Characteristics of respondents can be known by sex, HHIE-S and MMSE results.

This type of research was observational analytic using a cross sectional research design type. Retrieval of data using the HHIE-S questionnaire to determine whether the elderly have a handicap or not and to test dementia using MMSE to determine whether or not there is dementia in these patients is then carried out an audiometry test to see the presbycusis degree of the patient.

**HHIE-S:** Hearing Handicap Inventory for the Elderly-Screening (HHIE-S) is a subjective questionnaire and can be used as a reference to determine the presence of handicaps in the elderly who carry out this test<sup>5</sup>. This questionnaire consists of 10 questions that are designed

to measure the emotional and social level of the elderly with hearing loss<sup>6</sup>. Assessment of the HHIE-S score for the "YES" answer is 4, the answer is not "0" and the "sometimes" answer is 2 for each question. The minimum score that can be achieved is 0 and the highest score that can be achieved is 40.

**MMSE:** The Mini Mental State Examination (MMSE) is the most commonly used test for complaints of memory problems. MMSE is a series of questions and tests, each of which has a score of points if the question is answered correctly. In general, values from 27 and above are considered normal. However, getting a score below does not always mean that someone has dementia, their mental abilities may be disrupted for other reasons or they may have physical problems such as hearing difficulties that make them more difficult to take the test.

## Result

**Subject Characteristic:** The sex of the respondents consisted of male and female patients. There are 28 total patients with 12 male patients (42.9%) and 16 female patients (57.1%). Then, for the next step, based on the results of the MMSE analysis to measure dementia, the patients were divided into 2 groups, namely normal and abnormal. On the characteristics based on the decline in the function of thinking and observing (MMSE), it is known that 12 people belong to the normal category (42.9%), and 16 people belong to the abnormal group (57.1%). To determine the risk factors for patients affected by presbycusis attacked by dementia, it is necessary to test to find out the odds ratio. HHIE-S was divided into 2 groups, namely positive presbycusis and negative presbycusis.

The patients who did not experience presbycusis and did not experience dementia were 9 patients (32.1%) while those who had dementia were 3 patients (10.7%). Patients who experienced presbycusis but did not experience dementia as many as 3 patients (10.7%) and patients who experienced presbycusis and had dementia as many as 13 patients (46.4%). The chi-square test results obtained a significance value of 0.003 ( $p < 0.01$ ). This shows that by using the error rate of 1%, HHIE-S affects the MMSE. This is also indicated by a risk ratio of 13.00 which can be concluded that patients who experience presbycusis have a risk of dementia 13,00 times compared to patients who do not experience presbycusis.

## Discussion

Presbycusis is a multifactor process, where the aging process and exposure to noise for a long time are the main factors. In addition, excessive buildup of earwax can also be a factor in this condition.<sup>2</sup> This disorder is characterized by reduced hearing sensitivity and speech comprehension in noisy environments. The center for processing acoustic information is slow and there is interference with the sound source localization. As a result, people with presbycusis disorders have difficulty hearing, comparable to the level of hearing loss in conversation, music appreciation, alarm orientation, and participation in social activities.<sup>9</sup>

Dementia is a disease caused by damage to brain nerve cells in certain parts, resulting in decreased ability to communicate with other body nerves, and resulting in the appearance of symptoms according to areas of the brain that are damaged such as reduced memory, decreased ability to think, understand something, consider and understand language and reduce mental intelligence.<sup>8</sup> Dementia can occur to individuals who experience delirium. Delirium is a brain syndrome caused by a malfunctioning or general brain metabolism. Delirium can often be traced to one or more contributing factors, such as severe or chronic medical illnesses, drugs, infections, head trauma, surgery, drugs or alcohol.<sup>9</sup>

The hearing process in the ear begins with the entry of sound waves into the external auditory, then the sound waves are converted into signals that can be received by the brain through the tympanic membrane and processed into sound perception. But in the elderly there is a decrease in the ability to process signals into sound perception.

The cross-sectional study by Christie et al (2017) showed that those who had a hearing loss with a hearing threshold of more than 40 dB would experience loss of cognitive function faster than those with a hearing threshold of 26 dB. The mechanism for the decline in cognitive function is three possibilities. The first possibility is the disruption of verbal responses to neuropsychological tests<sup>12</sup>. Many individuals with decreased hearing thus having difficulty in giving verbal responses withdraw from these situations and develop social isolation. We are also aware that social isolation is a risk factor for cognitive decline.<sup>13,14</sup>

The second possibility is the reduction of auditory

sensory. Hearing loss has also been associated with decreased white matter integrity leading into and out of the auditory cortex (inferior colliculus to primary auditory cortex).<sup>15</sup> One study found neuroimaging evidence of brain atrophy and volume decline in the right temporal lobe in individuals with hearing loss compared to individuals with normal hearing across six years of evaluation.<sup>16</sup> Studies have shown that poor hearing is associated with reduced gray matter volume in the auditory cortex bilaterally when age-related structural brain changes were controlled.<sup>17,18</sup>

Other brain areas such as the prefrontal cortex gray matter volume and thickness were reduced in patients with poor ability to perceive speech in noisy environments when age effects were taken into an account.<sup>19</sup> The mechanism of this relationship is still not known with certainty but can be proven that the hearing threshold is a determinant of cognitive loss. Research conducted by Lin et al in 2010 using pure tone that did not require processing at the cortical level showed that the increased risk of dementia was proportional to the severity of hearing loss compared to normal hearing, which was 1.89 times that for mild hearing loss, 3-fold for moderate hearing loss and 4.94 times for severe hearing loss.<sup>20</sup>

According to Gallacher et al (2012) increasing hearing threshold are associated with incidences of dementia and cognitive decline. Research shows that people with mild hearing loss symptoms may be twice as likely to develop dementia than those with healthy hearing. People with severe hearing loss may be five times more likely to develop dementia.<sup>21</sup> Histopathological studies have reported progressive loss and degeneration of spiral ganglion cells<sup>22,23</sup>, loss of nerve fibers in spiral lamina<sup>24,25</sup> and hypertrophy of the internal elastic lamina of the internal auditory artery<sup>24</sup> in aged adults. Progressive outer hair cell loss with no degeneration of the cells have been reported in Stria vascularis<sup>26</sup>, spiral ganglion cell degeneration<sup>27</sup>, and degeneration of organ of Corti and afferent neurons<sup>28</sup> in mouse models. Another physiological impairment observed in aging cochlear is asynchronous firing of the auditory nerve fibers as indicated by increased thresholds of the compound action potential of the auditory nerve.<sup>9</sup>

In a study conducted by Lin et al (2011) it was found that hearing loss was independently associated with the incidence of all causes of dementia after adjustment for gender, age, race, education, diabetes, smoking,

and hypertension, and our findings are strong for some sensitivity analyzes. The risk of all causes of dementia increases linearly with the severity of hearing loss, and for individuals > 60 years in our group, more than a third of the risk of incident all causes of dementia are associated with hearing loss. This study also shows that individuals with hearing loss are more likely to have a diagnosis of dementia and worse cognitive function.<sup>20</sup>

In neuroimaging studies, peripheral hearing loss has been shown to be associated with acceleration of whole brain atrophy and volume in the right temporal lobe that functions as speech processing. In addition there are microstructural changes, namely the loss of myelin and axon fibers in the auditory tract. Whereas the gyrus of the temporal lobe is inferior and the media is not only for speech processing, but also functions for semantic memory, sensory integration and this is the initial stage in Alzheimer's disease.<sup>20</sup>

### Conclusion

From the sample, it is known that 16 people belong to the abnormal or dementia group (57.1%). The results of the analysis show that there is a correlation between HHIE-S and MMSE. This is assumed by a risk ratio of 13.00 which can be concluded that patients who experience presbycusis probably have a risk of dementia 13.00 times compared to patients who do not experience presbycusis.

**Conflict of Interest:** There was no conflict of interest in this study.

**Ethical Clearance:** This study was received ethical approval from the Health Research Ethics Committee Faculty of Medicine Universitas Airlangga.

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# Comparison of Some Healthy Motor and Physical Abilities among Young Taekwondo and Karate Players and Their Relationship to Skill Performance

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## Abstract

**Context:** The study aimed to compare some of the motor and physical abilities of young taekwondo and karate players and their relation of skill performance, the researchers used the descriptive approach to suit the research problem. The researchers identified the research sample as Al Furat Al Awsat players of Taekwondo and Karate and the number of sample members of (24) players. The main experiment was conducted on the sample in the physical and physical abilities (motor response speed, balance, and fitness, explosive ability of the legs, motor speed, and the rapid capacity of the legs). The researchers found that there was a significant difference in the balance, fitness and the rapid capacity of the legs for Taekwondo players, the absence of a significant difference in the speed of motor response and explosive capacity of the legs and the motor speed between of Taekwondo and Karate players. Taekwondo players excelled in the variables (balance - Fitness - fast ability of legs), the researchers recommended necessary to conduct the continuous tests on the physical and physical abilities to develop the level of players which helps them to perform better, and ensure the use of exercises which help on improve the balance and motor speed of karate players for what Have a clear impact on players' performance, As well as the use of exercises which help to improve the speed of motor response.

**Keywords:** Motor, Physical Abilities, Skill Performance.

## Introduction

Taekwondo and karate are one of the most advanced activities among competing athletes, as depend on the integration of many basic individual and motor skills, these skills must be mastered with a high degree of the player and in any way so that it can be used in the appropriate positions and according to different playing conditions and theses two sports have complex natural with their motor and physical requirements, they require multiple skills and abilities to achieve a high level of technical performance and this is occurred by presence of the qualifications of motor and physical, including (speed of response motor, balance, fitness, fast ability, explosive ability, motor speed). Hence, as stated by (2) the importance of the research is to identify the comparison of some motor and physical abilities between young Taekwondo and Karate players and

their relationship of skill performance, the problem of research is that individual games need many physical and motor abilities. Therefore, trainers should know and focus on the most required requirement of the sport practiced and its relationship of skill performance. The motor and physical abilities are common capabilities of Taekwondo and Karate sports in the development and improvement of performance and get the point, therefore, it is important to show performance in a perfect way to reach the goal and achieve this distinctively.

**Field Research Procedures:** The researchers used the descriptive approach in the survey method to suit the nature of the research problem, the research sample is the players of Al Furat Al Awsat for Taekwondo and Karate, were randomly way selected and the number of (24) players, including (12) Taekwondo player, (12) Karate player and table (1) shows that:

**Table 1: shows the population and its simple**

Effectiveness	Number	Percentage
Taekwondo	12	50%
Karate	12	50%
<b>Total</b>	<b>12</b>	<b>100%</b>

Heterogeneity was done in variables (length, mass, and training age) as in Table (2).

**Table 2: shows the homogeneity of the variables (length, mass, training age)**

Tests	Measurements Unit	S-	Mean	A	Sprains	Type of Significance
Length	C M	169.68	168.97	6.43	0.33	Homogeneous
Mass	K G	61.30	60.5	5.73	0.41	Homogeneous
Training Age	Month	162	164	8	0.75	Homogeneous

**The Tests:** First: Determination of motor and physical abilities: motor abilities have been adopted (motor response speed, balance, fitness) and Physical abilities (explosive ability of legs, motor speed, rapid ability of legs) by researchers because they are important capabilities of both activities.

**Second:** Determination of tests: After reviewing many sources and references were determined tests of motor and physical abilities by researchers, are:

**The Motor Tests:** Test of Motor response speed (70: 3)

**Purpose of the test: To measure the speed of motor response (to kick):** Performance Specifications: The player of (Taekwondo and Karate stands about 1 m) from the goal to adjust the distance facing the boxing bag to perform the required kicking skill when the exciting appearance of the player performs the skill. Note that the height of the bag is determined according to the lengths of the players<sup>(3)</sup>.

The number of attempts: given to the experimenter three attempts and a period of rest, including (1.30) minutes.

**Recording:**

1. Time is calculated for the moment of the photodiode glow and even touching the bag through the skill of kicking.
2. Records the time for each attempt and then beep the clock in the device.
3. The average time of three attempts is taken.

**Moving Balance Test (87: 4):**

**The Test Aim:** to measure the balance through movement.

**Performance Specifications:** The experimenter walks on the wooden bench and hands aside.

**Recording:** The attempt is calculated correctly in the case of walking on the wooden bench from the beginning to the end without falling, give the experimenter (10) attempts.

**Fitness test of Adjustment Side Step (99: 3):**

**The Test Purpose:** To measure the speed of the individual moving sideways movement and change the direction of movement of the reverse side with kicking the circular side.

**Performance Specifications:** The experimenter stands on the middle line so that the line between the feet wide chest, when giving the start signal takes side steps to the right until it reaches the end of the side line then kicks the apparent foot of the goal placed (60 cm) from the end of the side line and vice versa to the left<sup>(5)</sup>. The experimenter performs kicking movements on both sides as quickly as possible trying to touch the goal, calculates the number of times touching the goal for the two sides during (10 seconds).

**Physical Tests:**

Explosive power test for legs (233: 6):

**Purpose of the Test:** To measure the muscle capacity of the legs from the long jump.

**Performance Specifications:** The experimenter stands behind the starting line, with slightly feet and the arms are high and the arms swing forward, down and back with the knees bent in half and tilt the trunk in front until it reaches what looks like the starting position of swimming. From this position the arms swing in front strongly with the extension of the legs along the torso and push the ground with feet strongly trying to jump in the farthest distance possible<sup>(4)</sup>.

**Recording:** Record the distance from behind the starting line Long jump attempt to the farthest distance and enter the measurement line in the distance. The experimenters have three attempts and choice the best one

**Motor Speed Test (Running in Place):**

**Purpose of the Test:** To measure the motor speed

**Performance Specifications:** The experimenter stands in front of the rubber thread tied to the two high jump, the height of the rubber thread off the ground is equivalent to the experimenter knee when taking the standing position half, one of the thighs is equivalent to the ground when you hear the start signal, the experimenter run in the place of maximum speed so that the thread touches his knee at all stages of running in the place, the arbitrator calculates the number of steps taken by the experimenter in (15 seconds), provided that the count on the right foot only.

**Recording:** The experimenter records the number of times touching the right foot of the earth at the scheduled time.

**Speed ability test for legs (309: 7):**

**The Purpose of the Test:** to measure the speed capacity of the legs

**Performance Specifications:** The experimenter stands inside the circuit and when you hear the start signal the experimenter will jump in place to the maximum number possible during (15 seconds) and feet together.

**Recording:** Records the number of leaps he made during the specified period (15 seconds).

**Exploratory Experiment:** The researchers conducted the exploratory experiment on Wednesday 23/6/2018 and on Al-Tadamonclub hall on a sample of (4) players.

**The Scientific Basis of the Tests:** The researchers achieved the stability of the tests by conducting the tests and returned five days after its implementation on the sample of the first exploratory experiment, the researchers used the correlation coefficient (Pearson) and the results showed high correlations, Self-honesty was extracted for all tests and all tests were highly honest, the objective of the tests was extract the simple correlation coefficient (Pearson). The results showed the existence of correlation coefficients for the tests, confirming its objectivity as in the following table:

**Table 3: shows the scientific basis for the variables under research**

Test Name	Measurement unit	Stability	Honesty	Objectivity
Motor response speed	Second	0.87	0.89	0.91
Balance	Number	0.84	0.86	0.89
Fitness	Number	0.85	0.87	0.91
The explosive power of the legs	cm	0.91	0.88	0.90
Motor speed	Number	0.89	0.85	0.87
Fast capacity of legs	Number	0.82	0.84	0.89

**Skill Performance evaluation:** For the purpose of evaluating the skill performance of the Taekwondo and Karate players, the researchers used three federal arbitrators evaluate each activity, the score was (10) and the arithmetic mean is extracted for the three arbitrators.

**The Main Experiment:** The main experiment was conducted on Monday and Tuesday, 9-10 / 7/2018 at nine o'clock in the morning at the halls of Al-Tadamon Club and Karbala.

**Statistical Method:** The researchers used the statistical bag spss and extracted statistical parameters.



**Results and Discussion**

1. show and analyze the results of the motor level, physical and skill performance.
2. show, analyze and discuss the results of the differences in motor and physical abilities between Taekwondo and Karate players.

**Table 4: shows the results of the motor level and physical abilities and skill performance of Taekwondo and Karate players**

Variables	Mean Arithmetic	Mean Hypothesis	Significance
Motor response speed	0.59	0.57	High
Balance	6.67	6.34	High
Fitness	5.09	5.01	High
The explosive power of the legs	9.76	9.45	High
Motor speed	21.37	20.12	High
Speed ability of legs	15.76	15.44	High
Skill performance	8.5	8.3	High
Motor response speed	0.68	0.68	High
Balance	5.46	5.26	High
fitness	6.08	6.02	High
The explosive power of the legs	11.55	11.34	High
Motor speed	18.09	17.67	High
Speed ability of legs	13.02	12.89	High
Skill performance	8.3	8.0	High

Table (4) shows that the values of the arithmetic means for all variables are higher than the corresponding hypothesis, which indicates the high level of Taekwondo and Karate players in motor and physical abilities and skill performance.

**Table 5: shows the results of the differences in the motor abilities of the legs between Taekwondo and Karate players**

Variables	Taekwondo		Karate		Calculated T Value	Significance
	S-	A	S-	A		
Motor response speed	0.59	0.12	0.68	0.12	0.11	Non - moral
Balance	6.67	0.48	5.46	0.28	5.04	Moral
Fitness	5.09	0.17	6.08	0.37	5.5	Moral
Explosive power of the legs	9.76	5.78	11.55	6.67	0.45	Non - moral
Motor speed	21.37	6.37	18.09	4.18	0,96	Non - moral
Speed ability of legs	15.76	1.35	13.02	0.48	4,28	Moral

\* The value of (T) tabular (1.717) at the level of significance (0.05) and the degree of freedom (22).

**Table (5) shows the following:** The significant differences between Taekwondo and Karate players in the variables (balance - fitness - speed ability of the legs) and in favor of Taekwondo players, where the calculated (T) values more than the tabular values of the significance level (0.05) and the freedom degree of (11), and also shows no significant differences between Taekwondo and Karate players in the variables (motor

response speed - explosive power of the legs - motor speed), where the calculated (T) values less than the tabular values with a level of significance (0.05) and freedom degree (11).The researchers attribute the significant differences to the performance nature of Taekwondo players is different from the performance nature of karate players because the circular movements is a very high percentage of performance unlike karate

players as well as jumping up and performance skills that distinguish them from karate players so most their training units and from identifying them its included fitness training, speed ability and high balance and this is what distinguishes the Taekwondo game from the rest of the other fighting games, especially karate, as <sup>(6)</sup>ensured that the exercise of some special exercises related to these abilities work on increasing the motor capacity and increasing the neuromuscular compatibility, through the method of gradual difficulty during the defense, attack and adjust the distance of the basic situation and the achievement of the maximum amount of these exercises make the player of Karate or Taekwondo be a high level

of physical performance and motor skill (100: 3). As regard the lack of significant differences in the speed of response, explosive ability and motor speed, note that most trainers rely on those capabilities because the speed of response in most coaches depend on these movements as the speed response of most times resolve the struggle and explosive capacity linked in the speed response character and cannot found a high-level reaction unless there are instructions from the defense and the muscles to perform the skill, the motor speed is an required character of all fighting games, especially Taekwondo and Karate activates.

**Table 6: shows the relationship of motor and physical abilities to the skill performance of Taekwondo and Karate players**

Abilities	Skill performance	Significance
Motor response speed	0.84	Moral
Balance	0.89	Moral
Fitness	0.83	Moral
The explosive power of the legs	0.22	No- moral
Motor speed	0.88	Moral
Speed ability of legs	0.84	Moral
Motor response speed	0.87	Moral
Balance	0.23	No-moral
Fitness	0.89	Moral
The explosive power of arms	0.85	Moral
Motor speed	0.88	Moral
Speed ability of legs	0.12	No-Moral

\* The tabular (t) value (0.57) at the significance level (0.05) and the freedom degree (10)

**Table (6) shows the following:** Significant correlation between variables (Motor response speed, Balance, fitness, Motor speed, Speedability of the legs) and skill performance for Taekwondo players, no significant correlation between variable (explosive ability of legs) and skill performance for Taekwondo players, significant correlation between the variables (Motor response speed - fitness - explosive power of legs - Motor speed) and skill performance for karate players, There is no significant correlation between the variables (balance - speed ability of legs) and skill performance for karate players, here we note that the significance of differences in all motor and physical abilities, and this distinguishes the Taekwondo game from Karate because it does not depend on one

performance only but depends on consecutive attacks and repeated reactions as the game of Taekwondo need all these abilities, especially in training units that contain a continuous development to achieve the result, the level of skill performance in any sporting activity depends on the extent of developing the motor and physical requirements specially in the events with different proportions. As for the karate game, it is noticeable that the balance and speed ability is not significant and this is found in the karate player through the standby position that does not need to train in the balance and the lack of use of successive attacks because it can resolve the fight with performance only which the reaction or attack by one decisive skill. The other qualities are from the main requirements of the karate game and without it cannot the

karate player distinguished from the rest of his peers as these requirements overheat the fight in the first minute of the fight, when developing these abilities, the player can be characterized by high potentials with skillful performance. Also,<sup>(7)</sup> confirmed that the development of these abilities of any player to be distinguished by a high degree of muscle strength and a high degree of speed and skill performance, this is what distinguishes karate players through the above relationship (98:1).

### Conclusions

1. High level of Taekwondo and Karate players in motor skills, studied structure and skill performance.
2. The superiority of Taekwondo players in the variables (balance - fitness - speed ability of legs).
3. The skills performance of Taekwondo players is related to variables (motor response speed - balance-fitness - motor speed - speed ability of legs).
4. The skill performance of karate players is related to variables (motor response speed - fitness - explosive power of legs - motor speed).

### Recommendations:

1. Ensuring on training the motor and physical abilities of Taekwondo and Karate players were related to skill performance.
2. Studies on other variables that may be related to skill performance.
3. Conducting comparative studies on other martial activities

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**Ethical Clearance:** Not required

**Conflict of Interest:** None

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# Health care Systems and Their Transformation: A Comparing the Health Care System of Three Selected Countries

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## Abstract

**Background:** Health is known as one of the important rights of every human being. Therefore, access to health care should be possible for all people based on their needs, as such; this protects, maintains and promotes their health without risk of financial hardship. This article comprehensively analyses healthcare systems of three selected countries.

**Objective:** In this study, we sought to compare the healthcare system of Afghanistan with Iran and Australia.

**Method:** Descriptive-comparative study was used to compare the health system of Afghanistan with that of Iran and Australia based on the conceptual framework for healthcare system comparison by Wendt. According to Wendt's conceptual framework, comparison focuses on the contribution of three actors in health system that is: the government, private sectors and societal scheme in three dimensions of health system financing, provision and regulation.

**Results:** The result of this study showed that the Afghanistan health care system is state based mixed type which is similar with that of Iran and Australia in some aspects. But difference exists in the contribution of each of three actors in dimensions of health care system. In Afghanistan, regulation dimension of health care system is highly centralized; all decisions related to goals, monitoring, evaluation, policies and finance are made in Ministry of Public Health (MOPH). This aspect is quit similar with that observed in the Iranian Healthcare system outlook.

**Conclusion:** Findings of this study showed that the success of health system in two other countries, it seems that the applying the decentralization of regulation and contribution of private and societal scheme in financing and provision of health care is the best choice for improving the health care system in Afghanistan. Also, government should decrease dependency in donors.

**Keywords:** Health care system, Transformation, Afghanistan, Iran, Australia.

## Introduction

Health is known as one of the important rights of every human being and therefore, access to health care

should be provided for all people based on their needs, to protect, maintain and promote their health without risk of financial hardship. It is affected by many factors including, but not limited to, genetic, environmental, and socio-economic, access to health care and life style<sup>1</sup>.

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According to conceptual framework of Wendt, various health care systems used by different countries to provide access to health services for their people. In all countries these systems are based on three dimensions

of health care: provision, financing and regulation and three actors that are government, private sector, and societal scheme<sup>2</sup>. Contribution of each actor is different in various countries.

Afghanistan is located in the Middle East with an estimated population of 34.6 million and an estimated population growth of 2.7% annually. The life expectancy at birth in total years is estimated at 64 years and the countries fertility rate is estimated at 4.6 births per woman<sup>3</sup>. In context of the Afghan health system, in accordance with article 52 of the constitution, “the state shall provide free preventive healthcare and treatment of diseases as well as medical facilities to all citizens in accordance with the provisions the law”. Establishment and expansion of private medical services as well as health centers shall be encouraged and protected by the state in accordance with the provisions of the law. The state shall adopt necessary measures to foster healthy physical education and development of the national as well as local sports<sup>4</sup>. The government is required by law to provide access to health services for all Afghans without any charge. And also according to the law, private sectors have contribution to health system.

Studies results reported that different countries with different health system faced with similar challenges in health care in terms of equity in access, quantity and quality of services, financial risk protection, participation in decision making, and accountability and responsibility of health system. Dealing with these issues in various countries is affected by many factors including historical background, political system, geographical location, economic situation and cultural practices<sup>5</sup>.

Literature shows lessons from experience of other countries related to dealing with challenges; they use state regulation with contribution of private and societal scheme to increase access and to protect the risk of financial hardship<sup>6</sup>.

Different countries with different health systems used various synthesis of the dimension of health care with actors of health system to approach their goals<sup>2</sup>. It is important to make change in health care system with the aim of providing equal access to health services for all without financial risk because of changes that are constantly occurring at different aspect of the societies including, not limited to, demographics, patterns of disease, emerging of new disease, and increasing cost of health services urge the health system to be changed

in the pulse of society changes. Therefore, it demands comprehensive comparative studies of health systems in different countries to learn lessons from their health systems experiences<sup>7</sup>.

Health system in Afghanistan was in moribund situation due to many decades war. After the collapse of Taliban regime and establishment of transitional government, health system rehabilitation started in 2002 and many efforts have been done in this regard. Tangible improvements resulted from above mentioned activities such as coverage of basic health care services increase from 10% to 70% of population, maternal and child mortality decrease by more than half, and life expectancy has increased from 44 years to 60 years<sup>8</sup>. However, there is so much to be done, Afghanistan is still on the top of many lists including high prevalence of infectious disease, high mortality of maternal and child, a large difference between life expectancy of Afghans and other nations many other emerging chronic diseases and One-third of Afghans has no access to health services and some area overlapping or underutilization exist<sup>9</sup>.

Important factors that influence the provision of health services in Afghanistan are insecurity, geographical barriers, low level of education, and other social and environmental factors, and high contribution of out of-pocket payment 73% put people in risk of catastrophic health cost and impoverishing<sup>8 and 9</sup>.

Health system in Afghanistan suffer from many issues including Lack of health staff and unequal distribution of them, particularly female staff, Lack of professional training center for professional development of personnel, unregulated private actor of health sector, lack of capacity and logistic facilities to monitor and supervise provision of health services, weak surveillance system, lack of capacity and infrastructure in information and communication technology, bureaucratic system, lack of management capacity at provincial level, lack of documentation, inequality in access, Overlapping regularity function in quality control of supplies and interference of other organization with health activities<sup>8 and 9</sup>.

Comparative studies are useful tools for providing useful lessons on the successful experience of health systems in other countries, in order to make real and constructive changes for development of a responsive health system. This study was done to compare health care system of Afghanistan with Iran and Australia.

## Method

Descriptive-comparative study was used to compare the health system of Afghanistan with Iran and Australia based on the conceptual framework for health system classification of Wendt, which classify the health systems with focus on the contribution of three actors in health system government, private sectors and societal scheme in three dimension of health system financing, provision and regulation. The information on chosen countries health system was collected in 2018, from profiles of health care systems of Afghanistan and Iran and document of health system review of Australia, and website of world health organization. The following indices were used to data extraction: the actors of health system including government, societal scheme and private sectors contribution on provision, financing and regulation dimensions of health systems.

## Results

The result of this study showed that the Afghanistan health care system is state based mixed type which is same with Iran and Australia. But difference exists in the contribution of each of three actors in dimensions of health care system.

**Afghanistan Health care System:** Players and Provision: The provisions of health services in primary and secondary level in Afghanistan system delivered by NGOs and in tertiary level both private and government has its contribution. Ministry of public health (MOPH) of Afghanistan with their international partners in 2003 established the Basic Package of Health Services (BPHS) to provide access to standardized package of basic health care services through village clinics, district hospitals to improve the health and nutrition situation with special focus on women and children. BPHS is the foundation of health system of Afghanistan which includes health clinics, basic health center, comprehensive health centers, and district hospitals<sup>8 and 9</sup>. As a supplement to BPHS, the MOPH in 2005 started the essential Package of Hospital Services (EPHS) through provincial and regional hospital to guide the actions of MOPH and its partners in terms of staffing and supplying with technologies and drugs<sup>8</sup>. Afghanistan health system consists of rural clinics with community health workers for standardized services in all areas of Afghanistan, district hospital for emergency events and inpatient services to reduce mortality rate of mothers, infants and children under five, provincial hospital for emergency events and accepts refers from rural clinics and district

hospitals and also treating some other cases and regional hospitals accept and refer patients from other level of system<sup>8 and 9</sup>.

**Regulation:** in Afghanistan, regulation dimensions of the healthcare system are highly centralized; all decisions related to goals, monitoring, evaluation, policies and finance are made in Ministry of Public Health (MOPH).

**Financing:** Financing of health care system in Afghanistan is provided by government and private sectors. Contribution of government in term of total health expenditure is 52.6% and private quota is 47.4% of total health expenditure which is totally out of pocket payment without any contribution from societal scheme. 47.8% of health expenditure is paid by government which 37% of that expenditure is expended by societal scheme. 54.1% total health expenditure is paid by private sector from that amount 53% is out of pocket payment. In Australia 67.9% of total health expenditure is paid by government, 7.1% is the contribution of private health insurance, and out of pocket payment consist 20.3% of total health expenditure.

**Iranian Health system:** Players and Provision: In Iran, almost all primary and secondary health services and 73% of hospital beds are in governmental quota, Insurance Company and social welfare has shared 13.9% of hospitals beds and private providers has 12.5% of hospital beds. The health system in Iran decentralized with a network of Health facilities ranging from lower centers known as health houses/ health posts to University hospitals as the top most referral centers. The lower facilities start at primary care centers in the periphery followed by secondary-level hospitals in the provincial capital and tertiary hospitals in major cities. The system consists of both public and private service providers. The public sector provides primary, secondary, and tertiary health services. The private sector plays a significant role in health care provision in Iran. The private sector mainly focuses on secondary and tertiary health care in urban areas. There are many nongovernmental organizations (NGOs) active in health issues in Iran.

**Regulation:** The system is partly regulated by Article 29 of the Constitution of the Islamic Republic of Iran which stipulates the right of every citizen to the right to health. The Ministry of Health and Medical Education is mandated to fulfill this goal through policy

and medical education across the country. There is at least one medical university in every province. The president of a medical university is the highest health authority in the province who reports to the Minister of Health and Medical Education. The president of the medical university is in charge of public health, health care provision in public facilities, and medical education. Health care and public health services are provided through a nation-wide network<sup>10, 11 and 12</sup>.

**Financing:** The total expenditure on health as a percentage of Gross Domestic Product (GDP) of Iran stood at 6.9 in 2014<sup>13</sup>. In spite of government spending on health, out-of-pocket expenditure on health remains high, more than 90% of Iranian people are under the coverage of at least one kind of health insurance. The main public health insurers include: Social Security Organization; the Medical Service Insurance Organization; the Military Personnel Insurance Organization and the Emdade-Emam Committee<sup>10 and 12</sup>. The Social Security Organization is one of the largest health insurers in Iran. All the people employed in the formal sector, except for government officials and service people, contribute to the fund and receive benefit from this organization. The Medical Service Insurance Organization provides health insurance for government employees, students, and rural dwellers. The rural population not covered by any insurance became entitled to receive benefits at will in 2000. Patients are subject to copayment at the point of service. The Emdade-Emam Committee provides health insurance for the uninsured poor. Different insurance systems provide different levels of service coverage. There also options of some semi-public insurance companies whose policies mainly cover copayments for costly inpatient services<sup>10, 11 and 12</sup>.

**Australian Health System:** In Australia, Public hospitals, most public health programs, small amount of primary health care are related to government facilities, much of the primary care and much specialist medical care, most allied health care are belong to private sector and small amount is the contribution of non-for profit organization<sup>14</sup>.

In Australia regulation dimension is decentralized, decisions regards of goals and policies and other management issues are made in share with three actors of health system Government, agents of state or other authoritative bodies, NGOs, Quasi-autonomous non-governmental organization (QUANGOs), and Industry groups, professional groups, employers, and public

through consumer groups or individual patients<sup>14</sup>.

## Discussion

This comparative study was done to compare health care system of Afghanistan with health care systems of Iran and Australia based on conceptual framework for health system classification of Wendt, which classify the health systems with focus on the contribution of three actors in health system government, private sectors and societal scheme in three dimension of health system financing, provision and regulation.

The finding of this study showed that there are some shortage and problems with health system of Afghanistan in comparison with health care system of Iran and specially Australia, such as centralized regulation, out of pocket payment and no societal scheme, and contracted provision of health services.

In Afghanistan, the government acts as a dominant regulator of health care system in a centralized way, which is better to have the contribution of local government and private sector. This finding is in compatible with report of WHO that suggested decentralization of administration and technical management to local government and NGOs.

High contribution of donors in financing health services in Afghanistan, may make problem in long-term, government should reduce this dependency of donors. Financing dimension, the most important one, government should lay the foundation for societal scheme for preventing the risk of financial hardship associated with out of pocket payment, which may lead to impoverishment and catastrophic health services cost. The contribution of private sector is low, it is better to make environment supportive and friendly for private sector partnership in health system. The contracting out of primary and secondary health services may raise the question of quality and quantity of health care services.

## Conclusion

Findings of this study showed that the success of health system in two other countries, it seems that the applying the decentralization of regulation and contribution of private and societal scheme in financing and provision of health care is the best choice for improving the health care system in Afghanistan. Also, government should decrease dependency in donors.

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# Creating Value Bugis-Based Filosive Ada Na Gauk in South Sulawesi Regional General Hospital

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## Abstract

**Context:** Modern hospital management systems must provide customer-focused services, which means that hospitals must be able to understand the needs, desires and expectations of customers and create value in providing services in order to realize satisfaction and be able to survive in competition. Quality of service such as polite, empathetic and helpful has different understandings and perceptions from several similar studies and tends to vary greatly from culture to culture, because culture provides a framework for social interaction in society. Many writers have noted the influence of external variables on cultural expectations and recognition as a major determinant of consumer behavior.

This study aims to examine creating value based on bugis philosophical Ada Na Gauk in the Regional General Hospital (RSUD) of South Sulawesi.

The research locations chosen were Andi Makkasau Pare Pare Regional Hospital, Siwa Regional Hospital, Wajo Regency, Lamadukelleng Regional Hospital, Wajo Regency, and Tenriwaru Regional Hospital, Bone Regency. This type of research is quantitative and the respondents in this study were patients from the hospitals mentioned above.

The results of this study indicate that the visit variable, the value of bugis philosophical of Ada Na Gauk mostly is in good category with a visit variable  $\geq 4$  times that is equal to 82.1% and the least is in the experience of Ada Na Gauk with the category of less with visitation category  $\geq 4$  times as much as 17.9%.

**Keywords:** *Creating value, Ada Na Gauk, RSUD (Regional General Hospital). Bugis.*

## Introduction

The Bugis community is an ethnic group that occupies the middle partsouth of Jasirah South Sulawesi as the area of origin and place of residence according to Lontarak Attoriolongne ri Pammana.<sup>13</sup> Increased competition is increasingly competitive in the global economy, profitability, requires more than just good products and services, a business must provide unforgettable satisfaction for customers.<sup>1</sup>

Modern hospital management systems must provide customer-focused services, which means that hospitals must be able to understand the needs, desires and expectations of customers and create value in providing

services in order to realize satisfaction and be able to survive in competition<sup>2</sup>. Based on previous research, around 90% of death rates can be prevented by improving the quality of health care. This shows the importance of quality of care<sup>3</sup>.

Quality of service such as polite, empathetic and helpful has different understandings and perceptions from several similar studies and tends to vary greatly from culture to culture, because culture provides a framework for social interaction in society<sup>5</sup>. The existence of cultural characteristics, affect the values and perceptions of customers / consumers. Customer values have long been considered a source of competitive advantage for service organizations<sup>6,7</sup>. So the hospital

also needs to create value to its customers in providing service experience.

Hospitals in Indonesia continuously improve the quality of service to reach national and even international standard hospitals, with recognition through hospital accreditation that must implement the elements specified in Hospital Accreditation Standards (SNARS) edition 1. One of the standards of accreditation hospital, namely the Patient and Family Rights (HPK), illustrates that the hospital builds trust and open communication with patients to understand and protect the cultural, psychosocial, and spiritual values of each patient. Patients and their families are unique individuals with different characteristics, attitudes, behaviors, personal needs, religion, beliefs and values. The results of service to patients will increase if the patient and family have the right to make decisions, be included in decision making services and processes in accordance with expectations, values, and culture<sup>8</sup>.

Sulawesi Island itself, especially South Sulawesi, has a very fast growth of hospitals, and to improve the quality of its services all hospitals must be accredited with SNARS edition 1. Hospitals in South Sulawesi must maintain the quality of their services in providing services to their customers consisting of several ethnic groups, namely Bugis, Makassar, Mandar, Toraja. One of the most dominant tribes in the South Sulawesi area is the Bugis tribe. The Bugis community is an ethnic group that occupies the central and southern parts of South Sulawesi as their place of origin and residence. Among the 24 districts and municipalities there are several districts which are Bugis areas, each of which are: Bone, Wajo, Sinjai, Bulukumba, Soppeng, Sidenreng - Rappang, Luwu, Pinrang, Kotamadya Pare Pare, Barru, Pangkajene Islands and Maros.

The perception of service desired by consumers in the development of the hospital is polite, empathetic and helpful, almost all of which are included in the Bugis ideology. The Bugis ideology is understood and applied in the Bugis community. This is considered a strong character for them hereditary. Their ability is to move to start a new life by upholding the ideology of sirik na pessẽ. This Bugis ideology consists of four phrases; the first phrase is Ada Na Gauk (in line between words and deeds/honest/consistent/firm/independent), the second is Sipakatau (humanity/mutual attention/benefactors), the third is enumeration (unity/ fair/mutual help/cooperation), the fourth is teppe (trust/mutual trust).

This research focuses on cultural issues by examining regional public hospital services and Bugis ideology as a socio-cultural product. Bugis ideology contained in paseng or pappangngajatomatoa embodied in Lontarak and surekugik as well as other Bugis stories that allegedly created cultural phenomena in the form of local wisdom. This research tries to understand certain ethnic groups in South Sulawesi in producing cultural products in the form of community ideology.

## Materials and Method

- a. **Location and Research Type:** This research was conducted in 3 regencies in South Sulawesi, which are centered within the scope of 4 government hospitals, namely Andi Makkasau Hospital Pare Pare City, Siwa Hospita Wajo Regency, Lamadukelleng Hospital, Wajo Regency, and Tenriawaru Hospital, Bone Regency. This study uses quantitative research with the test used is the Confirmatory Factor Analysis Test.
- b. **Population and Sample:** The study population was all new inpatients with a minimum of 3 days inpatient and recurrent inpatients / their families who had received services at the Hospital in the Regional General Hospital in South Sulawesi. The sampling method used was purposive sampling with the requirements of the respondent being inpatients who had been treated more than twice or in other words repeated patients who at the time of the study were at least 3 days in hospital. The total sample were 400 inpatients at the Regional General Hospital in South Sulawesi.
- c. **Data Analysis:** Analysis of the data used in this study is univariate analysis, bivariate analysis and also multivariate analysis. Univariate analysis is used to determine the distribution of the characteristics of respondents obtained.

## Results

Hospitals have become a growing industry globally to provide patient care. Modern hospital management systems must provide customer-focused services, meaning that hospitals must understand the needs, desires, and expectations of customers and create value in providing services in order to realize satisfaction and be able to survive in global competition.

Customer experience is a differentiating element from traditional concepts of business strategy. This

paradigm shift from brand to service-based, then shifted to focus on service-based marketing relationships and towards managing customer experience<sup>9</sup>. Satisfaction and focus on customers is the focus of service companies this decade, they focus on finding ways to satisfy customers and find out what can make customers want to return, and tell friends and family about the service experience they get<sup>10</sup>

The application of customer experience will have an impact on increasing customer loyalty.. Patients prioritize the utilization of health care services and services regardless of the name of the hospital and other marketing aspects<sup>11</sup>.

Hospital service evaluation refers to the attributes that can be understood. Attributes that can be understood by patients include buildings, equipment, number and competence of doctors, waiting time, procedures, staff friendliness, and so on. Patients generally evaluate attributes that appear to be relatively small in relation to the actual benefits they seek from the hospital<sup>12</sup>. Hospital patients make the actual behavior of doctors and nurses an indicator in evaluating hospitals. Doctors and nurses are expected to be polite, empathetic, and able to help<sup>13,14,15</sup>.

Hospital value creation initiatives can be used to generate revenue and to build market share for businesses, thus it becomes an important part of management strategies that deal with patients without denying services such as courtesy, empathy, compliance with rules and helping to have cultural-based understanding and perception, because culture provides a framework for social interaction in society. Patient expectations based on Bugis Philosophical Ada Na Gauk in South Sulawesi Hospital Expectations on Bugis philosophical value of Ada Na Gauk is the expectation of patients given by hospital staff namely doctors and nurses in the form of integrity, one word and deed, what is conveyed is applied in everyday life. The results of the data analysis showed the Bugis philosophical value of Ada Na Gauk, patients have the expectation that doctors and nurses provide health services in accordance with standard operating procedures that must be obeyed in hospitals. What is delivered will be his action, according to the words of the deeds of the Bugis as Ada Na Gauk.

**Table 1: Characteristics of Patients Based on Sex in South Sulawesi Hospital Year 2019**

Sex	Frequency (n)	Percentage (%)
Male	158	39,5
Female	242	60,5
<b>Total</b>	<b>400</b>	<b>100,0</b>

**Source:** Primary Data Based on table 1 above for female is more than male in total of 242 people (60.5%) compared to the male gender that is equal to 158 people (39,5%).

**Table 2: Characteristics of Patients Based on Age in South Sulawesi Hospital Year 2019**

Age (yr)	Frquency (n)	Percentage (%)
<10	2	0,5
11-15	4	1,0
16-20	27	6,8
21-25	25	6,3
26-30	40	10,0
31-35	32	8,0
36-40	41	10,3
41-45	24	6,0
46-50	51	12,8
51-55	46	11,5
>56	108	27,0
<b>Total</b>	<b>400</b>	<b>100,0</b>

**Source:** Primary Data Based on table 2 above, the age group of the most patients is the age group > 56 years which is 108 patients (27%), while the least is in the age group <10 years in total of 2 patients (0.5%).

**Table 3: Characteristics of Patients Based on Nursing Class in South Sulawesi Hospital Year 2019**

Nursing Class	Frekuensi (n)	Percentage (%)
Class1	112	28,0
Class2	86	21,5
Class3	144	36,0
VIP	58	14,5
Total	400	100,0

**Source:** Primary Data Based on table 3 above, the type of treatment class, class 3 is the class with the most number of patients in total of 144 patients (36%).

**Table 4: Characteristics of Patients Based on Occupation in South Sulawesi Hospital Year 2019**

Occupation	Frequency (n)	Percentage (%)
Student	34	8,5
Private	37	9,3
Housewife	165	41,3
Civil Servant	46	11,5
Farmers	57	14,3
Nelayan/labor	58	14,5
Soldier/ police	3	0,8
Total	400	100,0

**Source:** Primary Data Based on table 4 above, the most types of patient work are housewives as many as 165 patients (41.3%), while the least is the work of TNI / Polri as many as 3 patients (0,8%).

**Table 5: Patient Characteristics Based on the Bugis Philosophical Value of Ada Na Gauk inpatient at South Sulawesi Hospital in 2019**

EAdanagau	Frequency (n)	Percentage (%)
Less	139	34,8
Good	261	65,3
Total	400	100,0

**Source:** Primary Data Based on table 5 above, it can be seen that from 400 respondents, Ada Na Gauk experience in the good category became a domain with a total of 261 patients (65.3%) and adanagau experience with a less category as many as 139 patients (34.8%).

**Table 6: Cross Tabulation of Patients with Bugis Philosophical Values Experience inpatient at South Sulawesi Hospital in 2019**

Variable	Experience of Adanagau					
	Less		Good		Total	
	n	%	n	%	n	%
<b>Sex</b>						
Male	59	37,3	99	62,7	158	100
Female	80	33,1	162	66,9	242	100
<b>Age</b>						
Old	84	36,7	145	63,3	229	100
Young	55	32,2	116	67,8	171	100
<b>Education Level</b>						
Low Education	138	34,7	260	65,3	398	100
High Education	1	50	1	50	2	100
<b>Occupation</b>						
Unemployed	73	36,7	126	63,3	199	100
Employed	66	32,8	135	67,2	201	100
<b>Income</b>						
Below Regional Minimum Wage	103	36,3	181	63,7	284	100
Above Regional Minimum Wage	36	31,0	80	69,0	116	100
<b>Type of Patient</b>						
New	69	46,6	79	53,4	148	100
Old	70	27,8	182	72,7	252	100
<b>Class</b>						
Class 1-3	129	37,7	213	62,3	342	100
VIP	10	17,2	48	82,8	58	100
<b>Visits</b>						
<4 times	134	36,0	238	64,0	372	100
≥4 times	5	17,9	23	82,1	28	100

**Source:** Primary Data The table above shows that in the sex variable, the value of the philosophical experience of Ada Na Gauk is mostly in the good category with the sex variable in the female category of 162 patients (66.9%) and the least is in the category of less by female sex equal to 80 patients (33,1%).

In the age variable, the value of Bugis philosophy of Ada Na Gauk experience is in the good category with the age variable in the young category of 116 patients (67.8%) and the least is in less category with young age category namely by 55 patients (32,2%).

At the education level variable, the value of Ada Na Gauk bugis philosophy is in the good category with the low education level variable in total of 260 patients (65.3%) and the lowest is in less and good category, namely respectively one patient (50%) in highly educated category.

For occupation variable, the value of Bugis philosophy of Ada Na Gauk experience is in the good category with occupation variable of working category in total of 135 patients (67.2%) while the least is in less category with the occupation of working category in total of 66 patients (32.8%).

In the income variable, the value of Ada Na Gauk's bugis philosophy is in good category with the income variable above Regional Minimum Wage of 80 patients (69%) and the least is in less category with the income category above Regional Minimum Wage in total of 36 patients (31%).

In the patient type variable, the value of Ada Na Gauk's bugis philosophy is in good category with old type of patient variable in total of 182 patients (72.7%) and the least is in less category with the type of patient of old category in total of 70 patients (27,8%).

In the treatment class variable, the value of Ada Na Gauk's bugis philosophy is in good category with the VIP nursing class variable in total of 48 patients (82.8%) and the least is less category with VIP category nursing class in total of 10 patients (17.2%).

In the visit variable, the value of Ada Na Gauk's bugis philosophy is in good category with the variabel of  $\geq 4$  times category visit that is equal to 82.1% and the least is less category with the visitation of  $\geq 4$  times by 17.9%.

Bugis philosophical values of Ada Na Gauk (according to words and deeds), doctors and nurses according to the code of ethics and work according to policy, SOP. So in conclusion, creating values based on the Bugis philosophy can be a solution offer for regional public hospital services to be the order and basis in the service of Regional General Hospitals in South Sulawesi

in particular and all regional public hospitals in Indonesia in particular.

## Conclusion and suggestion

One of the philosophical bugis is Ada Na Gauk which is defined as according to words and deeds, what is becoming the Standard Operating Procedures must be implemented, all policies that are mutually agreed upon must be implemented. . The philosophy value of Ada Na Gauk needs to be applied in hospitals according to one of the standards of hospital accreditation, namely the Rights of Patients and Families (HPK), which illustrates that hospitals build trust and open communication with patients to understand and protect the cultural values of each patient. As a material consideration for further researchers to conduct further research related to other indicators to improve service quality in hospitals.

**Conflict of Interest:** There is no conflict of interest in this study

**Source Of Funding:** Domestic Government

**Ethical Clearance:** This study has obtained information on ethical qualifications number: 0151/PL.09/KEPK FKG-RSGM UNHAS/2019 and registration number UH 17120156 dated 15 May 2019.

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# A Study of Exhaustion and Work-Related Stress of a Group of Employees at the Faculty of Science of Kenitra, Morocco

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## Abstract

**Background:** Exhaustion is a syndrome that is very important for professionals in all sectors. Objective: The purpose of the work is to quantify the state of stress in a group of employees at Faculty of Science in Kenitra and to search for determinants.

**Methodology:** The tests used to evaluate this psychic and organizational behavior, are the burnout test and perceived stress test. The study was conducted on 70 interviewers of whom 61.3% are male and 38.7% are female; the average age of respondents is  $36.73 \pm 1.14$  years.

**Results:** The results of this analysis show that 32.85% of the respondents are in a high state of emotional exhaustion; 18.57% have a high level of depersonalization and 35.71% have a low achievement. For the state of stress of the respondents, 22.86% are in a state of perpetual threat and 14.28% are in a perpetual state. In addition, the results obtained do confirm that the occupational stress and burnout syndrome are strongly correlated ( $R^2 = 0.791$ ). The results of the multiple regression confirm that the nature of the occupation is a determining factor in the state of stress ( $p < 0.037$ ).

**Conclusion:** This study helps to pave the way for important practical consequences for the consideration of risk factors in order to prevent burnout and guarantee the well-being of employees.

**Keywords:** Burnout, Employee, Kenitra, Perceived stress, Regression, Syndrome.

## Introduction

Mental health is defined as a state of cognitive, emotional, and behavioral equilibrium that enables a person to produce and maintain satisfying relationships, to participate in the activities of their workplace<sup>1</sup>. However, these requirements increase stress at work and may be the cause of psychological distress or

burnout<sup>2,3</sup>. These behaviors usually result in anxiety and depressive disorders, addictions to drugs and alcohol, and adjustment disorders.

Exhaustion is well known as burn-out. According to the WHO, it is a feeling of intense fatigue, loss of control and inability to achieve concrete results at work. In times of crisis, pressure can increase on employees as well as on managers.

According to Pines (1982)<sup>4</sup>, burnout is a crisis, a suffering that can progress to illness. This is a crisis response after prolonged exposure to stressful circumstances. Therefore, this syndrome is a mental health problem whose main source is the loss of balance due to work stress<sup>5</sup>.

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A close understanding of stress and especially

burnout, its signs, sources and symptoms will help improve the health and quality of life for ourselves and those around us<sup>6</sup>.

In recent years, many researchers have been interested in studying this issue. According to Enzman (2005)<sup>7</sup> about 6000 studies have been published. These behaviors have been classified as a major public health problem, research on stress is no longer the concern of a science associated with popular psychology, but a field of research on stress at work<sup>8,9</sup>.

Our study consists in evaluating the degree of work-related stress and its association with the burnout syndrome, thus looking for the determinants of these two psycho-cognitive behaviors among employees in the public sector: The case of Faculty of Science in Kenitra.

**Material and Method**

1. **Context and Population of the Study:** The study was conducted on 75 employees from Kenitra Faculty of Science. The 75 participants answered a questionnaire dealing with several items (socio-cultural, work schedule, etc.) and neuro-cognitive-behavioral tests in order to obtain a complete and objective approach on the relationship between burnout and perceived stress.
2. **Psychometric Tests:**
  1. The Maslach Burnout Inventory (MBI) consists of 22 questions related to the psychological feeling of work in order to assess the degree of burnout<sup>10</sup>.
  2. Perceived Stress Scale (PSS) is a scale that can be used for secondary assessment (perceived control).

It assesses the frequency with which life (or work) situations are generally perceived as “threatening”<sup>11</sup>.

3. **Statistical Analyses:** After filtration and coding, the data matrix is subjected to statistical analyzes of descriptive order (mean, standard deviation, etc.) and of multiple analytical order (chi-square independence test at 5% error, ANOVA I (one way), multiple regression). The results are expressed as absolute frequencies for the qualitative characters and on average for the quantitative characters.

**Results and Discussion**

1. **Socio-demographic characteristics of respondents:** The distribution of 70 respondents by sex shows that 61.3% are male and 38.7% are female. The sex ratio shows a dominance of male respondents. 66.7% of them are married and 33.3% are single. In addition, 68% (n = 51) of interviewees are in charge of administration (engineers, student affairs administrators, economic departments, etc.), while 32% are technicians. The average age of the respondents is 36,  $73 \pm 1.14$  years, with a minimum age of 26 years and a maximum age of 62; the dispersion does not exceed 27% (coefficient of variation).
2. **MBI Scale (Maslach Burnout Inventory) based Study of Burnout among Respondents:** The validity of the questionnaire was verified by cronbach’s alpha calculation. This value exceeds 0.7 for all three dimensions. This explains a better intra- and inter-dimensional compatibility. The factors were thus strongly correlated with each other. (Table 1).

**Table 1: Repair of categories of burnout by sex in three dimensions**

Dimension		Low	Moderate	High	Total	Chi-square	p value
Emotional Exhaustion	Male	16	6	20	42	10,44	0,002*
	Female	19	6	3	28		
	Total	35	12	23	70		
Depersonalization	Male	21	10	11	42	7,59	0,004**
	Female	23	3	2	28		
	Total	44	13	13	70		
Accomplishment	Male	17	11	14	42	1,42	0,14
	Female	13	4	11	28		
	Total	30	15	25	70		

\*Highly significant difference 1%; \*\*: very highly significant difference: 1 for a thousand; groups with the same letter do not differ significantly.



1. The chi-square independence test reveals a strong link between emotional exhaustion and sex (chi-squared = 10.44, p <0.002). In addition, the distribution of the respondents shows that 47.62% (n = 20) of males shows high levels of emotional exhaustion against 10.71% (n = 3) in the female group. However, 17.14% showed Moderate levels of emotional exhaustion including 6 males and 6 females. While 50% were emotionally or emotionally exhausted.
2. The analysis of the score of the dimension of depersonalization shows that sex has a direct effect on this pathology (chi-square = 7.59, p <0.004). Indeed, 26.19% (n = 11) of males are dehumanized people against 7.14% for females. However, 18.57% (n = 13) of the respondents showed moderate depersonalization, including 10 male and 3 female subjects. While 62.84% (n = 44) of respondents showed low depersonalization.
3. In the third dimension, 42.86% (n = 30) of respondents are characterized by a loss of self-actualization, self-deprecation, reflecting both the feeling of being ineffective in one's work and not to be up to the job. In addition, the chi-square test did not show a significant difference between achievement levels and sex (chi-square = 1.42, p <0.14). Finally, low personal achievement is reflected in feelings of professional incompetence and lack of personal fulfillment at work.

**Table 2: Relationship between socio-demographic variables and the three dimensions (Chi-square; P value)**

Variable	Modality	Emotional Exhaustion	Depersonalization	Accomplishment
Age	<25	15,34 ('p<0,05) **	16,44 ('p<0,037)**	10,85 ('p<0,21)
	25<math>\diamond</math>30			
	30<math>\diamond</math>35			
	35<math>\diamond</math>40			
	>40			
Marital status	Married	0,24 (p<0,88)	0,26 (p<0,88)	6,98 (p<0,03)*
	Single			
Profession	Administrators	16,85 (p<0,000) ***	16,32 (p<0,000)***	20,05 (p<0,000) ***
	Technician			
Number hours/days	<6	13,19 (p<0,01) **	7,15 (p<0,128)	8,12 (p<0,087)
	6<math>\diamond</math>8			
	>8			

\*Highly significant difference 1%; \*\*: very highly significant difference: 1 for a thousand; groups with the same letter do not differ significantly.

The table above presents the results of the chi-square independence test between the state of exhaustion and certain socio-demographic parameters.

The results of this test show that relationships between emotional state and age (chi-squared = 15.34, p <0.05), are highly significant between emotional state and number of working hours. (chi-square = 13.19, p <0.01) and very highly significant between emotional state and occupation (chi-square = 16.85, p <0.000). In addition, most pathological cases have an age range between 25 and 35 years and are usually technicians. However, the marital status has no direct effect on the emotional state (p > 0.88).

On the other hand, as far as depersonalization is concerned, the analysis carried out by the chi-square test shows that age and occupation are two risk factors, with values of 0.037 and 0.000, respectively. In fact, nine out of 13 pathological cases are aged 25 to 40 years old and 10 out of 13 are technicians. The marital status and the number of hours have no influence on the state of depersonalization (p > 0.05).

However, the results of the chi-square independence test presented in the table show that marital status and occupation are two major risk factors for achievement, with values of 0.03 and 0.000, respectively. However, 18 out of 50 supposedly pathological cases are married

and 26 out of 51 are administrators. The other variables show no significant difference.

**5. Perceived Stress:** This adapted scale of Cohen and Williamson is one of the most used method to assess the perception of stress. Its 10 items allow for a simple and a quick measuring of the importance with which life situations are perceived as threatening (unpredictable, uncontrollable and painful). By setting benchmarks, it allows to start a discussion about the work during health check-ups at work. Indeed, it is necessary to have benchmarks to discuss and communicate.

- The first category where the score is less than 21: 34.28% concerns employees' ability to cope with stress and adapt and for which there are still solutions.
- The second category where the score is between 21 and 26 concerns people who know how to manage the state of stress; still, there are a number of situations they cannot handle. They sometimes have a feeling of helplessness that causes emotional disturbances. They can get rid of this feeling of helplessness by learning method of change strategies. In our sample, this represents 28.57%.
- The last category where the score exceeds 27: 22.86% concerns people who are perpetually threatened. These people feel that they are

going through most of the situations and cannot do anything but accept them. This strong sense of helplessness that characterizes their view of life can cause illness. Research on their thought patterns and their way of reacting is desirable. The distribution showed that 14.28% are in a state of perpetual stress.

The chi-square test of independence between the categories of the perceived test and certain supposed risk factors shows no significant relationship either with sex ( $p < 0.11$ ), the profession ( $p < 0.14$ ), marital status, age ( $p < 0.077$ ) or with working hours per week ( $p < 0.98$ ).

**6. Global Analysis:** To search for possible stressors in the Kenitra Faculty of Science, we have used multiple regressions, whose dependent variable is perceived stress score and explanatory variables (the three dimensions of burnout, age, sex and occupation). The results of this analysis show that these variables explain 79.1% of the total stress variation. The ANOVAI of the different regression coefficients shows a very highly significant difference (Fisher = 18.88,  $p < 0.000$  and  $ddl = (6; 68)$ ). Table (3) presents the results of multiple regressions; it follows that the three dimensions of burnout and occupation significantly explain respondents' state of stress; however, combined with these variables, age and sex did not show a significant effect on occurrence of stress.

**Table 3: Results of multiple regression (dependent variable = perceived stress)**

Variable	Unstandardized coefficients		Standardized coefficients	T student	Sig.
	A	Erreur standard	Bêta		
(Constant)	,354	,167		2,443	,007**
Emotional exhaustion	1,030	,152	,679	6,795	,000***
Depersonalization	,438	,176	,251	2,494	,015*
Accomplishment	-,274	-,133	-,182	-2,052	,044*
Age	,012	,011	,091	1,122	,266
Sex	,040	,249	,015	,162	,872
Profession	,260	,186	,091	1,909	,037*

\*\*\* : Highly significant difference \* : significant difference; sig : signification

### Discussion

The work we did with permanent staff at the Kenitra Faculty of Science focused on the assessment of stress and burnout and its association. The results of our study

on burnout show that age, sex and occupation are risk factors, especially among young people aged 25 to 35, a fact confirmed by French and American studies carried out by emergency doctors and which consider that age is

one of the risk factors for burnout<sup>2,3,12</sup>. Males would be at greater risk than females<sup>13</sup>.

Moreover, According to our results, there is a significant and positive relationship between the number of working hours and the appearance of burnout. In fact, the burn-out rate related to the increase in working time reduces the time of rest and recuperation for employees. Burnout could certainly have a negative effect on the health of the individual<sup>14</sup>. This usually results in summarization disorder, anxiety and depression. On the other hand, the causes of stress vary from one subject to another as an accident, surgery, illness, difficult living conditions, low salary level<sup>15</sup>. Stress at work is usually the result of too great a pressure, a lack of control in the tasks to be performed, poor organization and communication and finally a working environment with no real help system<sup>16-19</sup>.

The results show that there is a significant relationship between sex and stress and that women have higher scores than men. The results obtained in our study also show this significant relationship according to the chi-square statistical test, but the male sex is more exposed to stress than the female sex. Finally, the stress resistance trend was too age-related, which explains the increase in perceived stress in the elderly. Our study also showed the relationship between age, stress resistance and perceived stress using the chi-square statistical test ( $p < 0.05$ ), in addition to the high percentage of participants.

### Conclusion

The study that we have conducted on the permanent administrators and technicians of the Faculty of science makes it possible to draw a psychological profile of these respondents. This profile differs according to several parameters such as gender, the nature of the profession, age and the state of burnout. However, the 25- to 40-year-old age groups suffer from this stress-related burnout problem; therefore, technicians also have fairly high levels of stress. Faced with this situation, the authorities are called upon to review the established set of systems related to work schedules and to integrate people into training sessions in the presence of a specialist in the field of health.

**Conflict of Interest:** No

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**Ethical Approval:** The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Ibn Tofail University Kenitra. This procedure were examined and approved by the Committee

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# The Role of Endometrial Volume By 3 D Ultrasonography in Prediction of Endometrial Hyperplasia and Carcinoma

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## Abstract

**Background:** The most commonly used technique for detecting endometrial disease in women with AUB is 2D and 3D transvaginal ultrasound.

**Patients and Method:** This study is a controlled clinical trial that was conducted in El-Minia University Maternity Hospital, Egypt. Cases were collected from the outpatient clinic and inpatient gynecological department and 132 pre- & postmenopausal women were included in this study. All cases presented by AUB. The study was conducted between August 2017 and August 2019. The study was approved by the hospital ethical committee.

**Results:** In our study by comparing the AUCs of ET is 0.859, EV is 0.875, VI is 0.916, FI is 0.803, VFI is 0.906, PI is 0.902 and RI is 0.930, the best variable to predict malignancy is RI followed by VI followed by VFI, PI and EV.

**Conclusion:** 3D ultrasonography and power Doppler, especially RI, may be useful for discrimination between benign and malignant endometrium in women with AUB.

**Keywords:** 3D ultrasonography, power Doppler, Endometrial carcinoma, AUB, endometrial volume.

## Introduction

AUB is a common gynecological complaint in outpatient clinic, but is often complex and difficult to be diagnosed. <sup>(1)</sup>

There are many benign causes of PMB including : atrophic endometrium (50%), hyperplasia (13%) and polyps (10%). However, 10% probability of endometrial cancer in women with PMB. <sup>(2,3)</sup>

The cumulative risk of endometrial cancer up to

the age of 75 years estimated as 1.6% for high-resource regions and 0.7% for low-resource countries <sup>(4,5)</sup>.

The most commonly used technique for detecting endometrial disease in women with abnormal vaginal bleeding is 2D transvaginal ultrasound <sup>(6)</sup>. Previous studies have reported a relationship between endometrial thickness and histoathologic diagnosis of endometrial cancer in peri- postmenopausal women <sup>(7,8)</sup>.

Although the sensitivity of 2D ultrasound in detecting endometrial cancer has been considered good, it is associated with low false-negative rate. <sup>(9,10)</sup>

The value of Doppler and color Doppler U/S is to discriminate benign from malignant endometrial disease is controversial <sup>(11,12)</sup>.

EV measurements using a 3DPD machine has been considered moderately satisfactory <sup>(13)</sup>. However, another study by several of the same authors published

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2 years later has good inter-observer reliability for both endometrial volume and vascular measurements with 3DPD imaging<sup>(14)</sup>. Histological characteristics of endometrial biopsy remains the gold standard for the clinical diagnosis of endometrial pathology. <sup>(15)</sup>.

The aim of this work is to measure endometrial thickness, volume, (VI), (FI), (VFI), RI and PI in women with peri- and postmenopausal bleeding and correlate it with histopathological results to discriminate between benign and malignant endometrial lesions.

### Patients & Method

This study is a controlled clinical trial that was conducted in El-Minia University Hospital, Egypt. Cases were collected from the outpatient clinic and inpatient gynecological department and 132 pre- & postmenopausal women were included in this study. All cases presented by AUB. The study was conducted between August 2017 and August 2019.

#### Inclusion Criteria:

1. Age group above 40 years.
2. Abnormal uterine bleeding
3. Definitive endometrial histological diagnosis was obtained.

#### Exclusion criteria:

1. Evident general cause that can cause vaginal bleeding.
2. Presence of vaginal, vulval or cervical causes of bleeding.
3. Pregnancy.
4. Contraception use.
5. Any gross uterine or ovarian pathology.
6. Endometrial thickness less than 4 mm.

#### Each patient was subjected to:

**A. Complete history:** With assessment of: age, parity, menopausal status and medical disorders.

#### B. Clinical examination

1. BMI
2. Abdominal examination
3. Speculum examination : to rule out tumors of the cervix, vagina or vulva.

**C. D-Transvaginal Ultrasound Examination:** Using Voluson S8, ultrasonography was performed to measure maximal endometrial thickness (double layer) and then 2-DPD gate was activated to assess (RI) and (PI) along ascending branch of the uterine artery.

**D. Dimensional Ultrasound Examination:** 3 dimensional volumes were activated. With VOCAL program, endometrial area was evaluated manually in the coronal or C plane. With a rotational technique with a 30-degree step, 6 endometrial slices were obtained that outlined the endometrium at the myometrial-endometrial junction from the fundus to the internal cervical os. The VOCAL program automatically calculates EV and three 3-dimensional power Doppler indices: (VI), (FI) and (VFI).

**E. Endometrial Sampling:** Within 1 week after ultrasound examination, all patients underwent endometrial sampling or hysterectomy. Definitive histological diagnosis was obtained in all cases

**Statistical Analysis:** Statistical analysis was done on a personal computer using IBM© SPSS© Statistics version 22 (IBM© Corp., Armonk, NY, USA) and MedCalc© version 13 (MedCalc© Software bvba, Ostend, Belgium). Mann-Whitney U test was used for non parametric quantitative data. Independent sample T test was for comparison between two groups with parametric quantitative data. Fisher's exact test was used for qualitative data. Receiver-operating characteristic (ROC) curve analysis was used to examine the value of 3D-Doppler measures for identification of malignant lesions.  $P < 0.05$  is considered statistically significant

### Results

Patients in our study were divided into two groups according to histopathological results; (A) Benign group: containing 108 patients (81.8%) , (B) Malignant group: containing 24 patients (18.2%) . The endometrial lesions in benign group were: atrophic endometrium 51(38.6%), disordered proliferative endometrium 18(13.6%), endometritis 6(4.5%), secretory endometrium 3(2.3%), complex endometrial hyperplasia 6(4.5%), simple endometrial hyperplasia 18(13.6%) and hyperplastic endometrial polyps 6 (4.5%) . The malignant endometrial lesions include: endometrioid adenocarcinoma 18 (13.6%) (12 grade I and 6 grade II), one patient with clear cell carcinoma (0.8%) and other with serous papillary adenocarcinoma (0.8%) and 4 patients with squamous cell carcinoma (3%).

**Table 1: Shows the percentage of various types of histopathological results**

		N=132	
		Malignant Benign	
		24(18.2%) 108(81.8%)	
Histopathology	Malignant	Endometrioid adencarc. G.I	12(9.1%)
		Endometrioid adencarc. G.II	6(4.5%)
		Clear cell carcinoma	1(0.8%)
		Papillary sero. adenocarcinoma	1(0.8%)
		Squamous cell carcinoma	4(3%)
	Benign	Atrphic endometrium	51(38.6%)
		Complex endometr. hyperplasia	6(4.5%)
		Simple endometr. hyperplasia	18(13.6%)
		Disordered proliferative endom.	18(13.6%)
		Endometritis	6(4.5%)
Hyperplastic polyp	6(4.5%)		
Secretory endometrium	3(2.3%)		

**Table 2: Shows comparison of the histopathological results(benign & malignant) with each variable**

		All cases	Histopathology		P value
			Bengin	Malignant	
			N=108	N=24	
ET	Range Mean ± SD Median / IQR	(4-20) 9±3.7 8 / (7-10.8)	(4-14) 7.9±2.4 8 / (6-9)	(7-20) 13.8±4.5 14.1 / (9.5-18.3)	<0.001*
EV	Range Mean ± SD Median / IQR	(3.1-19.2) 7.6±3.7 6.3 / (5.5-8.4)	(3.1-9.5) 6.2±1.4 6.1 / (5.3-7)	(4.4-19.2) 13.5±4.7 14.1 / (10.1-17.7)	<0.001*
FI	Range Mean ± SD	(20-37.2) 26.4±4.5	(20-34) 25.5±3.9	(22-37.2) 30.7±4.8	<0.001*
VI	Range Mean ± SD Median / IQR	(4.1-23.3) 8.6±4.9 7 / (5.5-9.3)	(4.1-11.5) 6.8±2 6.3 / (5.2-8.4)	(5.8-23.3) 16.7±5.8 18.1 / (12.2-21.9)	<0.001*
VFI	Range Mean ± SD Median / IQR	(0.4-7.3) 2.1±1.6 1.7 / (0.9-3)	(0.4-3.2) 1.6±0.9 1.5 / (0.9-2.3)	(0.8-7.3) 4.7±1.9 4.9 / (3.5-6.5)	<0.001*
RI	Range Mean ± SD Median / IQR	(0.3-1.6) 0.7±0.3 0.6 / (0.4-0.8)	(0.3-1.2) 0.6±0.2 0.5 / (0.4-0.7)	(0.5-1.6) 1.2±0.3 1.2 / (0.9-1.5)	<0.001*
PI	Range Mean ± SD	(0.8-2.2) 1.2±0.4	(0.8-1.7) 1±0.2	(1-2.2) 1.7±0.4	<0.001*

**Table 3: Receiver-operating characteristic (ROC) curve analysis for prediction of malignant lesions using different parameters measured.**

	ET	EV	FI	VI	VFI	RI	PI
Cutoff point	> 10	> 8.5	> 26.4	> 11	> 3.1	> 0.89	> 1.3
AUC	0.859	0.875	0.803	0.916	0.906	0.930	0.902
95% CI	0.788-0.914	0.806-0.926	0.725-0.867	0.855-0.957	0.843-0.950	0.872-0.967	0.838-0.947
P value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Sensitivity	75	83.33	83.33	83.33	83.33	83.33	79.17
Specificity	86.11	93.52	69.44	99.07	99.07	93.52	92.59

	ET	EV	FI	VI	VFI	RI	PI
PPV	54.5	74.1	37.7	95.2	95.2	74.1	70.4
NPV	93.9	96.2	94.9	96.4	96.4	96.2	95.2
Accuracy	84.1	91.67	72	96.21	96.21	91.67	90.15

**Table 4: Comparison of the areas under the ROC curves (AUCs) associated with various predictors.**

Comparison	ΔAUC	Standard error	95% CI	Z	P value
ET vsEV	0.0152	0.0374	-0.0581 to 0.0885	0.408	0.6836
EV vs FI	0.0561	0.0426	-0.0274 to 0.140	1.317	0.1877
ET vs VI	0.0565	0.0297	-0.00162 to 0.115	1.905	0.0567
ET vs VFI	0.0465	0.0321	-0.0165 to 0.109	1.447	0.1478
ET vs RI	0.0704	0.0303	0.0109 to 0.130	2.321	0.0203*
ETvsPI	0.0426	0.0225	-0.00148 to 0.0867	1.894	0.0582
EVvs FI	0.0714	0.0643	-0.0546 to 0.197	1.111	0.2667
EV vs VI	0.0413	0.0213	-0.000464 to 0.0830	1.938	0.0526
EV vs VFI	0.0312	0.0184	-0.00487 to 0.0674	1.696	0.0899
EV vs RI	0.0552	0.0371	-0.0176 to 0.128	1.486	0.1372
EVvsPI	0.0274	0.0458	-0.0625 to 0.117	0.598	0.5501
FI vs VI	0.113	0.0495	0.0156 to 0.210	2.276	0.0228*
FI vs VFI	0.103	0.0514	0.00193 to 0.203	1.998	0.0458*
FI vs RI	0.127	0.0403	0.0475 to 0.206	3.139	0.0017*
FI vs PI	0.0988	0.0448	0.0109 to 0.187	2.204	0.0275*
VI vs VFI	0.01	0.00699	-0.00368 to 0.0237	1.434	0.1515
VI vs RI	0.0139	0.0181	-0.0217 to 0.0494	0.766	0.4439
VI vs PI	0.0139	0.0333	-0.0514 to 0.0792	0.417	0.6769
VFI vs RI	0.0239	0.0209	-0.0170 to 0.0648	1.146	0.2518
VFI vs PI	0.00386	0.0366	-0.0679 to 0.0756	0.105	0.9161
RI vs PI	0.0278	0.0281	-0.0273 to 0.0828	0.989	0.3226

**Discussion**

In this study, regarding (ET), the median ET of benign group was 8 mm IQR(6-9), in malignant group was 14.1 mm IQR(9.5-18.3), denoting statistical significance (P<0.001). When ET cut-off was 10 mm, the AUC was 0.859, sensitivity 75%, specificity 86.11%, PPV 54.5% and NPV 93.9%. These results are in agreement with the study of Granbergetal.<sup>(18)</sup> but in disagreement with Saha et al. <sup>(19)</sup>.

As regards EV, the median EV of benign group was 6.1, IQR (5.3-7) and of malignant one was 14.1, IQR (10.1-17.7). These results show statistical significance (P<0.001) Table(2). Using EV cut-off >8.5 for predicting malignancy, the AUC : 0.875, sensitivity :83.33%, specificity: 93.52%, PPV : 74.1%, NPV:96.2% (P <0.001) denoting statistical significance .Table (3). The results of our study are in agreement with those of

Gruboeck et al. <sup>(20)</sup> and Odeh et al. <sup>(21)</sup>

Comparing AUCs of ROC curve between endometrial thickness and endometrial volume Table(4) showed no significance (P=0.6836). Yet endometrial volume tended to be superior to endometrial thickness (Table 3). An opposite result was reported by Opolskiene et al. <sup>(22)</sup>.

Regarding the mean (VI) of benign group was 6.8 with range (4.1-11.5) while in malignant group the median was 16.7 with range (5.8-23.3), these results show statistical significance (P< 0.001) (Table 2). By using VI cut-off >11 for predicting malignancy :AUC 0.916, sensitivity 83.3%, specificity 99.07%, PPV 95.2%, NPV 96.4% (P< 0.001) which denotes high statistical significance (Table 3). The results are in agreement with those of Alcazar & Galvan<sup>(17)</sup> and recent study of Hanafi et al.<sup>(23)</sup>.



The mean (FI) of benign group was 25.5, range (20-34), while in malignant group 30.7, range (22-37.2), these results are statistically significant ( $P=0.001$ ) (Table 2). Using FI cut-off  $>26.4$ , the AUC 0.803, sensitivity 83.33%, specificity 69.44%, PPV 37.7%, NPV 94.9% and ( $P<0.001$ ) with statistical significance (Table 3). The results are in agreement with those of Mercé et al. <sup>(24)</sup> and those of Alcázar & Galvan. We also agree with study of Hanafi et al. <sup>(23)</sup>.

As regarding (VFI), the mean (VFI) of the benign group was 1.6, range (0.4-3.2), while in malignant group was 4.7, range (0.8-7.3), these results are statistically significant ( $P<0.001$ ) (Table 2). Using VFI cut-off  $>3.1$  for predicting malignancy with AUC 0.906, sensitivity 83.33%, specificity 99.07%, PPV 95.2%, NPV 96.4% ( $P<0.001$ ) with statistical significance (Table 3). The results of our study are in agreement with those of Alcázar et al. <sup>(17)</sup>. And Mercé et al. <sup>(24)</sup> and Hanafi et al. <sup>(23)</sup>

As regarding median RI of benign group was 0.5, IQR (0.4 -0.7) and malignant group 1.2, IQR (0.9-1.5) denoting statistical difference ( $P<0.001$ ) (table 2). By using RI cut-off  $>0.89$  to predict malignancy had AUC 0.930, sensitivity 83.3%, specificity 93.52%, PPV of 74.1%, NPV of 96.2% and ( $P<0.001$ ) (table 4). The results are in disagreement with those of Kupesic & Kurjak <sup>(25)</sup>.

As regarding mean PI of the benign group was 1.0, range (0.8 -1.7) and malignant group was 1.7, range (1-2.2) which denotes that there is statistical difference ( $P<0.001$ ) (table 2). By using PI cut-off  $>1.3$  to predict malignancy had AUC 0.902, sensitivity 79.17%, specificity 92.59%, PPV 70.4%, NPV 95.2% and ( $P<0.001$ ) (table 3). These results are in agreement with those of Amit et al. <sup>(26)</sup>. In disagreement with our results was with El-Sharkawy et al., <sup>(16)</sup>

Our results showed that endometrial thickness, volume, Doppler velocimetry (RI, PI) and 3D-PDA indices, may discriminate between endometrial cancer and benign conditions as their values were higher in malignant endometrial lesions than those with benign endometrium. In our study by comparing the AUCs of ET is 0.859, EV is 0.875, VI is 0.916, FI is 0.803, VFI is 0.906, PI is 0.902 and RI is 0.930, the best variable to predict malignancy is RI followed by VI followed by VFI, PI and EV.

## Conclusion

This study showed that the use of three-dimensional sonography and power Doppler angiography can complement the conventional two dimensional ultrasound in assessing the endometrial lesions. The detection of increased endometrial Doppler signals by 3D-PDA may be a possible new ultrasound marker in the diagnosis of endometrial malignancy, and it is worthy of further researches.

**Ethical Considerations:** The study protocol was approved by the ethical committee of the Obstetrics & Gynecology dept. at faculty of medicine, Minia University.

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**Conflict of Interest:** None.

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# Emotional Freedom Technique as a Promotive Effort for Housewives to Change the Smoking Behavior of Family Members in Indonesia

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## Abstract

**Context:** Smoking behavior in Indonesia has become a lifestyle and smoking behavior has been started since elementary school children. In Indonesia, the promotion of prevention of cigarette consumption has been wrapped in cigarettes which presents a danger to health, but this appeal is still ignored by people who smoke. So to reduce the smoking behavior in adolescents needs to be done a promotive step or Emotional Freedom Technique (EFT) therapy to change a person's behavior, attitude or mindset towards smoking, so they have the desire to stop smoking. This study uses a t-test dependent test with a sample of 140 people in the District of West Bogor. The results showed that there were significant differences between before and after EFT.

**Keywords:** *Smoking behavior, emotional freedom technique*

## Introduction

Indonesia is one of the cigarette producing countries because it is a country rich in tobacco. But as the number of cigarette production in Indonesia is directly proportional to the smoking behavior of the community even starting from elementary school.<sup>1,2</sup> Smoking behavior in Indonesia has become a daily lifestyle and does not even look at the social economy.<sup>3</sup> The Indonesian government has tried to reduce smoking behavior such as stopping smoking campaigns in schools, installing the dangers of cigarettes wrapped in cigarettes but there are still many people who find it difficult to stop smoking.<sup>4,5,6</sup>

As a result of smoking behavior is known to cause interference in the lungs but not only that also cancer, oral cancer, cardiovascular, pharynx, coronary heart disease, COPD and esophagus. The more cigarettes

consumed, of course, the greater the danger posed by smoking behavior.<sup>7,8</sup> The high prevalence of smoking in Indonesia, especially among adolescents, causes the problem of smoking to become more serious. The impact caused by cigarettes is not only in people who smoke, but the greatest risk is in passive smokers, namely people who don't smoke but are badly affected by smoking.<sup>9,10,11</sup>

In cigarette addicts, there is a conflict between the conscious mind and the subconscious mind. Where the habit of smoking is the product of the subconscious mind while the desire to stop smoking is the result of the logic of the conscious mind because smoking clearly harms health and the economy. Addiction is a habit that is firmly planted in the subconscious mind. With hypnotherapy.<sup>12</sup>

Reducing the risks posed by smoking for both active smokers and passive smokers need to be done an effort to increase interest in changing smoking behavior. Emotional Freedom Technique (EFT) or also known as Spiritual Emotional Freedom Technique (SEFT). EFT or SEFT is often used to change someone's behavior, attitude or mindset. EFT therapy is similar to the theory

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of acupuncture because both EFT and acupuncture depart from the same theory, but as it is known that acupuncture is something very complicated that not everyone can master it. The SEFT method is carried out by tapping 18 key points along the 12 energy pathways of the body.<sup>10,13.</sup>

EFT therapy is effective for improving health and treating physical ailments, phobias, including overcoming insomnia, trauma, reducing addiction, eliminating smoking, allergies, diet, anxiety, depression, breathing, blood pressure, fear and various problems related to emotions.<sup>14,15</sup>

Positive emotions and thoughts can direct smokers to take adaptive actions and not lead to behaviors that violate existing norms. Such emotional conditioning and positive mind changes can be done one of them by providing psychological interventions in the form of spiritual approaches and simple movements that lead to the improvement of emotional conditions, cognition, and behavior or what is called SEFT therapy.<sup>15,11</sup>

Changing the stable emotional conditions and positive thoughts, allows a person to be more active and productive in responding to a thing, object or stimulus received. EFT can be done by housewives to reduce the smoking behavior of family members. A mother has an important role in the life of a family, both its role for her husband and children.<sup>10,16</sup>

This is what the researcher wants to do so that housewives can re-teach this eft therapy process to family members who are addicted and have the desire to stop smoking so that smoking behavior can be eradicated by this SEFT method.

**Material and Method**

This research is quantitative research in which the research design used is Quasi Experiment design with pretest and posttest with non-control group design, a research design that aims to test the causal relationship. This research was conducted in Semplak Village, West Bogor District, with the study population being housewives who had family members of active smokers. Sampling using simple purposive sampling technique with a sample of 140 respondents. Data obtained using the t-test dependent test.

**Findings:**

**Table 1: Pre-test and Post-test have given EFT Traini**

	Mean	SD	P-Value
Before EFT	0,00	0,000	0,001
After EFT	0,86	0.363	

**Discussion**

The results of this study stated that there were differences in the average value of housewives' knowledge of smoking cessation through hypnotherapy training or cigarette EFT. The intended change is to lead to better behavior. The mindset changes from bad or negative to good or positive.

EFT therapy is very influential in the intensity of smoking because it can neutralize the psychological problems of smokers. EFT therapy consists of set up, tune in, and tapping. At the setup stage, make sure the energy flow is channeled properly, and say the setup sentences. Sentences set up include, even though I feel good when I smoke, and it's hard to stop smoking, I sincerely accept that and I surrender my healing to you my God. After saying the sentence set up then the emotional problems of smokers are raised by feeling the pleasure of smoking and then do tapping at 18 meridian points while smokers say surrender and sincerely. Tapping in tune-in can neutralize the emotional problems of smokers. When that happens it causes the effect of loss of pleasure in smoking, because in cigarettes contain nicotine which can stimulate the hormone dopamine, endorphins, and serotonin which function as a sedative, so that the smoker can reduce the intensity of smoking.<sup>17,18.5</sup>

Nearly 60-70 percent of chronic illnesses have great psychological aspects, so suggestive aspects are very necessary for therapy. This mind therapy generally uses a hypnotherapy approach, by utilizing a person's hypnosis condition (state hypnosis). The influence of the subconscious mind on human beings is 9 times stronger than the conscious mind. That is why many people find it difficult to change even though they consciously want to change. When there is a conflict of desires between the conscious and subconscious mind, the subconscious mind always wins.<sup>19,13</sup>

Smoking behavior is an interaction between pharmacological and psychological factors. Psychologically it includes aspects of stimulus control and the role of cigarettes as a reinforcer to get a sense of

pleasure and relaxation. The enjoyment and relaxation of smoking are obtained when smoking is done after eating, as a companion to drinking coffee or drinking alcoholic beverages. Behaviors that can reduce discomforts such as anxiety, tension, boredom and fatigue.<sup>20,21</sup>

One way to do EFT is that community empowerment is basically a planned social change strategy aimed at addressing problems or meeting community needs. In the process of empowerment, the community gets learning so that they can independently make efforts to improve the quality of their lives. Thus, the process must be carried out with the full involvement of the community itself gradually, continuously, and continuously.<sup>22</sup>

### Conclusion

Average knowledge of housewives on the effect of stopping smoking through the EFT pre-test 0,000 with a standard deviation of 0,000. There is a better change after EFT training for housewives who have family members of active smokers with an average of 0.86 with a standard deviation of 0.363.

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**Ethical Clearance:** The study was approved by the institutional Ethical Board of The Ibn Khaldun Bogor University.

All subjects were fully informed about the procedures and objectives of this study each subject prior to the study signed an informed consent form.

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# Nutritional Status, Family Support and Dietary Habit among Tuberculosis Patients: An Overview

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## Abstract

**Objectives:** This research aimed at identifying Nutritional Status, Family Support and Dietary Habit among Tuberculosis Patients

**Method:** A cross-sectional study was set up as a method. In selecting the subjects, purposive sampling was used by referring to the set inclusive criterion, which was that the patients were in the intensive phase. To end up, as many as 38 patients diagnosed with tuberculosis were recruited as the respondents. Chi-square test was used for data analysis of this current research.

**Results:** The majority of the respondents were reportedly equipped with abnormal nutritional status by signifying 52.6%. Meanwhile, the rest 18 participants, signifying 47.4%, had shown normal nutritional status. More than half of the whole respondents (52.6%) had normal nutritional status, while the rest (47.4%) of whom showed abnormal condition. Both of the groups of respondents, with regular and abnormal nutritional statuses, received poor familial support, with 61.1% (11 respondents) in the former and 60% (12 respondents) in the latter.

**Conclusion:** More than half of the whole respondents had normal nutritional status. More than half of the respondents with good dietary habit had normal nutritional status. Both of the groups of respondents, with regular and abnormal nutritional statuses, received poor familial support

**Keywords:** *Nutritional status, tuberculosis, Community Health Center.*

## Introduction

According to the Information Centre of the University of Stellenbosch, tuberculosis (TB) is named as “The Mother of Diseases” and constitutes infectious disease just like fire. TB is closely interconnected with poverty, population density, alcoholism, stress, narcotics addiction, and malnutrition. Besides, this kind of disease

can quickly spread over in some conditions, such as in a dense population, in a space with a weak ventilation system, and amid malnutrition community. That is the reason why TB is known as a poverty disease (1). Less nutrition consumption on TB patients can be triggered by some factors, such as 1) economy, where the patients are categorized under the poverty line by not having access to health service, having lack of healthy food supply, and not having an easy access to medication service. These effects lead to some consequences, such as disability and long-termed disease; 2) comorbidities, in which those (TB patients) with HIV or diabetes mellitus have shown lower level of BMI (Body Mass Index) than those without both diseases. Indeed, TB can accelerate the HIV infection; 3) food consumed; 4) acquaintance; 5) patient’s behaviour upon food and health; and 6) the length of sufferance from Pulmonary TB<sup>(2-5)</sup>.

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Alluding to a study from Bhargava (2013), it was reported that nutritional status on diagnosing and TB therapeutics completion could lead to death occurrence<sup>(6)</sup>. There were 1.179 adult patients found to suffer from pulmonary TB in some rural areas in India during 2004 – 2009. The average BMI and bodyweight of theirs successively constituted 16.0 kg/m<sup>2</sup> and 42.1 kg on males and 15.0 kg/m<sup>2</sup> and 34.1 kg on females. The finding had indicated that 80% of the females and 67% of the males suffered from moderate to a substantial level of malnutrition (with BMI < 17.0 kg/m<sup>2</sup>). Also, 52% of the patients (57% males and 48% females) were suffering from stunting and showing less chronically nutrition. Half of the females and one-third of the males were identified stagnant on low body weight in the final session of medication. Further, 60 deaths were occurring amid 1.179 patients (only 5%) in the early medication stage. Holistically, the majority of the patients were reported to suffer from chronicle malnutrition in diagnose stage, which lasted after successful medication on significant proportion.

Another research was brought up by Dodor (2008), aiming at evaluating the nutritional status of TB patients after the first diagnose without any receipt of medication. The result had shown that the average BMI constituted 18.7 kg/m<sup>2</sup>, in which as many as 51% of TB patients were diagnosed to suffer from malnutrition – with 24% of whom suffering from venial malnutrition, 12% moderate, and 15% heavy. Two months after the first treatment, the average BMI signified 19.5 kg/ m<sup>2</sup>, in which the number of the patients with malnutrition inclined to 40% –with 21% of whom suffering from venial malnutrition, 11% moderate, and 8% heavy. In the study, it mentioned that how nutritional status was meaningfully correlated to merit of age, marital status, occupation (monthly income), educational background, personal belief for specific food avoidance, and family in the first TB treatment. This finding also highlighted the importance of nutritional support during TB treatment in addition to other merits mentioned. For that reason, this current research aimed at investigating some factors that affect the nutritional status of TB patients in an attempt to incline the dissemination and infection of TB<sup>(7)</sup>. To sum up, identifying the nutritional status and factors corresponding to the improvement of nutritional status on tuberculosis patients is set up as the most ultimate goal of the research.

## Material and Method

**Research Design:** This research applies a cross-sectional design.

**Sampling Technique:** This research was administered at around the working scope of Community Health Service in Ciptomulyo to recruit the respondents, purposive sampling technique was used. Further, there was an inclusive criterion defined for the respondent selection. Thus, the TB patients who had been in the intensive phase were voluntarily chosen as the respondents. In the end, there were 38 TB patients involved.

**Research Instrument:** The research instruments consisted of anthropometry measurement (body weight and height) and questionnaire. The former was used to examine the nutritional status of TB patients, while the latter comprised demographical data, dietary habit, and familial support. The questionnaire regarding dietary habit was developed by the researchers. Moreover, the one with the respect of familial support was adopted from a study brought up by Melizza (2017)<sup>8</sup> with the reliability of  $\alpha = 0.96$ . Further, the familial support questionnaire consisted of 32 questions packed in the form of Likert scale, with the indicator of “Always = 5”, “Frequently = 4”, “Sometimes = 3”, “Seldom = 2”, and “Never = 1” (8).

**Data Collection:** After Community Health Service of Ciptomulyo conferred approval, an inform consent was given to ask for research approval. After the respondents agreed, the questionnaire was self-administered for 30-40 minutes.

**Data Analysis:** Chi-Square was set up for data analysis as this research aimed at investigating the correlational relationship between variables through the degree of reliability of 95%, in which  $\alpha = 0.05$  – meaning that  $p < 0.05$  according to computerization assistance through SPSS (Statistic Product for the Social Science).

## Results

**The Demographical Data of TB Patients:** In general, the data consisted of gender, age, the background of education, occupation, and monthly income of TB patients.



**Table 1: The distribution of respondents with TB regarding gender, age, background of education, occupation, monthly income, and marital status**

Characteristics	n (38)	% (100)	Min	Max	Mean
<b>Gender:</b>					
Female	18	47.4		-	
Male	20	52.6			
<b>Age:</b>					
Late teenager (17-25 years old)	8	21.1	17	74	44.84
Early adult (26-35 years old)	3	7.9			
Late adult (36-45 years old)	7	18.4			
Early elderly (46-55 years old)	11	28.9			
Late elderly (56-65 years old)	4	10.5			
Old men/women (>65 years old)	5	13.2			
<b>Background of Education:</b>					
Elementary School	9	23.7			
Junior High School	19	50		-	
Senior High School	9	23.7			
Higher Education	1	2.6			
<b>Occupation:</b>					
Housewife	11	28.9			
Private employee	15	39.5		-	
Unemployed	11	28.9			
Entrepreneur	1	2.6			
<b>Income/Revenue:</b>					
<2 million/month	37	97.4		-	
2-5 million/month	1	2.6			
<b>Marital Status:</b>					
Married	35	92.1		-	
Widow	1	2.6			
Unmarried	2	5.3			

Table 1 showed that male respondents outnumbered their counterparts, constituting 52.6%; with 28.9% of whom were those grouped into early elderly category (46-55 years old). Moreover, half of the entire respondents (50%) were from Junior High School background, named the most dominant. Meanwhile, only one respondent (2.6%) was from Higher Education level, labeled the most inferior. In terms of occupation, housewife and unemployed categories had shown the same result in number (28.9%). Further, private employee category had the highest number (39.5%), whilst entrepreneur one showed the lowest (2.6%). Those from the private employee category gained revenue of more than 2 million/month (97.4%), addressed as the highest. Meanwhile, only one respondent (2.6%) had increased 2-5 million/month in the entrepreneur category. Based on marital status, married group (92.1%) showed the

highest number among its counterparts, successively followed by the group of unmarried (5.3%) and widow (2.6%).

#### Nutritional Status:

**Table 2: The distribution of respondents with TB based on nutritional status**

Nutritional Status	Number of Respondents	
	n (38)	% (100)
Normal	18	47.4
Abnormal	20	52.6

According to Table 2 above, more than half of the whole respondents (52.6%) had normal nutritional status, while the rest (47.4%) of whom showed abnormal condition.

**Dietary Habit:**

**Table 3: The distribution of respondents with TB based on dietary habit**

Dietary Habit Status	Number of Respondents	
	n (38)	% (100)
Good	19	50
Poor	19	50

Table 3 showed that an equal number of respondents, between those having a good dietary habit and those with a poor one.

**A Cross Tabulation Between Nutritional Status and Dietary Habit:**

**Table 4: The cross-tabulation between nutritional status and dietary habit of patients with TB**

Nutritional Status	Dietary Habit			
	Good		Poor	
	n (38)	% (100)	n (38)	% (100)
Normal	11	61.1	7	38.9
Abnormal	8	40	12	60

According to the table 4, it is evident that 61.1% of the respondents with good dietary habit had normal nutritional status. Meanwhile, 60% of the respondents with poor dietary habit had shown abnormal nutritional status.

**A Cross Tabulation between Nutritional Status and Familial Support**

**Table 5: The cross tabulation between nutritional status and familial support for the patients with TB**

Nutritional Status	Familial Support			
	Good		Poor	
	n (38)	% (100)	n (38)	% (100)
Normal	7	38,9	11	61,1
Abnormal	8	40	12	60

Table 5 illustrated that both of the groups of respondents, with regular and abnormal nutritional statuses, received poor familial support, with 61.1% (11 respondents) in the former and 60% (12 respondents) in the latter.

**Discussion**

Based on the finding, half of the entire participants were equipped with abnormal nutritional status. It

was probably due to insufficient revenue gained by the majority of the respondents in each month. This statement was in line with a study from Puspitasari (2017), reporting that around 43% of patients with TB in Mojokerto, East Java had poor nutritional status<sup>(9)</sup>. Furthermore, Dargie, et al. (2016) also stated that the prevalence of undernutrition was found to be 39.7%<sup>(10)</sup>.

This research proved that more than half of the respondents with good dietary habit had normal nutritional status. In the same study, Dargie (2016) explained that patients with a high level of eating frequency without any counseling guidance about eating were more potential to undergo under nutritious condition than those who received the counseling. The mechanism occurred due to the fact that those knowledgeable about diet would be able to apply the suggestion for sufficient and nutritious consumption of food<sup>(10)</sup>. In addition, nutritional counseling was appropriate to be given to patients with TB in addition to nutritional support for severe under nutrition, and the nutritional examination on patients with TB had to be set periodically<sup>(11)</sup>2016. Results: This study revealed that about one-fifth of TB patients did not consume sufficient amount of calories as per RDA. More than one-third of patients were underweight during the time of registration and this is reduced to 21.8 percent in the present situation. Mean BMI was 20.99 kg/m<sup>2</sup> (SD ± 5.81. Reportedly, the finding was different from Mardalena (2017), who stated that the quality of human’s nutritional status was dependent on two matters, food consumed and body health or infection status<sup>(12)</sup>.

The study reported that that both of the groups of respondents, with regular and abnormal nutritional statuses, received poor familial support. In addition, good and sufficient familial support and attention had been considered as primary needs the patients could live their routines, such as monopoly assistance, emotional support, moral support, and motivational support for the sake of immediate recovery for patients with TB<sup>(13)</sup>. In addition, another research of Puspitasari, et al. (2017) had demonstrated that high familial support was adequate to affect the nutritional status of patients with TB (with p= 0,010). Further, more irrelevant result than that of prior research could be connected with demographical data, which was assumed contributive to the research. Also, the dominance of male respondents was also seen as a possible factor<sup>(9)</sup>. In Bhargava’s study (2013), it was stated that male patients more frequently suffered from death occurrence during medication on

TB disease due to a low level of BMI than female ones – for the females were proved more adaptable to hunger than the males<sup>(6)</sup>. Moreover, Dodor (2008), as cited in Melizza (2017), had claimed that nutritional status could be significantly interrelated to marital status, monthly revenue, educational background, belief on specific food avoidance, occupation, age, and family size during TB medication<sup>(8)</sup>. Family support could improve status nutritional among tuberculosis patient<sup>(14)</sup>.

### Conclusion

More than half of the whole respondents had normal nutritional status. More than half of the respondents with good dietary habit had normal nutritional status. Both of the groups of respondents, with regular and abnormal nutritional statuses, received poor familial support

**Recommendations:** Further research should consider about the classification of the respondent characteristic such as age, education. This characteristic could be related to the nutritional status among Tuberculosis patient.

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# The Ratio of 7-Ketocholesterol to Free Cholesterol on Patients of Acute Myocardial Infarction Treated in ICCU

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## Abstract

**Context:** Coronary Heart Disease (CHD) and its complications still become the main cause of morbidity and mortality globally, including Indonesia. Previous research simultaneously investigates the conversion of oxidized lipid cholesterol biomarker inside the plasma as the predictor of acute myocardial infarction cardiovascular disease. In accordance with the background of the study, this research attempts to analyze the increasing ratios of 7-ketocholesterol to free cholesterol in the plasma, 7-ketocholesterol (7KC), free cholesterol (FC), and fasting blood glucose level (FBG) of Acute Myocardial Infarction Coronary Heart Disease (AMI-CHD) and post-Acute Myocardial Infarction Diabetes Mellitus (Post-AMI DM) patients. This research applied the cross-sectional laboratory observation design. Free cholesterol, 7-ketocholesterol and its ratio to free cholesterol were analyzed using Ultra-Fast Liquid Chromatography (UFLC). The result of Levene's bivariate t-test analysis indicates the comparison of 7-KC/FC ratio, 7-KC, F, and FBG increases with different significance ( $p < 0.05$ ) on AMI-CHD patients and Post-AMI DM ones. Pearson correlational statistics shows negative (inversed) correlation between the increasing free cholesterol level and linear correlation of 7-ketocholesterol and 7-ketocholesterol ratio on free cholesterol. The average 7-KC/FC ratio is significantly higher than the normal score. This is significantly different between AMI-CHD and Post-AMI DM. 7-KC/FC ratio significantly correlates with 7-KC concentration with  $r = 0.62$  on AMI-CHD patients and  $r = -0.725$  on post-AMI DM ones.

**Keywords:** 7-KC/FC ratio; 7-Ketocholesterol; Free Cholesterol; Acute Myocardial infarctions; diabetes mellitus.

## Introduction

Atherosclerotic Coronary Heart Disease (ASCHD) places the highest rank of mortality and morbidity cause in developed countries and many developing countries. ASCHD triggers acute myocardial infarction and chronic damage. Since 1990, the mortality rate of Coronary Heart Disease (CHD) had increased from 6 million to 7 million in 1999 and had been projected to

reach 9 million by 2020<sup>1,2,3</sup> Although the mortality rate of ASCHD is actually decreasing in the last thmillion to 7 million in 1999 and had been projected to reach 9 million by 2020

ree deCHDes mostly caused by better life control and advanced therapy, aging process and careless-ignorant lifestyle of the affected population makes the prevalence of the disease remain high<sup>4</sup>. Recent type-2 diabetes epidemic may complicate this problem. National census held in 2001 indicated the deaths from cardiovascular diseases was 26.4% and becoming the main cause of early death on about 40% of middle-aged men<sup>5</sup>.

Lipid biomarkers trigger lipotoxicity of ASCHD lesions which leads to injury and cell death caused by excessive free fatty acids and other lipid-related metabolites. The increasing free fatty acid level generates

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the accumulation of reactive oxygen species due to the decreasing endogenous antioxidant capacity.

Excessive free cholesterol, 7-ketocholesterol, and its ratio to free cholesterol complicates the identification of lipotoxic species affecting lipid regulation, inflammation, stress on endoplasmic reticulum (ER), apoptosis, and necrosis<sup>6</sup>. Therefore, the ratio of 7-ketocholesterol to free cholesterol in blood plasma is considered as an important target factor in preventing CHD incidence that reflects pathogenesis process of coronary heart disease; consequently, with clinical application. However, it is difficult to perceive the significance of 7-ketocholesterol and free cholesterol concentration clinically because it is hard to analyze the concentration of this metabolite accurately. In this study, the measurement system for 7-ketocholesterol and free cholesterol concentrations in blood plasma is carried out by applying high performance liquid chromatography spectrometry technique on the blood sample of AMI-CHD and Post-AMI DM patients.

## Method

**Study Design, Setting, and Sampling:** The research design used was cross-sectional in Acute Myocardial Infarction Coronary Heart Disease (AMI-CHD) and post-Acute Myocardial Infarction Diabetes Mellitus (Post-AMI DM) patients. The population in this study was all Acute Myocardial Infarction Coronary Heart Disease (AMI-CHD) and post-Acute Myocardial Infarction Diabetes Mellitus (Post-AMI DM) patients in Dr Soetomo Surabaya Hospital. A sample of 16 28 AMI-CHD and 15 Post-AMI DM. The study was conducted on November 2016 to November 2017.

**Study Variables:** The independent variable is increasing ratios of 7-ketocholesterol to free cholesterol in the plasma, 7-ketocholesterol (7KC), free cholesterol (FC), and fasting blood glucose level (FBG). The dependent variable was manifestation of AMI-CHD and Post-AMI DM. The main instrument used in preparation and analysis was UFLC (Ultra-Fast Liquid Chromatography).

**Data Analysis:** This study uses descriptive analysis carried out using the number of frequencies and percentages for categorical data and the mean, median, and standard deviation used for numerical data. Analysis of the main data using the Levene's t-test with a significant level of  $p < 0.05$ .

## Results

The results of the biomarkers are of 7-ketokolestertol (7-KC) plasma, and 7-KC/FC ratio, and free cholesterol (FC), in patients with AMI-CHD and Post-AMI DM are shown in Table 1. Sequentially, the increased concentrations of 7-ketocholesterol/free cholesterol ratio, 7-ketocholesterol, and free cholesterol, on AMI-CHD patients is significantly higher than those on post-AMI DM patients.

Blood plasma 7-ketocholesterol, 7-KC/FC ratio, and free cholesterol are the biomarkers with higher average score compared to normal reference value on both AMI-CHD patients and Post-AMI DM patients. The proportion of AMI-CHD patients is higher than Post-AMI DM patients with an average score above the reference value for each patient proportion and the mean level of 7-ketocholesterol biomarkers (93.79% > 46.66%; 38.48 > 24.12 ng / ml), fasting blood glucose (75% > 40%; 140 > 120.45mg / dl), 7-KC/FC ratio (81.25 > 40%; 0.38 > 0.227ng / ml), free cholesterol (87.50 > 46.66%; 124.90 > 93.45%).

Pearson correlation test shows that high 7-KC/FC ratio has linear correlation with the increasing 7-ketocholesterol concentration on AMI-CHD patient blood plasma (95%CI; 0.37-0.85;  $r=0.62$ ;  $p=0.01$ ) and has significant negative (inversed) correlation with free cholesterol concentration on the blood plasma of AMI-CHD patients [95% CI;  $r = -0.72$  (0.86 -0.37);  $p=0.001$ ] and post-AMI DM patients [95% CI;  $r = -0.83$  (0.93 - 0.58);  $p=0.009$ ]. Significant inverse correlation only occurs on the increasing blood plasma 7-ketocholesterol concentration with the decreasing triglyceride concentration on post IMA DM patients (shown on Table 2).

**Table 1: Results of Levene's Significance Test Among Lipid Biomarker Profiles on AMI-CHD and Post-AMI DM Subjects**

No.	Research Variables	Levene's Significance Test (95% CI), AMI-CHD proportion, Post-AMI DM proportion & average value above reference	p Value
1.	7-ketokolestertol (7KC)	14.36 (5.71-23.003); (93.75; 46.66%) (38.48; 25.67)ng/ml	S (0.002)
2.	Free Cholesterol (FC)	31.45 (3.00-59.00); (87.50; 46.66%) (124.90; 93.45ng/ml)	S (0.002)
3.	7-KC/FC ratio (r7-KC/FC)	0,16 (0.014-0.31); (81.25 : 40.00%) (0.37; 0.25ng/ml)	S (0.033)

**Table 2: Results of Pearson Correlation Test ( $\leftrightarrow$ ) on the increasing biomarkers of AMI-CHD and Post-AMI DM patients**

Biomarker Correlation	r (95%;CI)	p value
AMI-CHD: Ratio7-KC/FC $\leftrightarrow$ 7KC	r = 0.62 (0.37 to 0.85)	(S) 0.010
Ratio7-KC/FC $\leftrightarrow$ FC	r = -0.72 (-0.86 to -0.37)	(S) 0.001
Post-AMI DM: Ratio7-KC/FC $\leftrightarrow$ FC	r = -0.83 (-0.93 to -0.58)	(S) 0.007
7KC $\leftrightarrow$ TG	r = -0.53 (-0.83 to -0.20)	(S) 0.041

## Discussion

The results showed that the IVUS study indicates that 7-KC reflects fragile coronary plaques that cannot be detected by coronary angiography. 7-KC excess in atherosclerotic plaques further contributes to the development of atherosclerosis, triggers apoptosis and inhibits smooth muscle cell migration<sup>7,8</sup>. The finding of previous study suggests the accumulation of 7-KC may reduce the number of cells and make atherosclerotic plaques unstable.

AMI-CHD patients with plasma r7-KC/FC levels above the normal reference score (81.25%) is larger than Post-AMI DM patients (40.00%), Levene's Test ( $p = 0.009$ ); there were significant differences plasma r7KC / KB levels that increase in PJK-IMA patients and post IMA-DM.

Related to the findings of previous research concerning free cholesterol, r7-KC/FC increases  $\approx$ 10 times in mice aorta, but not in the lung. The concentration of r7-KC/FC in LDL is  $\approx$  twice higher on mice exposed to PM25 pollutant<sup>9</sup>. Brown's research shows 7KK molar quantity and KB to be esterified into 7-ketocolesteryl ester (7KKE) and cholesteryl ester (KE) in mouse cells peritoneal macrophages (MPM) and J774A, which contains oxidized LDL (ox-LDL) and acetylated LDL (ac-LDL) indicating the ratio of 7KKE:7KC is higher than the ratio of KE:FC on the both types of cell<sup>10</sup>.

The increasing plasma r7KC / KB levels in patients with AMI-CHD are influenced by high levels

of 7KC and auto-oxidation of FC, KE, and 7KKE accumulated in ruptured plaque lesions. When plaque ruptures, the accumulated cholesteryl ester, oxysterol 7-ketocholesteryl ester in LDL, cellular waste, calcium, and other lipid substances stored in the intima wall of this artery breaks and overflows the circulation stream. However, the low concentration of r7-KC/FC on post AMI-DM after 2-3 months' period may be the effect of healing detoxification process at the level of organelle-cellular caused by expression of cytosolic sulfotransferase of mRNA activation (Sulfonate steroid-sterol), an enzyme that protects the cytotoxic accumulation of cardiovascular disorders<sup>6</sup>.

The increasing blood plasma 7-KC concentration on AMI-CHD patients is the effect of ruptured plaque. Ruptured plaque releases a large number of dead cell remnants and other products of advanced oxidative stress that triggers the increasing lipotoxic 7KC and other oxysterol inside blood circulation<sup>11</sup>.

Hence, blood plasma 7KC is important not only in reflecting the progression of atherosclerosis, but also in causing plaque rupture as the result of the most severe complication of coronary artery atherosclerosis that triggers AMI-CHD<sup>12</sup>. This metabolite can be reduced to 7- $\beta$  hydroxysterol by steroldehydrogenase 11 $\beta$ -hydroxy type 1 (11 $\beta$ -HSD-1). Oxysterol 7-cholesterol, 5.6  $\alpha$  epoxy cholesterol, 5.6  $\beta$  epoxicholesterol, 7- $\alpha$  hydroxycholesterol, 7- $\beta$  hydroxycholesterol and 27-hydroxycholesterolemia will detoxify at the organelle-cellular level by expression of

cytosolic sulfotransferase activation (Sulfonate steroid-sterols) protective enzymes for the accumulation of cytotoxic cardiovascular disorders.

Consistent with detoxification mechanism explained above, it is reasonable that the level of 7-KC on post-AMI CHD patient blood plasma is lower than 7-KC level of AMI-CHD patients after 2-3 months' recovery period. However, the value is still higher than the normal reference score due to the effect of lipotoxicity and chronic glucotoxicity. Non-esterified fatty acids (NEFAs) secreted by adipose tissues on obese people may generate a new hypothesis that insulin resistance and  $\beta$  cell pancreas dysfunction are most likely related. In angiography study, the concentration of 7-KC on AMI CHD subjects is significantly higher than NCA; multi-logistic regression analysis reveals that 7-KC is chosen as independent factor for AMI incidence as the default factor<sup>12</sup>. The high plasma 7-KC concentration is a different biomarker of blood cholesterol even though 7-KC is a product of advanced cholesterol oxidation. Blood plasma 7-KC oxysterol can be used as a predictor for AMI CHD incidence that cannot be detected by conventional lipid profiles.

The high blood plasma 7-ketocholesterol concentration has negative (inversed) correlation with the low triglyceride concentration on post AMI CHD-DM patients. The data indicates the imbalance FC esterification in SBMF lysosome, causing most of FC to oxidize and increases 7-KC concentration<sup>11</sup>.

The mean value of plasma KB level of on AMI-CHD patients ( $124.90 \pm 48.54$ ) is higher than the post-AMI DM CHD ( $93.45 \pm 24$ ), and above the normal score  $<91$  ng/ ml plasma. Disruption in the pathway of free cholesterol efflux foam cell artery walls greatly affects the increasing free cholesterol on AMI-CHD patient blood plasma.

Macrophage foam cells has four efflux pathways of non-esterified cholesterol, to extracellular HDL acceptor to catabolism and elimination in the liver. Research to test on macrophages have been incubated with sera from participants with and without coronary heart disease and strikingly, cholesterol efflux capacity is found to be a strong inverse predictor of the occurrence of disease<sup>13</sup>. The increased intracellular free cholesterol crystals may destruct the cells by physically damages intracellular structure. The intracellular free cholesterol accumulation of lysosomes that is proven to be very difficult to mobilize

out of the lysosome foam cell macrophages will increase the cholesterol oxidation stress further into oxysterols, some of which are very cytotoxic<sup>11</sup>.

Finally, overloading free cholesterol in foam cell macrophages can trigger a series of apoptotic pathways. Excessive cholesterol on membrane may disrupt the function of signaling proteins and affect certain membrane integral proteins that require conformation flexibility to perform right functions. These functions will be disrupted by high ratio of cholesterol/phospholipid<sup>14</sup>.

The model of free cholesterol culture macrophage has revealed cellular responses that attract free cholesterol accumulation and final consequence of free cholesterol loading that is relevant to atherosclerosis development and complication. Macrophage is usually protected from excessive free cholesterol accumulation through esterification mediated by ACAT-1 and by disintegrating cholesterol. In addition, the results of free cholesterol hydrolysis stored by neutral hydrolase of CE usually do not exceed cell capacity to efflux or re-esterify this cholesterol collection. A study that measures cholesterol in the aorta and tissue of rat lungs exposed to pollutant particles PM-25 and FA has failed to estimate the different cholesterol level on the same tissue<sup>9</sup>.

Plasma free cholesterol in patients with post AMI-DM interval of 2-3 months leads to recovery of cholesterol metabolism which can be converted to 27-hydroxycholesterol in adipocytes, 4 $\beta$ -hydroxycholesterol in liver-adipocytes, and conversion of FC to 7 $\alpha$ -hydroxycholesterol for secretion in the liver<sup>6</sup>.

Higher FC concentration on Post-AMI CHD patient blood plasma compared to normal reference score is affected by multi factors, such as the effect of insulin resistance and chronic glucose toxicity is believed to slow the recovery of atherogenic dyslipidemia<sup>15</sup>. Example the synthesis of advanced glycation end products (AGEs) in AMI-DM CHD complications can regulate cholesterol metabolism by reducing the expression of ABCA-1 and ABCG-1, that disrupts the transportation of cholesterol from arterial wall artery lesions to the liver which allows its excretion to bile and feces<sup>16</sup>.

Xiaoquan has conducted a research to measure free cholesterol levels in rat aortic, liver and lung tissue, but they failed to detect differences in free cholesterol content between PM2,5 and FA exposure groups in the aorta, liver and lung<sup>9</sup>. The instability of



cholesterol molecules that is vulnerable to enzymatic conversion, ozonolysis and auto-oxidation. Therefore, it is reasonable if the research team of Xiaoquan found some difficulties in measuring the proportion of free cholesterol in circulation, adipocyte tissue, and rat liver HFC and ND<sup>9</sup>.

### Conclusion

Lipid biomarkers that significantly increased on AMI-CHD and post-AMI DM incidence are 7-KC/FC ratio, 7-ketocholesterol, and free cholesterol. High concentration of 7-ketocholesterol/free cholesterol ratio has linear correlation with 7-ketocholesterol on AMI-CHD patients and has negative (inversed) correlation with free cholesterol on both AMI-CHD and post-AMI DM patients.

Ethical Clearance: The ethical approval for this study was granted by the IRB committee of the Dr Soetomo Surabaya in 2016.

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**Conflict of Interest:** None

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# Antibacterial Chitosan of Milkfish Scales (*Chanos Chanos*) Onbacteria *Prophyromonas Gingivalis* & *Aggregatibacter* *Actinomycetemcomitans*

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## Abstract

**Context:** This research was conducted to appear the effectiveness of milkfish scales chitosan gel (*Chanos Chanos*) on the inhibition of *Aggregatibacter actinomycetemcomitans* which is a pathogenic bacterium that causes periodontitis. This research was conducted with five treatments with five repetitions, five treatments, namely: Positive control (metronidazole), negative control (aquadest), chitosan gel in milkfish scales concentration of 1%, 5%, and 10%. This research measuring instrument uses a calipers in units of millimeters (mm). Based on the results of the Mann Whitney test, there was a significant difference in inhibition of chitosan gel in 1%, 5%, and 10% milkfish gel against *Aggregatibacter actinomycetemcomitans* bacteria ( $p < 0.005$ ), and based on the Kruskal Wallis test it was found that the higher concentration of milkfish scale then the higher the average inhibition power. It was concluded that milkfish scales gel chitosan (*Chanos chanos*) can inhibit the growth of *Aggregatibacter actinomycetemcomitans* and the higher the concentration of chitosan gel in milkfish scales, the higher the inhibitory zone produced.

**Keywords:** *Chitosan gel, Fish scales, Aggregatibacter actinomycetemcomitans, Antibacterial.*

## Introduction

Tooth and mouth disease is one of the most common diseases affecting Indonesian people today. Dental and oral diseases that are most commonly complained are caries and periodontal disease. Periodontal disease is an inflammatory and destructive disease of periodontal tissue caused by pathogenic bacteria. Periodontal disease causes damage to periodontal tissue and can affect a person's quality of life such as disrupted eating, tooth loss, social and economic conditions.<sup>1</sup>

Periodontitis is a form of periodontal disease. Periodontitis is inflammation of the tooth supporting tissue caused by a specific group of microorganisms, which results in progressive damage to periodontal ligaments and alveolar bone characterized by pockets, recessions, or both.<sup>2</sup> Periodontitis occurs as a result of infection of specific microorganisms from coexisting bacteria.

Most of the periodontal pathogens are anaerobes, and others are facultative aerobics, capnophils and microaerophils whose numbers depend on biofilms and periodontal pockets. Many pathogenic bacteria that cause periodontal disease are *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Tannerella forsythia*, *Prevotella intermedia*, *Campylobacterrectus*, *Eubacteriumnodatum*, *Treponema* sp, *S. intermedius*, *P. micros*, *P. nigrescens*, *E. nucleatum*, *E. cor* sp. The bacteria *A. actinomycetemcomitans*, *Tannerella forsythia*, and *Porphyromonas gingivalis* are bacteria that are strongly associated with the initiation of periodontal disease, disease progression, and causes of unsuccessful periodontal therapy.<sup>1,3,20,21</sup>

*Aggregatibacter actinomycetemcomitans* are gram-negative coccobacillus anaerobes, measuring around  $0.4 \times 1.0 \mu\text{m}$ , dominated by bacilli with several forms of cocal. These bacteria are non-sporulation, non-motile, unbranched, capnophilic and facultative bacteria.<sup>4,5</sup>

A. actinomycetemcomitans which is one of the main causes of periodontal disease is local aggressive periodontitis. This bacteria is described as five serotypes (a-e), with more than one serotype found in the human mouth. Serotype B of A. actinomycetemcomitans is more common in aggressive periodontitis. The natural habitat of this organism is the oral cavity and can be isolated from various non-oral infections such as bacteremia, septicemia, endocarditis, atherosclerotics, pneumonia, skin infections, osteomyelitis, inflammation of the urinary tract, and various types of abscesses.<sup>5</sup>

This bacterium has a complex life cycle, obtained through transmission from the saliva of an infected individual and may initially colonize the oral mucosa as a facultative intracellular pathogen. These bacteria move from the colonies in the oral cavity to the gingival fissures and compete with other bacteria. Successful formation of persistent colonization in subgingival fissures by A. actinomycetemcomitans can cause periodontal damage and the development of periodontitis in susceptible individuals.<sup>6</sup>

Treatment of periodontal disease consists of surgical and non-surgical treatments. Surgical treatment can be in the form of Scaling, Root Planning and antimicrobial therapy. Antimicrobial therapy can be used locally such as mouthwash and systemic antibiotic treatment.<sup>7</sup>

The sustainable potential of marine fisheries in Indonesia is very large, this is supported by the vast territorial waters of Indonesia. Milkfish is one type of brackish water aquaculture (ponds) which is also a material for general public consumption, the average portion of fish meat that can be consumed (edible portion) is 40-50%. The body parts of fish that usually become waste are scales, skin, bones, gills, all internal organs, namely the pancreas, liver, heart, gonads, swimming bubbles, and intestines.<sup>8</sup>

Over time, many studies have been conducted on fish waste. One part of fish that can be used is scales. In general, fish have scales that contain Chitin. Chitin is then changed into chitosan.

Chitosan is a derivative of chitin which is desethylated. Chitosan is a linear biopolymer consisting of b- (1-4) -related N-acetyl-D-glucosamine which has been highlighted as a potential candidate as an antimicrobial and biocompatibility.<sup>10</sup> Chitosan as a natural carbohydrate biopolymer with unique structure and properties. Chitin and chitosan have been

investigated as antimicrobial agents against various target microorganisms such as algae, bacteria, yeast, and fungi in vivo and in vitro experiments involving chitosan in various forms. Linear biopolymers in chitosan show strong activity in reducing dental plaque and proving antimicrobial activity in vitro against various pathogenic bacteria in the oral cavity that are directly involved in plaque formation and periodontal diseases such as Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis and Streptococcus mutans.<sup>11</sup>

Based on the description above, researchers are interested in conducting research on the inhibitory ability of milkfish scales gel chitosan (Chanos Chanos) against Aggregatibacter actinomycetemcomitans

## Materials and Method

This type of research used in this study is an experimental laboratory research. The research design used is the post test only control group design. This research was conducted at the Pharmacognosis, Phytochemical and Pharmacology Laboratory of the Faculty of Mathematics and Natural Sciences, Pancasakti University and the Microbiology Laboratory of the Faculty of Medicine, Hasanuddin University in August 2019.

**Making Milkfish Scales Gel Chitosan (Chanos Chanos):** The chitosan of milkfish scales is made by the process of demineralization (removal of minerals), deprotonation and deacetylation of chitin into chitosan. After that chitosan was divided into three groups of gels with concentrations of 1%, 5% and 10%.

**Inhibition Test:** Tests carried out by the diffusion method using a disk. Prepare pure isolates of Aggregatibacter actinomycetemcomitans and petri dishes containing MHA medium. Prepare a paper disk for use on the sample to be tested. Prepare positive and negative controls. Prepare chitosan gel with a concentration of 1%, 2% and 3%. Dip the disk paper in the test sample with different concentrations, along with a positive control (gel metronidazole) and a negative control. The pure isolate of Aggregatibacter actinomycetemcomitans was suspended with 0.9% NaCl and did a bacterial swab on petri dishes containing MHA. Insert the paper disk dipped in the test sample in the prepared petri dish. Incubation in an incubator with anaerobic atmosphere at 37°C for 2x24 hours. Calculate the inhibition zone formed at each concentration with calipers and compare.

### Results

Based on the research conducted, obtained the results of the measurement of the inhibition zone diameter of *Aggregatibacter actinomycetemcomitans* bacteria are presented in the Table below.

**Table 1: Results of Measurement of the Average Value of Aggregate bacteria actinomycetemcomitan Bacteria Inhibition Zones**

Group	N	Mean	± SD
Chitosan gel 1%	5	9.34	± 1.28
Chitosan gel 5%	5	10.12	± 1.15
Chitosan gel 10%	5	11.08	± 0.80
Metronidazole control	5	11.34	± 1.66
Aquades control	5	6.20	± 0.00

**Table 2: Results of statistical tests for *Aggregatibacter actinomycetemcomitan* bacterial inhibition zones**

Group	N	Normality test	Comparison test
Chitosan gel 1%	5	0.696	0,000
Chitosan gel 5%	5	0.721	
Chitosan gel 10%	5	0.708	
Metronidazole control	5	0.569	
Aquades control	5	-	

\* Shapiro Wilk test:  $p > 0.05$ ; normal data distribution, \*\* One-Way Anova:  $p < 0.05$ ; significant

**Table 3. Results of Post hoc statistical tests of LSD zone for inhibition of *Aggregatibacter actinomycetemcomitan* bacteria**

Group treatment (i)	Comparison (j)	Mean difference (i-j)	p-value
Chitosan gel 1%	Chitosan gel 5%	-0.78	0.289
	Chitosan gel 10%	-1.74*	0.025
	Metronidazole control	-2.00*	0.011
	Aquades control	3.14*	0.000
Chitosan gel 5%	Chitosan gel 10%	-0.96	0.195
	Metronidazole control	-1.22	0.104
	Aquades control	3.92*	0.000
Chitosan gel 10%	Metronidazole control	-0.26	0.720
	Aquades control	4.88*	0.000
Metronidazole control	Aquades control	-5.14*	0.000

\* The mean difference is significant at the 0.05 level.

Based on the Shaphiro-Wilk statistical test to determine the normality value obtained  $p > 0.05$  which means the data is normally distributed so the test is continued with the parametric test that is Oneway Anova (Table 5.5). Based on the One-way Anova statistical test it was found that the significance value was 0,000 ( $p < 0.05$ ) which meant that there were significant differences between treatment groups. The results of the Post Hoc LSD test for zone of inhibition between treatment groups on *Aggregacter* bacteria actinomycetemcomitan have shown significant values ( $p < 0.05$ ). Chitosan gel 1% when compared with a concentration of 5%, has a  $p > 0.05$  which means there is no significant difference or have the same effect.

Meanwhile, when compared with a concentration of 10%, and positive control Metronidazole negative control of aquades has a  $p < 0.05$  which means there are significant differences or have different effects. In chitosan gel 5% when compared with a concentration of 10%, and positive control Metronidazole has a  $p > 0.05$  which means there are no significant differences or have the same effect. Meanwhile, when compared with negative controls aquades have a  $p < 0.05$  which means there are significant differences or have different effects. The 10% chitosan gel when compared with the positive control Metronidazole has a  $p > 0.05$  with a negative mean difference which means there is no significant difference or has the same effect, but the

Metronidazole control has a better effect than the 10% chitosan gel.

## Discussion

The result of this research is that milkfish scales chitosan gel with concentration of 1%, 5%, and 10% shows the presence of clear zone in *Aggregatibacter actinomycetemcomitans* isolates. with research conducted by Ummah (2017) which states that milkfish scales (*Chanos chanos*) contain chitosan which can be used as an antibacterial, besides that according to Loekito in 2018 and Adha in 2017 chitosan has antibacterial power against *Aggregatibacter actinomycetemcomitans*.<sup>12-14</sup>

By finding several concentrations that have been tested, it can be seen that the higher the concentration given by the milkfish scales chitosan gel, the higher the antibacterial inhibition. Concentration of 10% milkfish scales gel chitosan has the biggest inhibition zone. This is in line with research conducted by Hosseinnejad in 2016 which states that the higher the concentration of chitosan, the higher the inhibitory power of bacteria. At lower concentrations, chitosan binds to cell surfaces that are negatively charged, disrupts cell membranes, and causes cell death by inducing leakage of intracellular components. Meanwhile, at higher concentrations, protonated chitosan can coat the cell surface and prevent intracellular component leakage. In addition, positively charged bacterial cells repel each other and prevent agglutination.<sup>15</sup>

Categories of bacterial inhibition are divided into 4, namely: Weak ( $\leq 5$  mm), Medium (5-10 mm), Strong (10-20 mm), and Very strong ( $\geq 20$  mm).<sup>16</sup> Based on the category of inhibition, can be seen that if the diameter of the inhibition zone is greater than 20 mm, then the growth inhibition response is very strong. If it is 10-20 mm, the growth inhibition is strong and if it is 5-10 mm, the growth inhibition is moderate, while if it is  $\leq 5$  mm, the growth inhibition is weak. Thus, the conclusion of the inhibition response of the growth of milkfish chitosan gel scales has moderate to strong resistance to *Aggregatibacter actinomycetemcomitans*. It was seen that each concentration of chitosan gel in milkfish scales had inhibition zone diameters ranging from 9-12 mm.

The main factors influencing the antibacterial activity of chitosan are molecular weight and concentration. The minimum inhibitory concentration (MIC) of chitosans ranges from 0.005 to 0.1% depending on the bacterial species and molecular weight of Chitosan and varies

depending on the pH of the chitosan preparation.<sup>17,18</sup> The chitosan antimicrobial activity is higher at low pH, this is due to the fact that the chitosan amino group become ionized at a pH below 6.<sup>15,19</sup>

Based on the results and the previous discussion, it was concluded that Chitosan gel from milkfish scales (*Chanos chanos*) has inhibitory properties against *Aggregatibacter actinomycetemcomitans* which is one of the pathogens that cause periodontal disease. The results obtained indicate that the greater the concentration of chitosan gel, the inhibitory power of *Aggregatibacter actinomycetemcomitans* will also be greater. This can be seen in the 10% chitosan gel which has the greatest inhibition compared to other control groups. For these results it is recommended that further research be conducted on the toxicity test of chitosan milkfish scales gel, so that it can be developed as an alternative antimicrobial agent that causes periodontitis and for further research on milkfish scales chitosan gel on experimental animals that have been induced by bacteria that cause periodontal disease .

## Conclusion

**Conflict of Interest:** There is no conflict of interest in this study

**Source Of Funding:** Domestic Government

**Ethical Clearance:** This study has obtained information on ethical qualifications number: 0263/PL.09/KEPK FKG-RSGM UNHAS/2019 and registration number UH 17120269 dated 21 November 2019.

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# Evaluation of Dietary Habits and Assessment of Eating Disorders among Adolescents with Celiac Disease in Morocco

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## Abstract

**Background:** Celiac disease (CD) is an autoimmune disorder characterized by the intolerance of gluten, barley, rye, and oats, which may induce eating disorders (EDs), pathological behaviors. The study objectives were to evaluate dietary habits, to screen eating disorders, and to identify the factors associated with eating disorders among adolescents with CD.

**Materials and Method:** One hundred and thirty-two adolescents with CD ages 10 to 16 years participated in the study; 59.8% were females and 40.2% males. Adherence to Mediterranean diet by KIDMED index was used to evaluate dietary habits and SCOFF questionnaire to screen eating disorders in the study population.

**Results:** The prevalence of celiac adolescents with very low diet quality and having eating disorders was 20.45%. Besides, Chi<sup>2</sup> test showed that the dietary habit quality and eating disorders were significantly associated ( $p < 0.034$ ) and that they are significantly associated with age and gender. In addition, based on logistic regression, age, gender, BMI, area of residence, diet quality (KIDMED index) and some dietary habits were significantly associated with having eating disorders ( $p < 0.05$ ).

**Conclusion:** Mediterranean diet may have a protective effect against eating disorders among celiac patients. These findings may be useful for researchers interested by celiac disease in Morocco to better understand the link between CD, EDs, and adherence to the Mediterranean diet.

**Keywords:** Celiac disease; dietary habit; eating disorders; adolescents, Morocco

## Introduction

Celiac disease (CD) is a chronic systemic autoimmune disorder caused by a permanent intolerance to gluten proteins in genetically susceptible individuals<sup>1,2</sup>. Prevalence of CD varies across different countries and is

estimated to affect approximately 1%–2% of the adult and pediatric population. Despite its varying prevalence, CD is one of the most common chronic diseases in children<sup>3-5</sup>.

Currently, the only effective treatment for the disease is a life-long adherence to a gluten-free diet that excludes any products derived from wheat, barley and rye grains and oat<sup>6</sup>.

Indeed, eating disorders (EDs) are considered a major public health problem due to nutritional disturbances and despite that, it can affect all age categories, EDs are very common during childhood and adolescence<sup>7</sup>. Therefore, early detection of EDs may prevent its chronicity and subsequently the prevention of serious complications.

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No study in Morocco has evaluated so far the relationship between celiac disease and eating disorders in the general population neither adolescents. Thus, the study objectives were to evaluate dietary habits, to screen eating disorders, and to identify the factors associated with eating disorders among adolescents with CD.

## Method

**Study Design & Population:** The present study is a cross sectional study, in which, one hundred and thirty-two adolescents (10-16 years) with CD voluntarily participated, from Rabat city the capital of Morocco from 2015 -2017. All participants followed a gluten free (GF) diet for at least 1 year.

**Body Mass Index:** Body mass index (BMI) calculates weight in kg with height in m<sup>2</sup>. Classification was determined based on the 2007 World Health Organization standards for children and adolescents aged 5-19 years (overweight: > + 1 standard deviation; obesity: > + 2 standard deviations; thinness: < - 2 standard deviations) <sup>8</sup>.

**Assessment of Eating Disorders:** The assessment of eating disorders was performed using the SCOFF screening questionnaire (Sick Control Fat Food)<sup>9</sup>.

The SCOFF questionnaire was composed of five questions to detect the potential presence of an eating disorder in a patient, the validate Arabic version published previously was use in this study <sup>10</sup>. Each «yes» counts for 1 point, so the result is positive if the score obtained is equal to or greater than 2 points. Using a Cronbach index, the test showed a fidelity up to 0.81 (responses by participants consulted for accuracy).

**Dietary Habits Quality:** Dietary habits quality was estimated using the KIDMED index (Mediterranean Food Quality Index for Children and Adolescents), developed by Serra-Majem L et al. from Spain<sup>11</sup>. The KIDMED test assess the Mediterranean diet quality and is based on 16 questions (table 1) and the levels obtained help classify the population studied into three levels :≤3: very low diet quality; 4-7: improvement needed to adjust intake to Mediterranean, and ≥ 8: optimal Mediterranean diet.

**Ethical Approval:** The study protocol was previously approved by the ethics committee of biomedical research (CERB) of the faculty of medicine and pharmacy of Rabat (N° 588/2017) . All participants signed an informed consent before asking to questions.

## Results

Sociodemographic characteristics of celiac patients are shown in Table 2. Age groups, areas of residence (urban and rural), BMI, and growth retardation size across age were significantly different by gender.

In fact, Chi<sup>2</sup> test shows a significant association between KIDMED index and age (p<0.045), gender (p<0.013) and BMI (p<0.003). We found also that among adolescent between 10 and 16 years old (n=62), 22.55% had very low diet quality, 62.9% need improvement and 14.55% had optimal Mediterranean diet. Further, among those over 15 years old (n=70), 42.85% had very low diet quality, 38.58% need improvement and only 18.57% had optimal Mediterranean diet. Actually, “very low diet quality” increases among adolescents over 15 years old (n=30) than younger children (n=14). Further, females suffer more than males from “very low diet quality” (34 vs 10).

No significant association were noted between KIDMED index and growth retardation.

In the other hand, the Chi<sup>2</sup> test shows significant association between SCOFF and age (p<0.002). The prevalence of celiac adolescents under 15 years with eating disorders was higher (63.33%) than those over 15 years of age (36.67%).

Besides, significant association was found between SCOFF and gender (p <0.05). According to SCOFF questionnaire, 45.45% (n=60) adolescents have eating disorders, in which 68.33% (n = 41) are female and 31.67% (n = 19) are male.

No significant association were observed between SCOFF and growth retardation neither BMI.

Table 3 presents the distribution of celiac adolescents and the results of Chi<sup>2</sup> test according to KIDMED index and SCOFF.

Table 4 summarizes the results of the Chi<sup>2</sup> test which revealed a significant association between KIDMED index and SCOFF (p<0.034). Further, the prevalence of celiac patients with very low diet quality and eating disorders is 20.45%. In fact, of all celiac patients who had eating disorders (n=60), 27 have very low diet quality, 25 need improvement to adjust intake to Mediterranean patterns and eight have optimal Mediterranean diet. While of all celiac children and adolescents without eating disorders (n=72), 41 need an improvement in

their diet, 14 have optimal Mediterranean diet, and 17 have very low diet quality. Hence, we suppose that Mediterranean diet may have a protective effect against eating disorders among celiac patients.

Results of logistic regression shows the dependence of several variables to presence of eating disorders. Therefore, the following variables were significantly associated with eating disorders : gender (p=0.002), age

(p=0.000), area of residence (p=0.046), BMI (p=0.005), diet quality (KIDMED index) (p=0.0046) and some dietary habits (Q2: A second fruit every day; Q4: fresh or cooked vegetables more than once a day; Q5: Fish at least 2 or 3 times/week; Q7: Likes pulses and eats them more than once a week; Q9: Cereals or derivatives at breakfast; Q16: Eats sweets and candy several times a day) (p<0.05). Table 5 summaries the results of logic regression.

**Table 1: KIDMED test to assess the Mediterranean diet quality**

Scoring
+1 Takes a fruit or fruit juice every day
+1 Has a second fruit every day
+1 Has fresh or cooked vegetables regularly once a day
+1 Has fresh or cooked vegetables more than once a day
+1 Consumes fish regularly (at least 2–3 times per week)
-1 Goes more than once a week to a fast-food (hamburger) restaurant
-1 Likes pulses and eats them more than once a week
+1 Consumes pasta or rice almost every day (5 or more times per week)
+1 Has cereals or grains (bread, etc.) for breakfast
+1 Consumes nuts regularly (at least 2–3 times per week)
+1 Uses olive oil at home
+1 Skips breakfast
+1 Has a dairy product for breakfast (yoghurt, milk, etc.)
-1 Has commercially baked goods or pastries for breakfast
+1 Takes two yoghurts and/or some cheese (40 g) daily
-1 Takes sweets and candy several times every day

**KIDMED:** Mediterranean Diet Quality Index in children and adolescents

**Table 2: Sociodemographic characteristics of study population**

	Female (n=79)	Male (n=53)	Total (n=132)	Chi <sup>2</sup> (p value)
<b>Age, years</b>				
10-12	17 (48.57%)	18 (51.43%)	35	8.42 (p<0.015)
13-15	12 (44.44%)	15 (54.56%)	27	
>15	50 (71.43%)	20 (28.57%)	70	
<b>Area of residence</b>				
Urban	50 (51.02%)	48 (48.98%)	98	12.34 (p<0.000)
Rural	29 (85.29%)	5 (14.71%)	34	
<b>BMI z-scores</b>				
Thinness	11 (64.70%)	6 (35.30%)	17	8.64 (p<0.013)
Normal	57 (54.81%)	47 (45.19%)	104	
Obese	11 (100%)	0 (0%)	11	
<b>Growth retardatio size for age</b>				
Stunting	10 (43.48%)	13 (56.52%)	23	3.11 (p<0.05)
No Stunting	69 (63.30%)	40 (36.70%)	109	

Results expressed in frequency and percentage, **BMI:** Body mass index

**Table 3: Distribution of study population and results of Khi<sup>2</sup> test according to KIDMED index and SCOFF**

Variables	Modality	SCOFF		Khi <sup>2</sup>	KIDMED index			Khi <sup>2</sup>
		SCOFF+	SCOFF-		VLDQ	NI	OMD	
Age, years	10-12	23	12	12.46 (p<0.002) <sup>b</sup>	10	21	4	9.73 (p<0.045) <sup>a</sup>
	13-15	15	12		4	18	5	
	>15	22	48		30	27	13	
BMI	Thinness	8	9	0.45 (p<0.8)	5	12	0	16.01 (p<0.003) <sup>b</sup>
	Normal	46	58		32	53	19	
	Obese	6	5		7	1	3	
Growth retardation size for age	Stunting %	13	10	1.37 (p<0.24)	4	15	4	3.42 (p<0.18)
	No stunting %	47	62		40	51	18	
Gender	Female	41	38	3.29 (p<0.05) <sup>a</sup>	34	35	10	8.73 (p<0.013) <sup>a</sup>
	Male	19	34		10	31	12	

Results expressed in frequency in percentage, <sup>a</sup>significant difference at 5%, <sup>b</sup>significant difference at 1%

**BMI:** body mass index; **VLDQ:** very low diet quality; **NI:** needs improvement; **OMD:** Optimal Mediterranean diet; **SCOFF+:** have eating disorders; **SCOFF-:** don't have eating disorders

**Table 4: Independence test between KIDMED index and SCOFF in celiac patients**

		KIDMED index			Total	Khi <sup>2</sup> (p value)
		Very low diet quality	Improvement needed	Optimal Mediterranean diet		
SCOFF Questionnaire	SCOFF+	27 (20.45%)	25 (18.94%)	8 (6.06%)	60	6.75 (p<0.034) <sup>a</sup>
	SCOFF-	17 (12.88%)	41 (31.06%)	14 (10.61%)	72	
Total		44	66	22	132	

<sup>a</sup>significant difference at 5%; **SCOFF+:** have eating disorders; **SCOFF-:** don't have eating disorders

**Table 5: Dependent variables in eating disorders: logistic regression**

Variables	A	Wald	Significance	Exp(B)
Gender	1.532	9.165	0.002 <sup>b</sup>	4.629
Age	1.979	20.918	0.000 <sup>c</sup>	7.236
Area residence (urban)	1.032	3.986	0.046 <sup>a</sup>	2.807
BMI	-1.49	7.826	0.005 <sup>b</sup>	0.225
KIDMED index	0.159	2.493	0.0046 <sup>a</sup>	1.172
KIDMED test (questions)	1.56	8.77	0.047 <sup>a</sup>	2.55
Q2: A second fruit every day				
Q4: fresh or cooked vegetables more than once a day	1.88	11.11	0.05 <sup>a</sup>	2.01
Q5: Fish at least 2 or 3 times/week	1.9	9.56	0.009 <sup>b</sup>	1.15
Q7: Likes pulses and eats them more than once a week	1.03	4.01	0.008 <sup>b</sup>	1.33
Q9: Cereals or derivatives at breakfast	4.025	3.26	0.043 <sup>a</sup>	55.96
Q16: Eats sweets and candy several times a day	-2.96	4.86	0.027 <sup>a</sup>	0.052
Constant	-3.141	3.428	0.044 <sup>a</sup>	0.043

<sup>a</sup> significant difference at 5%, <sup>b</sup> significant difference at 1%, <sup>c</sup> significant difference to 1 per thousand; **Q1, Q3, Q6, Q8, Q10, Q11, Q12, Q13, Q14, and Q15:** were not statistically significantly.

## Discussion

According to a study conducted in the Mediterranean area in 2011, the prevalence of population with CD in Morocco is 343 432 and will become 383 098 in 10 years<sup>12</sup>. However, no data concerning adherence to gluten free diet in patients with celiac disease is available in Morocco.

Indeed, it has been previously demonstrated that diets followed by patients with CD can lead to nutritional deficiencies; therefore, if this diet is not carried out with attention, it may cause nutritional imbalances, which should be avoided, particularly at the phase of growth and development<sup>13</sup>

Very few studies evaluate the dietary habits and assessed of eating disorders among children & adolescents with celiac disease. In the present study, significant association between KIDMED index and age, gender & BMI<sup>14</sup>. From Spain assessed the dietary quality of children and adolescents with CD by KIDMED index too, and to found that Two-thirds of them showed moderate or poor KIDMED index, 47% of boys with CD demonstrated high adherence and only 25% of girls reached this goal. Besides, noted positive association of KIDMED index (poor, moderate and high) with sex and weight<sup>14</sup>.

Indeed, we found that among adolescents between 10 and 15 years old (n=62), 22.55% had very low diet quality, 62.9% need improvement and 14.55% had optimal Mediterranean diet. In Spain, they noted optimal Mediterranean diet in 33.7% of children and adolescents, 63.9% need improvement and only 2.4% had very low diet quality<sup>14</sup>.

In another hand, the prevalence of celiac adolescent with eating disorders in this study was 45.45%, in which 20.45% with very low diet quality and 18.98% need improvement. and of all celiac patients who had eating disorders (n=60), 27 have very low diet quality, 25 need improvement to adjust intake to Mediterranean patterns and eight have optimal Mediterranean diet. In addition, logistic regression showed that age, gender, BMI, area of residence, diet quality (KIDMED index) and some dietary habits were significantly associated with having eating disorders (p<0.05). While in Italy, Babio et al reported that only 7.14% of celiac patients (10-23 years old, n=98) had EDs, also that sex, age and BMI were not associated to EDs<sup>15</sup>. However, Karwautz et al. assessed the prevalence of EDs among 283 adolescent patients

with CD, and found that EDs affected 4.8%, which were all girls<sup>7</sup>.

Wagner et al. reported that adolescents with CD and EDs were older and more often non-compliant with their diet and had a higher BMI, also that female patients with CD and EDs were significantly older than girls with and without CD and an EDs respectively, and healthy controls had a higher current BMI and a lifetime maximum BMI than girls with and without CD and an ED, respectively, and healthy control<sup>16</sup>.

This results may indicate that celiac patients who were adherent to the Mediterranean diet were less likely to have EDs, suggesting a protective effect of the Mediterranean diet against EDs among adolescents.

## Conclusion

In the present study, statistical test showed that the dietary habit quality and eating disorders were significantly associated.

Besides, logistic regression showed that age, gender, BMI, area of residence, diet quality (KIDMED index) and some dietary habits were significantly associated with having eating disorders. We suppose that Mediterranean diet may have a protective effect against eating disorders among celiac patients. These findings may be useful for researchers interested by celiac disease in Morocco to understand the link between celiac disease, eating disorders and adherence to the Mediterranean diet. Also, can help health policy makers to establish a program to diagnostic, treat, and prevent eating disorders in Moroccan population.

**Conflict of Interest:** No

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# Intake of Sulfur Dioxide (SO<sub>2</sub>) Exposure to the Symptoms of Respiratory Impairment in Ceramics Industry Plered, Indonesia

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## Abstract

**Context:** The ceramic industry produces SO<sub>2</sub> derived from the combustion process with firewood. Many studies have been conducted to determine the health impact that can be caused by SO<sub>2</sub> exposure, such as respiratory impairment. This study used cross-sectional method, the population in this research is workers of the ceramic industry. It obtained a sample size of 107 people using SRS method. Measurement of SO<sub>2</sub> concentrations using the parrosaniline method and data collection of respiratory impairment, used SGRQ-C with interview method. Analysis results of the relationship between intake with respiratory impairment symptoms obtained that workers with intake > 0.0126, there are 74.5% that have experienced respiratory impairment symptoms. Chi-Square test results obtained the P-value = 0.189 then it can be concluded there is no significant relationship between respiratory impairment symptoms among the workers. Even so, the value of OR = 1.6 (95% CI: 0.717 – 3.908), workers with the intake > 0.0126 have the odds of 1.6 times higher to experience respiratory impairment symptoms.

The higher intake of SO<sub>2</sub> exposure has been gained by the worker, the opportunity (risk) causes higher respiratory impairment symptoms.

**Keywords:** Intake, SO<sub>2</sub>, Respiratory Impairment, Ceramic Industry.

## Introduction

Industrial ceramic Plered is one of the largest ceramic industry in Indonesia <sup>1</sup>. In the manufacturing process, ceramics are burned with wood fuel up to the temperature of 700<sup>0</sup>C to ≥ 1000<sup>0</sup>C <sup>2</sup>. Wood is one of the natural components containing sulfur with the amount of < 0.1% <sup>3</sup>. The similar research has been conducted before, where measurements on air parameters indicate that there is a concentration of SO<sub>2</sub> in the area around the pottery combustion above the TLV (5.7 ppm) <sup>4</sup>. Most of

SO<sub>2</sub> entering into the body through the respiratory tract<sup>5</sup>. Based on preliminary studies conducted earlier that the presence of health complaints by workers associated with respiratory disorders <sup>6</sup>.

Research conducted in Hongkong demonstrates a significant association between air pollution levels with increased morbidity related incidence of upper respiratory <sup>7</sup>. In addition, the similar research is related to the degree of ambient air pollution that can affect respiratory impairment with symptoms of shortness of breath, cough, phlegm, and sneezing <sup>8</sup>. The concentration of SO<sub>2</sub> in the air ambient also relates significantly to the symptoms of acute respiratory impairment that occur due to volcanic eruptions at Miyakejima Island <sup>9</sup>. The previous research explains the significant relationship between the deaths of lung cancer with a concentration level of SO<sub>2</sub><sup>10</sup>.

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Boushehr city shows when concentrations increased  $\pm 60 \mu\text{g}/\text{m}^3$  it will associate significantly with death from respiratory diseases<sup>11</sup>. Research in the traditional brick making industry in Pakistan shows that workers have chronic cough, chronic phlegm, shortness of breath and wheezing, etc. The study found that workers involved in the making of bricks would be more likely to be chronic bronchitis and asthma compared to the workers in the transport and placement<sup>12</sup>. Based on the above description, there is a risk of exposure to intake of  $\text{SO}_2$  concentrations that have an impact on acute respiratory impairment in the form of cough symptoms, phlegm, shortness of breath and wheezing. Thus we are designing this research to: know the concentration and intake of  $\text{SO}_2$  to the workers, explain the association between the intake of  $\text{SO}_2$  to respiratory impairment.

### Method

This study used cross-sectional method, population in this research is workers of the ceramic industry, with a minimum working period of 1 year. Based on the calculation of samples, it obtained a sample size of 107 people using the PPS with the SRS method. Data collection begins with the submission of research and approval sheets through informed consent.

Measurement of  $\text{SO}_2$  using the pararosaniline method with a spectrophotometer. The measuring principle is aligned with West and Gaeke (1956), where  $\text{SO}_2$  is absorbed into the tetraklomercuric solution and forms a complex compound of dichlorosulfonatomercuric II. The addition of pararosaniline and formaldehyde solution into the compounds of dichlorosulfonatomercurate II forms a blue-violet compound<sup>13</sup>. The formula used in intake measurements is as follows<sup>14,15</sup>:

**Intake =**

**Where:**

**C:** Substance concentration ( $\text{mg}/\text{m}^3$ )

**IR:** Intake rate ( $\text{mg}/\text{hour}$ )

**ET:** Exposure time ( $\text{hour}/\text{days}$ )

**EF:** Exposure frequency ( $\text{days}/\text{years}$ )

**ED:** Exposure duration (years)

**BW:** Body weight (kilograms)

**AT:** Averaging time ( $\text{ED} \times 365 \text{ days}/\text{years}$ )

Data collection of respiratory impairment in workers, used questionnaires with interview method. The questionnaire used was adapted from the American Thoracic Society, St. George's Respiratory Questionnaire for COPD Patients<sup>16</sup>. Questionnaires were used only at the symptoms such as cough, phlegm, breathlessness or wheezing. The questions have been adapted to the characteristics of workers and scoping of the research. Data analysis has been using SPSS software version 20, bivariate analysis was used to look at the relationship between the intake and respiratory impairment with the Chi-Square Test. The multivariate analysis used logistics regression tests of risk factors.

### Results

Based on the measurement of  $\text{SO}_2$  concentration has been obtained that the entire sampling point is still below the threshold level value (TLV) of 2 ppm<sup>17,18</sup>. While the average of the highest individual intake is 0.0171  $\text{mg}/\text{kg}/\text{day}$  and the lowest 0.0083  $\text{mg}/\text{kg}/\text{day}$  (Table 1). Age of research subjects is mostly  $\leq 44$  years in each location. Almost all research locations show that the nutritional status of workers tends to be normal. The determination of nutritional status is based on a cut-off point set by the WHO (normal BMI is 18.5 – 24.9  $\text{kg}/\text{m}^2$ )<sup>19</sup>.

**Table 1:  $\text{SO}_2$  Concentration on Each Location**

Location	$\text{SO}_2$ Concentration		Average Individual Intake ( $\text{mg}/\text{kg}/\text{day}$ )
	$\mu\text{g}/\text{m}^3$	ppm	
1	94.72	0.036	0.0126
2	110.8	0.042	0.0140
3	116.51	0.045	0.0119
4	112.0	0.043	0.0126
5	73.79	0.028	0.0083
6	144.43	0.055	0.0171

**Table 2: Distribution of Respondents by Age, Nutrition Status, Working Period, Smoking, Use of PPE and Respiratory Impairment Symptoms**

No.	Variable	Total (n)	Percentage (%)
1	<b>Age</b>		
	≤ 44 years old	62	57.9
	> 44 years old	45	42.1
2	<b>Nutritional Status</b>		
	Normal	61	57.0
	Abnormal	46	43.0
3	<b>Working Period</b>		
	≤ 15 years	60	56.1
	> 15 years	47	43.9
4	<b>Smoking</b>		
	Yes	55	51.4
	No	52	48.6
5	<b>Use of PPE</b>		
	Yes	20	18.7
	No	87	81.3
6	<b>Symptoms of Respiratory Impairment</b>		
	Yes	72	67.3
	No	35	32.7

Whereas if seen in each of the symptoms, cough

(43.93%), phlegm (32.71%), shortness of breath (31.78%) and wheezing (14.95%).Based on Table 2, shows that the majority of respondents were ≤44 years old(57.9%). While the nutritional status of workers is mostly normal of 57.0%, the working period is mostly ≤ 15 years of 56.1%. The majority of workers are smokers(51.4%) and use of PPE at work that is18.7%. Workers who respiratory impairment symptoms (67.3%).

Analysis results of the relationship between intake (SO<sub>2</sub> exposure) with respiratory impairment symptoms obtained that there were as much as 34 (60.7%) workers with an intake ≤ 0.0126 have experienced respiratory impairment symptoms. While among workers with intake > 0.0126, there are 38 (74.5%) that have experienced respiratory impairment symptoms. Chi-Square test results obtained the value P = 0.189 then it can be concluded there is no significant relationship between respiratory impairment symptoms among the workers with the intake ≤ 0.0126 and intake > 0.0126. From the results of analysis obtained also the value of OR = 1.891, which means that workers with the intake > 0.0126 have the odds of 1.89 times higher to experience respiratory impairment symptoms than workers with an intake ≤ 0.0126 (Table 3).

**Table 3: Distribution of Respondents by Intake and Respiratory Impairment Symptoms**

Intake (mg/kg/day)	Respiratory Impairment Symptoms				Total		OR (95%CI)	p-value
	No		Yes		n	%		
	n	%	n	%				
≤ 0.0126	22	39.3	34	60.7	56	100	1.891	0.189
>0.0126	13	25.5	38	74.5	51	100	0.827 - 4.325	
<b>Total</b>	<b>35</b>	<b>32.7</b>	<b>72</b>	<b>67.3</b>	<b>107</b>	<b>100</b>		

After confounding analysis, smoking behavior is confounding of the relationship between intake (SO<sub>2</sub> exposure) and respiratory impairment symptoms of ceramic industry workers, hence the model is as follows (Table 4):

**Table 4: Final Model of Logistic Regression Confounding Test**

No	Variable	P-value	OR	95% CI
1	Intake	0.234	1.674	0.717 – 3.908
2	Smoking	0.069	2.186	0.940 – 5.083

Based on the model above can be explained that the worker with the intake of SO<sub>2</sub>> 0.0126 (mg/kg/day) has an opportunity to experience the symptoms of respiratory

disorders 1.6 times compared to workers with the intake of SO<sub>2</sub>≤ 0.0126 (mg/kg/day) after controlled variable “smoking”.



## Discussion

The analysis results stated that there is no association between intake of SO<sub>2</sub> exposure with respiratory impairment symptoms by workers in the ceramic industry. However, intake of SO<sub>2</sub> exposure > 0.0126 (mg/kg/day) have a higher chance or risk 1.6 times to experiencing symptoms of respiratory impairment after variable of smoking habit controlled. The findings differ slightly from the research on workers of Silicon carbide (SiC), indicating that there is an association between phlegm, wheezing and a difficult breath with SO<sub>2</sub> exposure in the workplace. While the synergistic effect between SO<sub>2</sub> exposure and smoking is assessed able to improve the symptoms of respiratory impairment<sup>20</sup>.

It is similar to the previous research that there is a health risk due to the increase of SO<sub>2</sub> concentration i.e 10 µg/m<sup>3</sup> so in accordance with the increase of the total death of 1.7%; 3.4% cardiovascular and the death of respiratory impairment 2%<sup>21</sup>. The study showed that an increase in SO<sub>2</sub> concentration i.e 10 µg/m<sup>3</sup> could increase the death of respiratory impairment, where the habit of smoking and nutritional status was also instrumental in the incident<sup>22</sup>. In addition, other studies have shown a correlation between SO<sub>2</sub> and COPD (P < 0.01)<sup>23</sup>. While other studies, it shows that the concentration of SO<sub>2</sub> is not at risk (HR < 1) for cardiovascular and cerebrovascular<sup>24</sup>.

SO<sub>2</sub> becomes one of the many air contaminants associated with the industrial production process<sup>25</sup>. Related research has also been conducted on communities living in industrial areas in China, where gas generated from industrial activities can increase the chances i.e 1.48 – 1.72 for the prevalence of respiratory impairment, such as persistent cough and sputum, wheezing and asthma<sup>26</sup>. Previous studies explaining that exposure to airborne pollutants produced from the petrochemical industry can improve respiratory symptoms, decreased lung function capacity and increased incidence of asthma in the short term, especially for people within a radius of 5 km from the industry<sup>27</sup>.

The absence of data variations indicating that most workers do not use PPE. This is in line with the research conducted on workers of spinning textile in Indonesia where it shows that there is no relationship between the use of PPE with the lung function capacity of workers<sup>28</sup>. Other studies have shown that there is no relationship between impaired pulmonary function and the use of PPE on a locomotive worker<sup>29</sup>. However, a different

statement is shown in the study related to the discipline of the use of the PPE with respiratory disorders in the traffic police which is a significant relationship<sup>30</sup>.

In this study, the intake of SO<sub>2</sub> exposure also closely related to the working period and nutritional status. It is supported by Fahmi's research (2012) which suggests that the working period relates to the level of dust exposure and the longer it will accumulate (P = 0.01)<sup>28</sup>. The nutrition status can be used as the basis of health risk assessment caused by pollutant exposure in the environment as well as one of the preventive measures that can be done<sup>31</sup>.

## Conclusion

The results of this study indicate that the higher intake of SO<sub>2</sub> exposure has been gained by the worker, the opportunity causes higher respiratory distress symptoms. While the variables related to the working period, age, nutritional status, smoking and compliance of the PPE are important to consider in ensuring the relationship of both.

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**Ethics Approval:** The study protocol was approved by the Ethics Committee of Public Health Faculty, Universitas Indonesia, Depok, Indonesia.

**Conflict of Interest:** No conflict interests.

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# Aging Effect on Marginal Gap Distance and Cyclic Loading of Two Different Ceramic Crowns

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## Abstract

**Objectives:** This study was carried out to evaluate and compare the vertical marginal gap distance, and cyclic loading of all-ceramic crowns Vita suprinity and IPs e.max CAD (CAD/CAM milling, Cerec MCXL), using two types of finish lines (deep chamfer and radial shoulder).

**Method:** Specially designed stainless steel dies were constructed and a total number of 40 samples were constructed representing two equal groups (20 samples), according to the type of materials (VITA Suprinity and IPs E.max CAD “CAD/CAM milling technique Cerec MCXL) The twenty samples were further divided into two divisions (10 each) according to the type of the finish line used .Each division was then divided into two classes (5 each) (one class was constructed as a crown coping and then veneered, the second one was constructed as a full contoured crowns).

**Results:** As regard the vertical marginal gap test, the results showed that IPs e.max CAD crowns regardless to finish line type and veneering, recorded a higher vertical marginal gap. The cyclic loading test data revealed that IPs e.max CAD crowns recorded a higher fracture resistance. Vita suprinity crowns recorded a higher fracture resistance than the load cycled crowns regardless to finish line type and veneering.

**Conclusion:** crowns made from Vita suprinity are more accurately fit than those made of IPse.max CAD. While IPse.maxCAD are stronger than Vita suprinity crowns.

**Keyword:** *IPS e-maxCAD, Vita Suprinity, Marginal gap, Cyclic loading, All ceramic restoration, Cerec Mcxl.*

## Introduction

Several modern all ceramic systems are developed to achieve the most challenging requirements in restorative dentistry, ease of fabrication, good esthetics with adequate strength and fracture toughness. Recently IPs e.max Cad is an innovative all-ceramic system which covers the entire all-ceramics indication range from thin veneers to 5 units bridges<sup>(1)</sup>. Vita Suprinity, a new glass ceramic, features a special fine –grained and homogeneous structure which assures excellent material quality and consistent high load capacity, as well as long-term reliability<sup>(2)</sup>. Marginal accuracy is one of the most important and critical link in success of fixed prosthodontics<sup>(3)</sup>. The purpose of this study is to evaluate the CAD/CAM technology in construction of all-ceramic

crowns and to study some of their mechanical properties by two different materials and different laboratory investigations.

## Material and Method

A total of 40 samples were constructed representing warm-ups (20 samples each) according to the type of materials(VITA Suprinity and IPs E.maxCAD “CAD/CAM milling technique”). The twenty samples were further divided into two divisions (10 each), deep chamfer and radial shoulder). Each division was then divided into two classes (5 each), (one class was constructed as a crown coping and then veneered, these condone was constructed as a full contoured crowns).

**Working dies Construction:** Two specially designed stainless steel dies were fabricated using al at he cutting machine, with two different margins designs(deep chamfer and radial shoulder“120”). They provided a total axial taper of 6 degrees, 7 mm. exhilaratingly. finish line thickness, with a central groove for perfect reorientation of the crowns.



**Fig(1) : Stainless steelworkingdies**

**Construction of IPse. max CAD and Vita Suprinity crown copings and full contoured crowns:** Silicon duplicates were performed fort he metal models (dies) of the two subgroups by using siloxane rubber base impression material. An extra hard, type four,stone material “Dentona”, which is recommended for CAD/CAM models..After complete setting of the stone models they were trimmed and were ready for scanning.

**Scanning Technique:** Cerec Omnicam, a new camera, a new workflow used for scanning the model by moving the camera smoothly over the top of the sample, and tilt and roll it 90 degree toward buccul and then lingual in order to capture the sides of the sample.

**Designing the crown coping and the fully contoured crowns:** First design modes and restoration type were selected. Defining the margins is best accomplished manually . build the margins in small increments using the manual margination tool.

Using the scale, position and rotate tool self-adjusting of the crown coping and fully contoured crown dimensions according to the manufacturers recommended wall thickness which were 0. 8mm for the coping and 1.2 mm for the full contoured crown. The same process was repeated 20 times for each group to end with 40 milled restorations (20 crown copings and 20 fully contoured crowns).



**Fig(2): Tracing of the preparation model margin**

**Fitting of the crown Copings:** At this stage, them ate rial exhibited an unusual bluish color after milling. The milled samples were handled with care to avoid damage to their margins or initiation of microscopic cracks leading to subsequent failure of the restoration.



**Fig(3): E.max CAD crown before crystallization on metal die.**

**Crystallization of the samples:** The samples were subjected to a short (approximately 22 minutes) crystallization process in the furnace.

**Veneering of IPse. maxceramic copings:** Dentin material was mixed with IPs e.max ceramic build-up liquid. The mix was then applied in a thin coat on the entire crown coping.

**Glaze firing:** Glaze firing was conducted using IPse. maxceram glaze powder and liquid.

**Vertical Marginal Gap Measurement:** Vertical marginal gap distance was examined using a stereo

microscope. Crowns were held in place over their corresponding dies using a specially designed and fabricated holding device to seat the crown completely during microscopic measurements.

**Cyclic loading test:** All samples were individually mounted in the lower fixed compartment of a computer-controlled materials testing machine with a load cell of (5KN) and data were recorded using computer software.

The sample under went concluding, by means of a metallic sphere of (6.8mm) diameter which was attached to the upper movable compartment of the machine and the load was applied at the center of occlusal surface,

**Vertical Marginal Gap Results:** Means and standard deviations of vertical marginal gap for e.max and suprinity ceramics as function of production techniques, finish line and surface finishing are summarized in table (1).

**Table 1: Vertical marginal gap results (Mean±SD) for e.max ceramic as function of production techniques, finish line and surface finishing**

Group	Finish line	Fullyanatomic	Veneering
e.maxCAD	Deep chamfer	44.19 ± 2.682	42.38 ± 2.855
	Radial shoulder	43.81 ± 3.643	40.00 ± 3.036
Vita Suprinity	Deep chamfer	34.06 ± 1.598	31.13 ± 1.751
	Radial shoulder	41.50 ± 2.891	37.75 ± 2.656

**Cyclic Loading Results:**

**E.max CAD:** Regardless to finish line and veneering, non-cycle de. max CAD recorded a statistically non-significant higher fracture resistance mean value(1013± 53.84N) than with load cycled (888.1±104.5N) as reapportionments(t=2.004, p>0.05)

**Vita Suprinity:** Regardless to finish line and surface finishing, non-cycled Vita Suprinity recorded as tat is tic ally significant higher fracture resistance mean value(803.7 ±66.45N) than with load cycled (703.8±34.26N) as revealed with t-test (t=2.7,p<0.05)

**Discussion**

In the current study, Vita suprinity and IPs e.max CAD were selected as being recommended for use in posterior crowns because of the improved mechanical properties,with respect to two different margin designs (deep chamfer and radial shoulder).(4,5) Since(1993), it has been possible to fabricate crowns and FPD frameworks from industrially prefabricated blocks using various machine milling method: Precision copy milling and CAD/CAM milling as stated by **Wassermanetal, (2006)**(6). The computer aided design–computer aided manufacturing (CAD/CAM) is included among the most recent advances indent al technology for direct fabrication of all-ceramic restorations. The preparation

margin is marked with just a few mouse clicks and the software does all there st. In order to ensure the accuracy oft he restoration,we should sees what will be milled on the screen before it is sent to the milling machine. Milling performance and precision has been optimized to ±25 microns.(7)

Due to the aim oft he study and the variability of measurements, moreover, variations of margin designs and difficulty to standardize the designs to ensure realistic estimates of strength as a function of shape parameters, an in-vitro design was selected. The use of one single master metal die for each design made it possible to start the fabrication of all specimens from the same original situation. Metal dies with actual ceramic specimens fabricated tot he anatomic configuration of teeth became a useful tool fort he identification oft heir behavior. Accordingly, clinical variations and disturbing parameters not related tot he manufacturing technique and may affect the recorded values were reduced or avoided as much as possible. Finally thee valuation was performed on the unchanged baseline,performed on the unchanged baseline **Kernetal, (1992)**(8).

While,in contra indication with Christmastides et al (2002)(9), Kolbeck et al (2002)(10), and Rosentritt et al (2003)(11), whore commended the use of extracted human teeth as abutments because their modulus of

elasticity, bonding characteristics thermal conductivity and strength are closer to the clinical situation than those of metal, plastic and animal teeth.

**Vertical marginal gap:** The vertical cervical marginal gap measurement was selected as the most frequently used method to quantify the accuracy of fit of a restoration (Patteno et al, 2000<sup>(12)</sup> and Groten et al, 1997<sup>(13)</sup>). In spite of the presence of various testing method and measuring tools the direct view method using the digital measuring microscope is considered more convenient, accurate, easy and rapid for determining the marginal gap distance. Soreness et al, 1990<sup>(14)</sup>.

The results of his study revealed the effect of the production technique on the vertical marginal gap measurements of the e.max specimens, as the e.max CAD specimens recorded a higher vertical marginal gap mean value (42.59)  $\mu\text{m}$  than that obtained with vita suprinity specimens (36.11)  $\mu\text{m}$ . There is a significant difference between e.max CAD vertical marginal gap mean value and that of vita suprinity. This may be attributed to geometrical design of the restoration and difficulties regarding scanning, digitization, and the milling process of brittle ceramic material. Moreover the adaptation of restorations made out of milled ceramic blanks may be affected by the size of milling burs and material conditions during the milling procedure. These measurements were in accordance with Tinschert et al 2001<sup>(15)</sup>, Guazzato et al 2004<sup>(16)</sup> and Fleming et al 2005<sup>(17)</sup>.

The accuracy of CAD/ CAM restorations could be affected by surface roughness which may be related to the detachment of abrasive particles from the diamond burs or to forced vibration of the ceramic block at the finishing stage, as reported by Yarest 2004<sup>(18)</sup>.

The results of his study revealed that the finish line geometry (deep chamfer and radial shoulder) had no statistically significant effect on the vertical marginal gap distance records for the e.max specimens using t-test analysis. These results concur with Quintaset al<sup>(19)</sup> and Tsiro et al<sup>(20)</sup> who reported that no significant difference was related to the finish line type.

**Cyclic Loading:** To simulate conditions that are as close as possible to the clinical situation the cyclic compressive fatigue test at 10000 load cycles (most ceramics degraded significantly between 10000 to 100000)<sup>(21)</sup> were determined by testing according to the modified "staircase" method. The results of his study revealed that the cyclic loading had a significant effect

on the fracture resistance values of the e.max CAD crowns regardless to finish line design and veneering, as all then on-cycle e.max crowns recorded as statistically significant higher fracture resistance mean value (908.4) N. than load cycled one (796.0) N. as revealed with t-test. This was in agreement with (Attia and Kern, 2004)<sup>(22)</sup>

## Conclusion

**Under the limitations of this study, several conclusions could be detected:**

1. Regarding the recorded levels of the suggested acceptability for vertical marginal gap distance the tested groups had acceptable marginal fit which lead to clinical success.
2. Posterior crowns made from Vita suprinity are more accurately fit than those made of IPse .max CAD. While IPse .max CAD are stronger than Vita suprinity crowns.
3. CAD /CAM milling, Cerec MCXL, is a recent technique that allows easy and rapid constructions of restorations, but still effort must be made to improve precision.

**Conflict of Interest:** No

**Source of Funding:** Self-finding

**Ethical Clearance:** It was approved by the ethics committee of Minya university.

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# Effect of Evoo on Mda, Adma and no Level in Rattus Norvegicus Pre-Eclampsia Model

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## Abstract

**Background:** Preeclampsia is one of the three main factors causing maternal death. In Preeclampsia found an increase in MDA, ADMA and decreased NO. How to treat preeclampsia until now is to end the pregnancy. EVOO has a fatty acid profile (FA) with a high ratio of monounsaturated fatty acids (MUFA) or monounsaturated fatty acids and rich antioxidant content.

**Objective:** To determine the difference in MDA, ADMA and NO level with the effect of giving EVOO to the experimental group and comparing it with the control group.

**Method:** The method of this research was carried out in vivo using the experimental animal rat (*Rattus norvegicus*) wistar strain. In this study consisted of 5 treatment groups. Negative control group (healthy pregnant rats), positive control (pregnant rats with preeclampsia), treatment 1, treatment 2 and treatment 3 where the group treated were preeclampsia pregnant rats who were given EVOO with various doses (0.5 cc, 1 cc and 2 cc).

**Results:** The results One way ANOVA test showed on MDA levels obtained significant differences ( $p\text{-value} = 0,000$ ) in the five treatment groups. ADMA levels obtained significant differences ( $p\text{-value} = 0,000$ ) in the five treatment groups. NO levels obtained significant differences ( $p\text{-value} = 0,015$ ) in the five treatment groups. LSD test shows that the dose of EVOO is most effective in decreasing MDA, ADMA and NO levels in dose 2cc.

**Conclusion:** EVOO can decrease MDA, ADMA and increase NO levels in rats model preeclampsia.

**Keywords:** MDA, ADMA, NO, Preeclampsia, EVOO.

## Introduction

Pre eclampsia is a disorder in pregnancy that can

cause increased mortality and morbidity in the mother and fetus. Preeclampsia can result in mental retardation in children and can also result in prematurity labor, IUGR and stillbirth caused by damage to the placenta which causes a reduced supply of food and oxygen to the fetus<sup>(1)</sup>. In the world it is estimated that pregnancy complications include hypertension and preeclampsia in the amount of 5-10%. As many as 200 women die every day due to preeclampsia. Women in developing countries have a risk of dying from preeclampsia 300 times greater than developed countries<sup>(2)(3)</sup>.

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In preeclampsia, the cytotrophoblast fails to differentiate into an endothelial phenotype, so that invasion of the spiral arteries becomes more superficial, blood vessels remain stiff and narrow<sup>(4)</sup><sup>(5)</sup><sup>(6)</sup>. This condition can cause ischemia or hypoxia in the placenta. Hypoxia causes tissue or cell damage and endothelial dysfunction due to the presence of free radicals that cause lipid peroxidase. Lipid peroxidase is most common in cell membranes because unsaturated fatty acids and proteins are constituent components of cell membranes. Measurements of lipid peroxidation levels can be measured through the final product, namely Malondialdehyde (MDA). MDA is known to increase in the plasma of women with preeclampsia<sup>(7)</sup>. This condition describes oxidative stress. In conditions of oxidative stress an increase in superoxide and peroxynitrite production. In preeclampsia this increase will induce activation of Lectin-like oxidized low-density lipoprotein receptor-1 (LOX-1) and its ligand Oxidized low-density lipoprotein (oxLDL)<sup>(8)</sup>. Activation of both NADPH oxidase positive feedback loops to re-produce superoxide and aggravate oxidative stress conditions. In addition, an increase in oxLDL causes an increase in L-Arginine which has an effect on increasing ADMA. Both of them trigger eNOS uncoupling which inhibits NO synthesis. Reduced amount of NO results in vasoconstriction<sup>(9)</sup><sup>(10)</sup>. The decrease in NO causes an imbalance in the synthesis of ET-1, so that ET-1 has increased. Decreasing NO as a vascular vasodilator and increasing ET-1 causes blood vessels of preeclampsia to experience vasoconstriction. This condition reflects endothelial dysfunction that triggers damage to the glomerular filtration barrier causing proteinuria, hypertension, HELLP syndrome, cerebral or visual disorders and edema. All of these conditions lead to the clinical manifestation of preeclampsia<sup>(11)</sup><sup>(12)</sup>. One alternative that might be used in additional therapy or support for preeclampsia is the provision of Extra virgin olive oil or commonly called EVOO. Extra virgin olive oil is one type of oil that comes from the first juice of olives<sup>(12)</sup>.

Extra virgin olive oil is more than just monounsaturated fat because it contains high amounts of antioxidants<sup>(13)</sup>. The antioxidants possessed by EVOO are known to have a way of working to help protect cells from oxidative damage caused by free radicals. The antioxidants in EVOO belong to the preventive group of non-enzymatic antioxidants by damaging reactive oxygen formation<sup>(14)</sup>. The antioxidants contained in

EVOO have the role of delaying the oxidation process. In this case, the main antioxidant that inhibits the oxidation process at EVOO is OP (Olive Phenols), which acts as a chain breaker by donating hydrogen radicals to alkylperoxyl radicals produced by lipid oxidation and the formation of stable derivatives during reaction<sup>(13)</sup>.

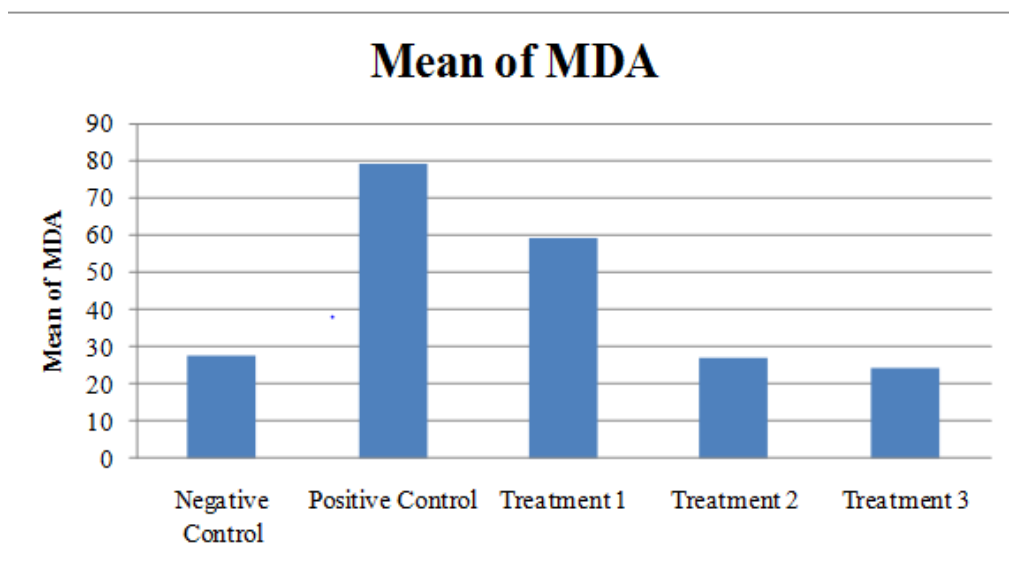
## Material and Method

The research design used in this study was post test only control group design. This research was conducted in vivo using experimental animals rats (*Rattus norvegicus*) wistar strain. This study used 20 pregnant rat and random divided into 5 groups. The negative control group consisted of normal pregnant rat. The positive control group was pregnant rat injected with L-NAME intraperitoneally without EVOO. The treatment group was pregnant rat injected with L-NAME intraperitoneally and given EVOO at a dose of 0.5 cc, 1 cc and 2 cc. Determination of the EVOO dose is based on the average daily consumption of the Mediterranean community converted to rat<sup>(15)</sup>.

Pregnant rat were random placed in 5 groups consisting of negative control group, positive control group and three treatment groups. Each group contains 4 pregnant rats. Intraperitoneal injection of L-NAME with a dose of 125 mg L-NAME / kilogram of body weight was given to rats with 13-19 days of gestation<sup>(16)</sup>. Preeclampsia rat model can be made by injection of L-NAME intraperitoneally used dose of 125 mg/ Kilogram of body weight was injected to rats with 13 days of gestation until 19 days of gestation<sup>(12)</sup>. The Blood pressure was measured on the 12, 15 and 19 day of gestation using Tail Cuff method with Kent Scientific CODA. This research has been approved by ethics committee Faculty Of Medicine Brawijaya University No. 73 / EC / KEPK-82/02/2019.

Measurement of MDA level was performed with spectrophotometry MDA KIT (No catalog K739-100). Measurement of ADMA level was performed with eliza ADMA KIT (No catalog E-EL-R0480). Measurement of NO concentration was performed with colorimetry NO kit a wavelength of 550 nm (No catalog Elabscience E-BC-K036). Data was analyzed statistically with ANOVA.

**Findings:** Figure 1 shows that the preeclampsia rat that were not treated with EVOO had a higher MDA levels compared to the preeclampsia rat model treated with EVOO.

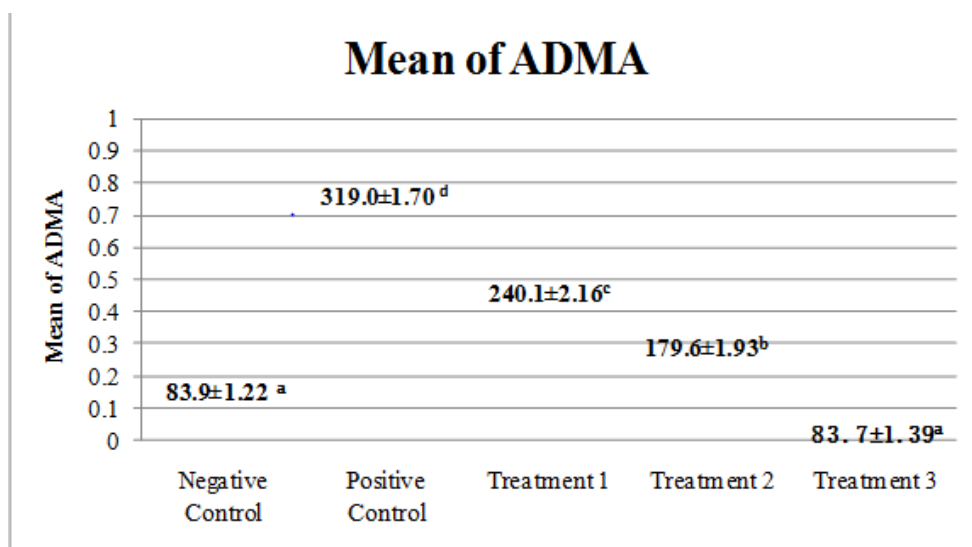


**Figure 1: Comparison of mean of MDA of negative control, positive control, treatment 1, treatment 2 and treatment 3.**

**Note:** Negative control is a normal pregnant rat. Positive control is a pregnant rat model of preeclampsia. Treatment 1 was a preeclampsia model rat that was given EVOO 0.5 cc. Treatment 2 was a preeclampsia model rat that was given EVOO 1 cc. Treatment 3 was a preeclampsia model rat that was given EVOO 2 cc.

and 2 cc/day doses. EVOO 0.5 cc/day doesdid not appear to significantly decrease MDA levelin the preeclampsia rat model. The data showed that the levels ofMDA in the treated group at 1 cc/day dose did not differ significantly from the mean in the normal pregnant rat group. This means that the optimum dose of EVOO to reduce MDA levels in the preeclampsia rat model was 1 cc/day.

A significant decrease in MDA levels was observed in the preeclampsia rat administered EVOO at 1 cc/day



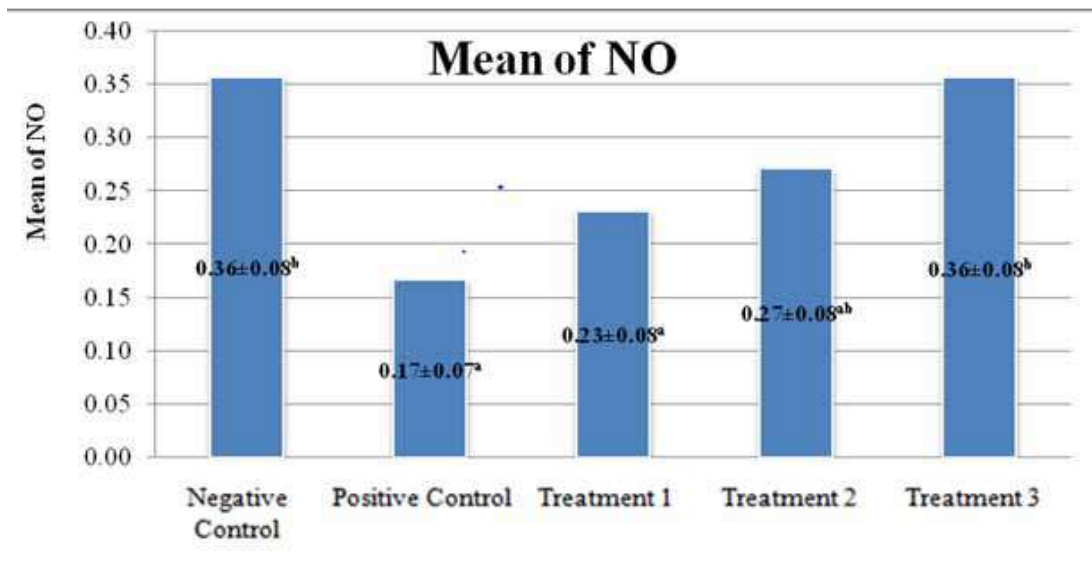
A significant decrease in ADMA levels was observed in the preeclampsia rat

**Figure 2: Comparison of mean of ADMA of negative control, positive control, treatment 1, treatment 2 and treatment 3.**

Figure 2 shows that the preeclampsia rat that were no treated with EVOO had a higher ADMA levels compared to the preeclampsia rat model treated with EVOO.

**Note:** Negative control is a normal pregnant rat. Positive control is a pregnant rat model of preeclampsia. Treatment 1 was a preeclampsia model rat that was given EVOO 0.5 cc. Treatment 2 was a preeclampsia model rat that was given EVOO 1 cc. Treatment 3 was a preeclampsia model rat that was given EVOO 2 cc.

ADMA levels appeared to decrease in the treatment 1, 2, and 3 groups when compared to the positive control group. Decreased ADMA levels along with the increase in the EVOO dose given. So the third dose of EVOO was able to reduce ADMA levels in rat preeclampsia model. While the EVOO dose which is considered the fastest able to reduce ADMA levels is a dose of 2 cc/day, because the average level of ADMA in the dose 3 group is the closest to the average value of ADMA in the negative control group.



**Figure 3:** Comparison of mean of ADMA of negative control, positive control, treatment 1, treatment 2 and treatment 3.

**Note:** Negative control is a normal pregnant rat. Positive control is a pregnant rat model of preeclampsia. Treatment 1 was a preeclampsia model rat that was given EVOO 0.5 cc. Treatment 2 was a preeclampsia model rat that was given EVOO 1 cc. Treatment 3 was a preeclampsia model rat that was given EVOO 2 cc.

In the picture 3 above shows the average histogram of NO levels in normal pregnant wistar rat that were not given anything (negative control), wistar preeclampsia pregnant rat with a given EVOO dose of 0.5 cc/day, dose of 1 cc/day and 2 cc/day. The figure shows the highest NO concentration in the negative control group and the

P3 group and the lowest for the NO concentration in the positive control group. This means that preeclampsia exposure in wistar rats resulted in decreased NO concentration. While the mean NO concentration appeared to increase in groups P1, P2 and P3 when compared to the positive control group. Increased NO concentration along with the increase in the EVOO dose given, although this increase did not reach statistical significant. So the third dose of EVOO is able to increase NO concentration in pregnant rat with preeclampsia. While the EVOO dose which is considered the fastest able to increase NO concentration of group P3.

**Table 1: Comparison of mean of MDA levels of preeclampsia rat model without EVOO treatment (positive control) compared to the preeclampsia rat model treated with EVOO**

Observation Group MDA	Mean±Standard Deviation	p-value
Positive control	79.13±12.89 <sup>a</sup>	0.000< $\alpha$
Treatment 1	58.88±15.34 <sup>a</sup>	
Treatment 2	27.22±19.10 <sup>b</sup>	
Treatment 3	24.12±4.799 <sup>b</sup>	

**Table 2: Comparison of mean of ADMA levels of preeclampsia rat model without EVOO treatment (positive control) compared to the preeclampsia rat model treated with EVOO**

Observation Group ADMA	Mean±Standard Deviation	p-value
Positive control	319.0±1.70 <sup>d</sup>	0.000< $\alpha$
Treatment 1	240.1±2.16 <sup>c</sup>	
Treatment 2	179.6±1.93 <sup>b</sup>	
Treatment 3	83.7±1.39 <sup>a</sup>	

**Table 3: Comparison of mean of NO levels of preeclampsia rat model without EVOO treatment (positive control) compared to the preeclampsia rat model treated with EVOO**

Observation Group No	Mean±Standard Deviation	p-value
Positive control	0.17±0.07 <sup>a</sup>	0.015< $\alpha$
Treatment 1	0.23±0.08 <sup>a</sup>	
Treatment 2	0.27±0.08 <sup>ab</sup>	
Treatment 3	0.36±0.08 <sup>b</sup>	

### Discussion

Our study confirmed that MDA and ADMA levels significantly increased and NO levels significantly decreased ( $p < 0.05$ ) in pregnant rat injected with L-NAME compared with normal pregnant rat.

This shows that the interperational injection of L-NAME may cause a significant increase in MDA, ADMA levels and decrease NO levels in a preeclampsia rat model. NG-Nitro-L-arginine-methyl ester (L-NAME) works to inhibit NO synthesis by blocking eNOS activity by causing interference with NO signaling in all arteries<sup>(17)(18)(19)</sup>. Inhibition of NO synthesis also results in eNOS uncoupling which contributes to the emergence of oxidative stress in vascular tissue<sup>(20)</sup>. The presence of oxidative stress can damage cell membranes where

many cell membranes contain layers of fat which will turn into lipid peroxides which can be measured through the final product called MDA<sup>(21)</sup>. Increased MDA causes an angiogenic imbalance characterized by an increase in sFlt1 expression associated with a decrease in PlGF or placental growth factor and a decrease in VEGF (vascular endothelial growth factor). This condition describes oxidative stress. In conditions of oxidative stress an increase in superoxide and peroxynitrite production. In preeclampsia this increase will induce activation of Lectin-like oxidized low-density lipoprotein receptor-1 (LOX-1) and its ligand Oxidized low-density lipoprotein (oxLDL). Activation of both NADPH oxidase positive feedback loops to re-produce superoxide and aggravate oxidative stress conditions. In addition, an increase in oxLDL causes an increase in L-Arginine which has an effect on increasing ADMA. Both of them trigger Enos uncoupling which inhibits NO synthesis. Decrease NO prevents interacting with endothelial receptors which will eventually lead to increased ET-1 levels and eventually endothelial dysfunction. ET-1 is a vasoactive peptide which results in a decrease NO vasodilator that plays an important role in the pathophysiology of preeclampsia<sup>(11)</sup>.

This study showed significant differences between MDA, ADMA and NO levels in the preeclampsia rat model without EVOO treatment (positive control) compared to the preeclampsia rat model treated with EVOO with a p-value of 0.000 ( $p < 0.05$ ).

These results indicate that EVOO can decrease MDA and ADMA levels, also increase NO in a rat model of preeclampsia. The antioxidants contained in EVOO have the role of delaying the oxidation process. In this case, the main antioxidant that inhibits the oxidation process at EVOO is OP (Olive Phenols), which acts as a chain breaker by donating hydroxide radicals to alkylperoxyl radicals which are produced by lipid oxidation and stable derivative formation during reaction<sup>(13)</sup>. The content contained in EVOO is an antioxidant such as phenolic groups such as flavonoids,  $\alpha$ -tocopherol (Vitamin E),  $\beta$ -carotene has and EVOO has been shown to have antioxidant activity<sup>(12)</sup>. Vitamin E itself can fight oxidative stress by preventing lipid peroxidation<sup>(19)</sup>. Vitamin E can inhibit oxidative stress, by preventing the formation of free radicals through inhibition of the enzyme NADPH oxidase in the placenta and in maternal neutrophils, and can also prevent free radical formation in mitochondria. The antioxidant capacity of vitamin E increases with the presence of

$\beta$ -carotene. The combination of carotenoids with other antioxidants (Vitamin E) can increase their activity against free radicals<sup>(19)</sup>.

### Conclusion

1. Intraperitoneal injection of L-NAME into pregnant rat increased MDA levels.
2. Intraperitoneal injection of L-NAME into pregnant rat increased ADMA levels.
3. Intraperitoneal injection of L-NAME into pregnant rat decreased NO levels.
4. EVOO decreased MDA levels in a preeclampsia rat model.
5. EVOO decreased ADMA levels in a preeclampsia rat model.
6. EVOO increased NO levels in a preeclampsia rat model.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** This research has been approved by ethics committee Faculty Of Medicine Brawijaya University No. 73 / EC / KEPK-82/02/2019.

**Recommendation:** The study may be used as a reference in supporting therapy in preeclampsia in humans.

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# The Alteration on Malondialdehyde Content on Wistar Rats' Blood and Lungs Tissue to Ward the Exposure of Electric Cigarette Smoke

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## Abstract

**Context:** The effect of electric cigarette smoke exposure had increased due to the number of electric cigarette smoker that raised every year. The smoke which enters the respiratory tract enhance the free radical inside the body, either in blood or lung tissue. The exceeding amount of free radical could trigger the oxidative stress which causes cell damage. The increase of cell damage within lung tissue is accompanied by the enhancement of malondialdehyde content. Therefore, this study aimed to know the malondialdehyde content alteration on blood and lung tissue against the exposure of electric cigarette smoke. This study used experimental methodology with posttest control group design using male Wistar rats as the sample. Wester rats were divided into groups and examined the cell damage through malondialdehyde content within the blood and the malondialdehyde expression within the lung tissue. The exposure of electric cigarette smoke was given to each group with different amount and duration. The lung tissue damage was measured using malondialdehyde content parameter within the blood and immunohistochemistry (IHC) on lung tissue. The finding showed that there was differentiation on malondialdehyde content within the blood and malondialdehyde expression on lung tissue ( $p < 0.05$ ). Whereas the relation between two groups showed a strong and significant relationship for ( $r=0.945$ ) and ( $p=0.000$ ). The duration of electric cigarette smoke exposure could affect the enhancement of malondialdehyde content within the blood and lung tissue.

**Keyword:** Malondialdehyde, electric cigarette, immunohistochemistry, lungs tissue

## Introduction

Electric cigarette has been popular these days. The increased number of electric cigarette user does not merely happen in developing countries but also in developed countries. In 2011, the E-cigarette user among Senior High school students in the United States of America was around 1.5% which then increases in 2014 for 13.4%. In New Zealand, the E-cigarette user at young age (14-15 years old) had reached three times bigger than

2012 for 20% in 2014<sup>1</sup>. E-cigarette is a battery-powered cigarette that works through the metal coil process using propylene glycol solution, vegetable glycerin and flavor that sometimes contained with nicotine<sup>2</sup>. It also known as a tool to heat the liquid nicotine into gas which inhaled by the user. This product is relatively new with popularity that increases every year<sup>1</sup>. A good marketing and an eye-catching form of E-cigarette make it more popular compared to the traditional cigarette. Besides, most of the society assumes that E-cigarette is safer than the traditional cigarette with tobacco, and lead to the rapid enhancement of the use of E-cigarette in society<sup>3</sup>. Besides, the use of electric cigarette consumed by everyone, ranged from adolescent until elder<sup>2</sup>. However, the amount of E-cigarette user is accompanied by the huge number of people who inhale the smoke which gives bad impact to health, especially in respiratory tract<sup>4</sup>.

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E-cigarettes contained various kinds of dangerous ingredients same as the traditional cigarette<sup>5</sup> which had a direct effect on respiratory tract<sup>6,7</sup>. The smoke that enters the respiratory tract could occur some health problems, including Chronic Obstructive Pulmonary Disease (COPD), asthma, cardiovascular disease and stroke<sup>8,9</sup>. Even if the long term effect on E-cigarette has not yet revealed, but the intrusion on health could be seen through the damaged cell caused by the E-cigarette smoke<sup>4</sup>. The damaged cell was caused due to the free radical enhancement that enters the respiratory tract<sup>10</sup>.

The E-cigarette smoke contained with high free radical component, including Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS)<sup>11</sup>. The exceed amount of free radical would cause an imbalance between free radical and antioxidant inside the body<sup>12</sup>. Free radical is a molecule derived from one or more unpaired electron. The amount of odd electron causes the free radical having short age, reactive and not stable<sup>13</sup>. This makes free radical able to catch the electron to get the stability by attacking the stable molecule around them. The attacked molecule will become free radical due to the loss of electron and caused cell damage. One of the most reactive free radical is superoxide<sup>14</sup>. The reaction would occur the oxidative stress and affect the cellular pathways, including cell metabolism, proliferation process and inflammation. The oxidative stress also triggers the peroxide lipid that caused cell damaged and fatality<sup>15</sup>. A very reactive and not stable free radical caused the measurement of free radical enhancement could not be done, except by using malondialdehyde content that was the final result of peroxide lipid<sup>16</sup>. Therefore, this study aimed to see the enhancement of free radical within the blood and lung tissue caused by the exposure of E-cigarette smoke.

## Materials and Method

This study used experimental methodology with posttest control group design. The sample was male Wistar rats (*Rattus norvegicus*) divided into six groups based on the treatment duration. The exposure of cigarette smoke was done for every 5 minutes of intervention with different amount of exposure per day and the duration time per week given to each group. The first group is the negative control group used as a comparison to the treatment group without giving the cigarette smoke exposure. While the rest of the groups was given the electric cigarette smoke exposure in a certain time and evaluated on malondialdehyde content through blood and

observation on lung tissue with Immunohistochemistry (IHC) staining to see the damaged cell.

**Wistar Rats:** Male Wistar rats aged around 2-3 months weighted for 150-200gr which had no abnormalities were used as the sample in this study. The research was done in the Laboratory of Medicine Faculty, Airlangga University, Surabaya. The Wistar rats were put for adaptation for 5 days before doing the treatment. After the adaptation, the Wistar rats were divided into groups contained with 5 male Wistar rats for each group. Then, each group would be given different duration and amount of the e-cigarette smoke exposure. The calculation of the replication sample was used to compare the treatment groups using the formulation as below:

$$n = \left\{ \frac{(Z_{1-\alpha} + Z_{1-\beta}) \cdot \sigma}{\mu_1 - \mu_0} \right\}^2$$

**E-Cigarette:** The e-cigarette solution used in this study was contained with 6mg of nicotine. The e-cigarette smoke was streamed around the room-sized 50cm x 40cm x 20cm with pipe around the room.

**Malondialdehyde Measurement Within the Blood:** The malondialdehyde measurement in blood was done using Thiobarbituric Acid Reactive Substance (TBARS) Assay. The examination was done directly and accurately using the Bioassay system based on the TBARS reaction with Thiobarbituric Acid in shaping the product or pink-colored compound. The color intensity was measured on 535nm or with fluorescence intensity on 560nm/585nm which proportional with TBARS concentration in sample.

**Immunohistochemistry (IHC):** The sample was valued in semi-quantitative using modified Remmele method in which the Remmule index scale (Immuno Reactive Score/IRS) was the multiplication result between the percentage values of immunoreactive cell with color intensity value in immunoreactive cell. The data for every sample was the mean value of IRS in 5 different high power fields of 1000 times magnification. This whole examination was used a light microscope.

**Treatment Examination:** The male Wistar rats were divided into 6 groups, including negative control and treatment group. The first group as the negative control group was a group that given no intervention for 4 weeks. While the second group as the treatment

group I was given the e-cigarette smoke intervention once every 5 minutes per day in a week. The third group or the treatment group II was given e-cigarette smoke exposure intervention twice every 5 minutes per day in a week. The treatment group III was given intervention of e-cigarette smoke exposure once every 5 minutes per day in 2 weeks. The treatment group IV was given e-cigarette smoke exposure twice every 5 minutes per day in 2 weeks. The last control group was given intervention of e-cigarette smoke exposure once every 5 minutes per day in 3 weeks.

**Statistical:** The statistical test was done to the collected data using ANOVA test with SPSS version 20 to see the differentiation on malondialdehyde content

within the blood and lung tissue in every group. Then, the Least Significance Differences (LSD) test was done to make comparison among groups. Moreover, correlation test was also done to see the relationship between two groups.

**Result**

**Malondialdehyde Content within the Blood due to E-cigarette Smoke Exposure:** The result showed that every group had the mean value on malondialdehyde content in blood was proportional to the duration of e-cigarette smoke exposure. In treatment group 1, the malondialdehyde content reached the lowest value or  $0.0144 \pm 0.0008$ , while the highest value was obtained by the treatment group IV for  $0.1444 \pm 0.0037$ .

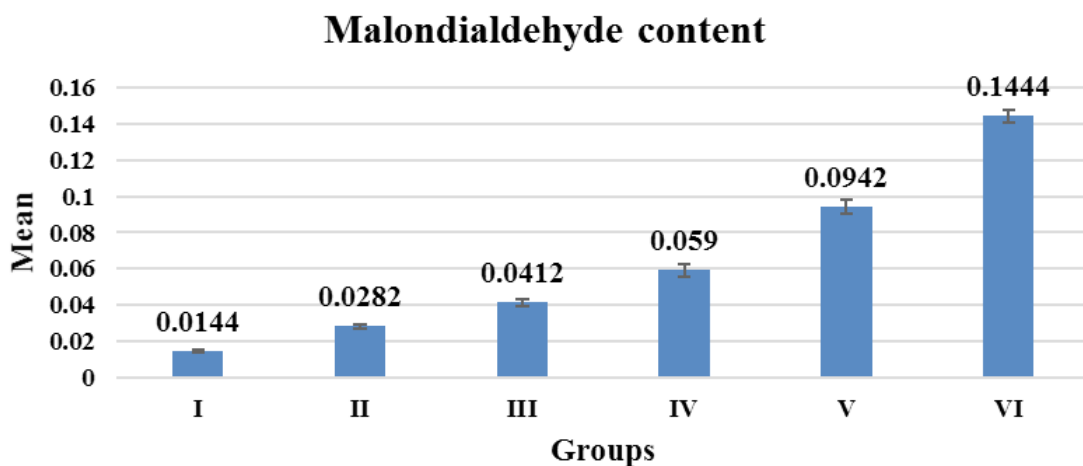


Figure 1: The mean value ± SD on Malondialdehyde content in blood

Table 1: The mean value and ANOVA test for Superoxide Dismutase (SOD) in each group

	Groups	Mean ± SD	P Value
I	Control Group	5,64 ± 0,12	0,000
II	Treatment Group I	4,35 ± 0,07	
III	Treatment Group II	2,92 ± 0,08	
IV	Treatment Group III	2,3 ± 0,06	
V	Treatment Group IV	1,49 ± 0,07	
VI	Treatment Group V	0,87 ± 0,05	

The ANOVA result showed the differentiation of malondialdehyde content in every group ( $p=0.000$ ). Then it analyzed using Least Significance Different (LSD) to see the differentiation among groups which

could be seen in table 2. Based on table 2 below, there was significant differentiation for ( $p<0.005$ ) of malondialdehyde content between the negative control group and all treatment groups.

Table 2: Least Significant Difference (LSD) Result on Malondialdehyde Content

Groups	I	II	III	IV	V	VI
I	-	-	-	-	-	-
II	0,002	-	-	-	-	-
III	0,000	0,003	-	-	-	-
IV	0,000	0,000	0,000	-	-	-
V	0,000	0,000	0,000	0,000	-	-
VI	0,000	0,000	0,000	0,000	0,000	-

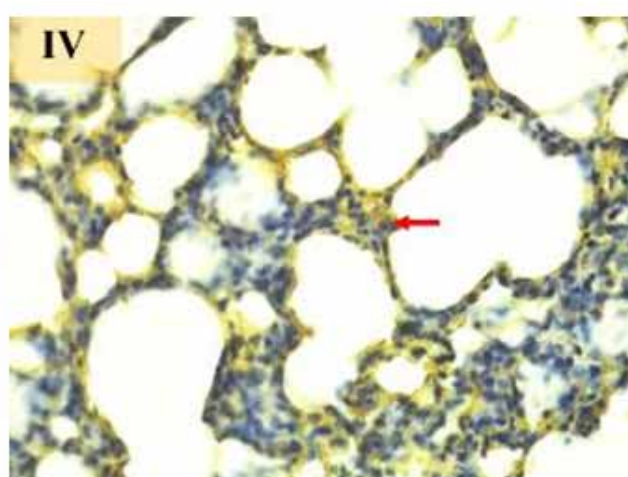
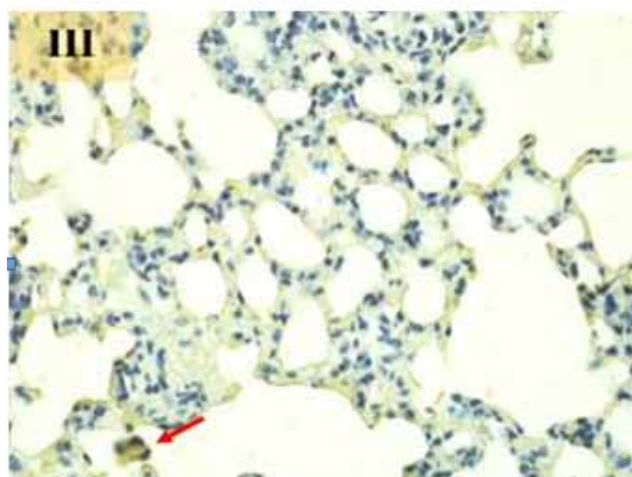
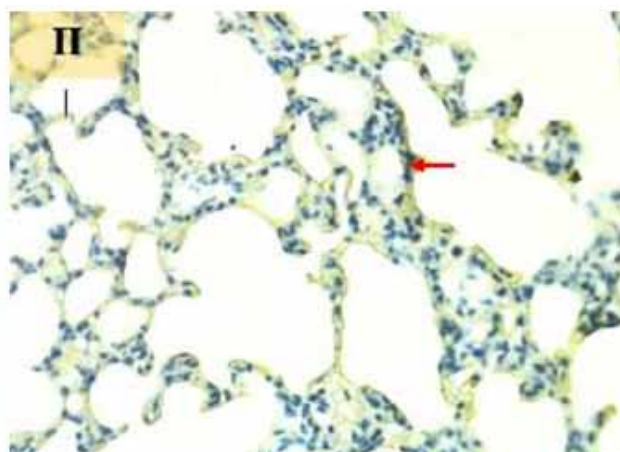
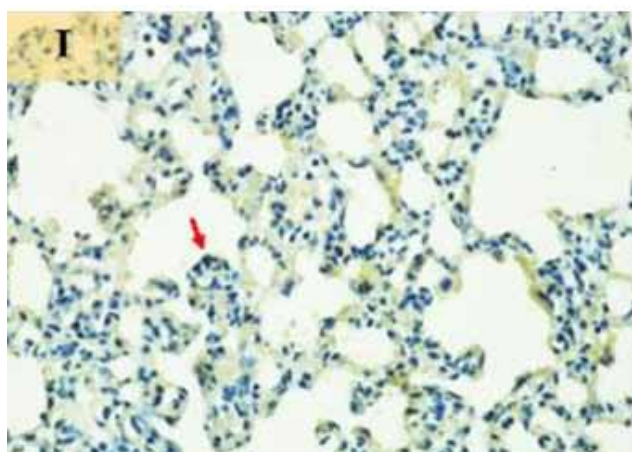
**Malondialdehyde Expression due to E-cigarette Smoke Exposure:** The result was used to compare the mean of malondialdehyde in every group for 5 high power fields. Based on figure 2 below, it could be seen that the mean value and deviation standard of malondialdehyde in every group. It showed that the enhancement of malondialdehyde was proportional to the length of time duration in e-cigarette smoke exposure. In treatment group I the mean value of malondialdehyde reached  $2.28 \pm 0.215$  which became the lowest mean value from every

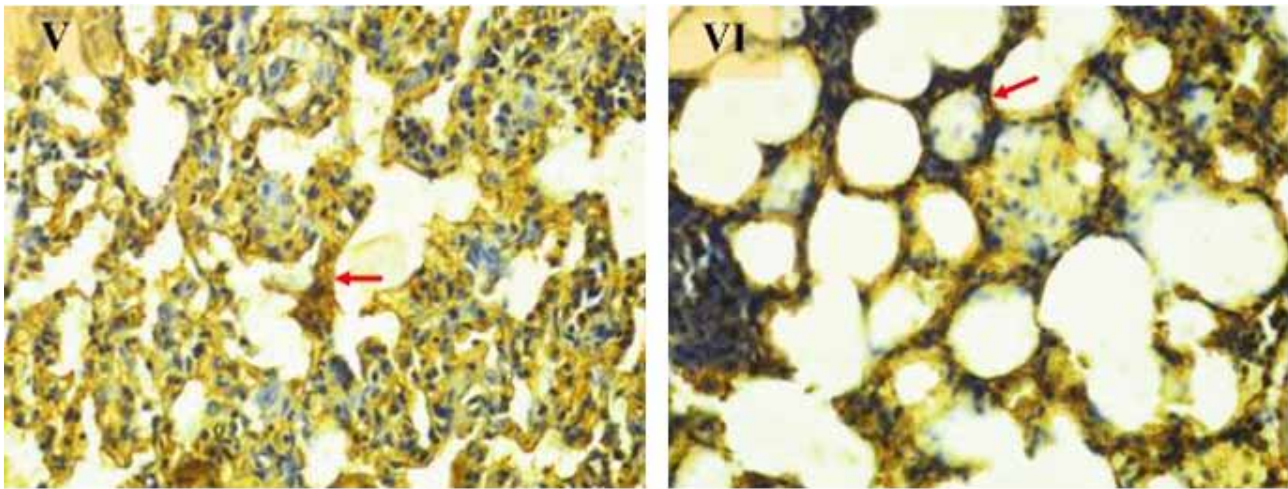
group. Meanwhile, the highest mean value was obtained in treatment group IV for  $10.08 \pm 0.196$ .

The differentiation of malondialdehyde expression in every group was done using Kruskal Wallis test since the obtained data were not fulfilled the requirement for normality and homogeneity test ( $p < 0.05$ ). The analysis result on malondialdehyde expression showed that there was differentiation on each groups ( $p = 0.000$ ) which could be seen in table 3 below;

**Table 3: The Result of Kruskal Wallis Test on Malondialdehyde**

Group	Mean ± SD	Maximum	Minimum	Kruskal Wallis Test
I	$2,28 \pm 0,215$	2,8	1,6	0,000
II	$3,2 \pm 0,063$	3,4	3,0	
III	$4,92 \pm 0,258$	5,8	4,4	
IV	$6,28 \pm 0,413$	7,0	5,0	
V	$8,96 \pm 0,117$	9,2	8,6	
VI	$10,08 \pm 0,196$	10,8	9,6	





**Figure 3: Malondialdehyde Expression on Wistar Rats due to E-Cigarette Smoke Exposure using Immunohistochemistry Technique**

Based on figure 3 above, it showed that the control group had low color intensity on lung tissue than the other groups. The correlation test also showed the strong relationship between malondialdehyde content on blood with lung tissue for ( $r=0.948$ ). Additionally, both control group and treatment groups had significant relationship ( $p<0.05$ ).

### Discussion

The sales of E-cigarette have always promoted the E-cigarette as one of the alternative ways to stop smoking. E-cigarettes also claimed as the traditional cigarette substitute which safe from hazardous substances, including tar, carbon monoxide, and other dangerous particles<sup>8</sup>. Some research showed clinical refinement on people who moved from traditional cigarettes to electric cigarettes, such as the enhancement of FEF 25% - 75% and the reduction of cough and choky symptoms<sup>17,18</sup>. However, it was too early to issue the statement on E-cigarette safety in reducing the danger of traditional cigarette and fixing the respiratory tract since the long term effect was not certainly known yet<sup>19,20</sup>. Therefore, the appraisalment on E-cigarette safety could be done by analyzing the smoke exposure which enters the human body through the respiratory tract. The huge amount of free radical resulted from E-cigarette showed negative effect on health<sup>21</sup>.

This free radical would enter the respiratory tract and caused oxidative stress and trigger the peroxide lipid process that damaged the cell<sup>22</sup>. One of the peroxide

lipid results was malondialdehyde which became the most often parameter to know the enhancement of free radical inside the body<sup>23</sup>.

This study showed that there was an enhancement on malondialdehyde content within the blood and lung tissue. Malondialdehyde within the lung tissue could be measured by immunohistochemistry coloring. The enhancement of malondialdehyde was proportional with the long time duration and the intensity in giving the smoke exposure. The longer the smoke exposure, then the malondialdehyde content will increase. The enhancement of malondialdehyde content within the blood was a sign on oxidative stress and often used for health problems, such as Chronic Obstructive Pulmonary Disease or COPD, asthma and cardiovascular disease<sup>24</sup>. While the malondialdehyde expression from immunohistochemistry coloring showed the availability of peroxide lipid within the tissue due to the increase of cellular oxidative stress.

This study showed that free radicals that came from the E-cigarette smoke exposure could enter into the blood and lung tissue. Moreover, it also increased the free radical inside the body which led to the negative effect for health.

### Conclusion

In conclusion, the long duration of E-cigarette smoke exposure could affect the enhancement of malondialdehyde content within the blood and lung tissue.

**Conflict of Interest:** The authors declare there is no conflict of interest

**Source of Funding:** No funding source

**Ethical Clearance:** Taken from the Ethics Committee of the Faculty of Public Health Airlangga University, with regards of the Human Rights and welfare in medical research.

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# Perceived Social Support Level and Related Factor among Community Dwelling Urban Elderly

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## Abstract

**Background:** The elderly have become increasingly worldwide. Due to the social gradient effect to the social support which influencing health outcomes among the elderly.

**Objectives:** To explore the level of perceived social support, personal resources and factor related to perceived social support among the elderly living in urban areas.

**Method:** A cross-sectional study was conducted among 489 elders. Questionnaires were used, comprising 3 parts: socio-demographic, health status and perceived social support. Data were collected by face to face interviews and then analyzed using frequency, percentage, mean, SD, independent sample *t*-test, ANOVA, multiple linear regression, and 95% CI.

**Results:** The response rate was 100%. Most of respondents were females, mean age was 69.48 (SD 7.55) years. The respondents had a high level of perceived social support, in which the mean score was 2.71 (SD 0.22, 95% CI: 2.69, 2.73). The most available personal resources when the elderly were in crisis or having financial problems was the family members such as child and spouse. Factor related to perceived social support among the elderly were depression, elderly club member, and activity of daily living (ADL).

**Conclusions:** To maintain the high level of social support there is a need for intervention programs that can reduce depression and maintain activities of the elderly club in community and for ADL were recommended.

**Keywords:** *Social support, elderly, Factor related*

## Introduction

The proportion of elderly people aged 65 years and above is growing faster than any other age group and projected to survive to the age of 80 years or over. The number of this age group have increased more

than threefold from 2017 to 2050 <sup>[1]</sup>. In Thailand, the proportion of the elderly was a rapid increase from 8.7% in 2000 to 30% in 2050<sup>[2]</sup>.

Due to the population aging increasing of longevity, the total dependency ratio is projected to increase gradually over the coming decades together with the growing proportion of older persons. In 2030, projections indicate that there will be 76 people in the dependent age group per 100 working-age people, and in 2050, the global total dependency ratio is projected to rise to 79 dependents per 100 working-age persons. A rising ratio indicates that there will be slightly more dependents to be supported by each person of the working ages<sup>[1]</sup>.

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As the population becomes increasingly aged, there are a fewer child who are potential source of support for this old age people. In addition, due to a social change, lack of social caregiver, decrease in the number of friends and small sizes of family members, these might affect the elderly social network and have a greater impact on the quality of life/well-being of the elderly [3].

Social support involves positive assistance from a network of friends, family, and others. High perceived social support has been linked with good health outcomes both physical and mental health[3]. The aging society causes fragility in health care problems related to this age group such as lack of caregivers and social support styles change from face to face contact to contact by using digital technology. Therefore, understanding perceived social support, personal resources and its associated factor in this era is required in order to provide appropriate social support intervention to enhancing the elderly quality of life and their social well-being.

**Objectives:** This study aimed to explore the level of perceived social support, personal resources and its associated factors among the elderly living in urban areas.

**Materials and Method**

A cross-sectional study was conducted in Ban Ped villages, Ban Ped Subdistrict, Muang District, Khon Kaen province. The inclusion criteria were the elderly aged 60 years and above, living in the primary health service areas under the Ban Ped Health Promotion Hospital. The exclusion criteria were the elderly who had severe health problems and were unable to communicate and participate. The sample size calculation was calculated based on a previous study social support mean score of 6.55 (SD 0.57)[4], The Win Pepi program was used for a sample size calculation with a confidence level of 95%, maximum acceptable difference of 0.5 % of mean. Therefore, the sample size required 489 samples.

The study tool were questionnaires, comprising 3 parts: socio-demographic characteristics, health status, and perceived social support. To assess the health status, the standard tools were used, namely: (1) Thai Geriatric Depression Scale (TGDs) [5], which consisted of 15 items. The cutoff point was 6 or more, the score of 6 and above was considered as having depression;(2) Activities of Daily Living (ADL), which was assessed by the Barthel ADL index. The cutoff point for severe disability was 12 points or below [6, 7].

For perceived social support, the Personal Resource Questionnaire (PRQ 85) was used[8], which consisted of two parts; Part 1 consisted of 10-life situations. It measured the resources of support for each of the situation (whether or not the respondents had experienced the situation in the past 6 months), Part 2 was perceived social support, consisting of 25-items. Each item response was scored on a 3-point Likert scale. The score ranged from 3-75, in which the higher scores indicated higher levels of perceived social support. The validity of the PRQ85 was tested by experts and reliability as tested by Cronbach’s alpha was 0.87[9]. The PRQ85 questionnaire had been translated and adjusted into Thai version. The Cronbach’s alpha for Thai version was 0.73.

Data were collected through the well-trained interviewers. The data was entry and transferred into the SPSS of Khon Kaen University licensed for data analysis. The data were analyzed using frequency, percentage, mean, SD and 95%CI, chi-squared, independent sample t-test, ANOVA and multiple linear regression analysis.

**Results**

The response rate was 100%. The majority of respondents were females (59.88%), in the age range of 60-69 years (58.40%), had completed primary school (91.70%), had family caregivers (94.63%), had close friends (92.41%), joined the elderly club (86.55%). In all, about half of the respondents were married (56.97%).

**Table 1: Health status**

Variables	Number (%)
<b>Chronic diseases (n=453)</b>	
No	316 (69.76)
Yes	137 (30.24)
<b>Perceived Health status (n=445)</b>	
Very good	18 (4.05)
Good	261 (58.65)
Moderate	149 (33.48)
Poor	7 (1.57)
Need care	10 (2.25)
<b>Fall (n=452)</b>	
No	411 (90.93)
Yes	41 (9.07)
<b>Depression (n=489)</b>	
No	390 (79.75)
Yes	99 (20.25)



Variables	Number (%)
<b>ADL (n=436)</b>	
Independent	422 (96.79)
Partially Dependent	9 (2.06)
Total dependent	5 (1.15)

This study found 30.2% of the participants had chronic diseases, half of them perceived good health

status, 20.2% had depression, and most of the participants were independent. (Table 1).

This study found the top three most common reported situation were having financial problems, needs someone to talk with, being unwell and not able to carry out the routine activities. The most reported available personal resource was their children.(Table 2).

**Table 2: The participants’ situation in the past 6 month and their available personal resources**

Situation	Happened	Personal resources					
		No One Care	No Need	Spouse	Children	Friends	Others*
1. The elderly experienced urgent needs (crisis)	128(27.90%)	0	0	33	133	11	2
2. If the elderly needed help for an extended period of time in caring for a family member who was ill or disabled	142(31.50%)	1	0	18	87	10	95
3. If the elderly concerned about relationship with spouse, partner or intimates	48(12.10%)	4	0	2	38	12	1
4. If the elderly needed help or advice for a problem with a family member or friend	67(15.60%)	0	3	2	25	27	20
5. If the elderly having financial problems	172(37.90%)	0	1	31	185	5	3
6. If the elderly felt lonely	81(18.70%)	1	2	12	38	42	7
7. If the elderly was ill and not able to carry out their routine activities for a week	145(32.40%)	1	0	50	113	26	14
8. If the elderly was upset and frustrated with the conditions of their life	68(15.50%)	0	3	13	24	22	20
9. If the elderly had problems with their work at home or at the work place	47(11.10%)	1	2	12	23	13	1
10. If the elderly needed someone to talk with about their day-to-day personal concerns	172(37.02%)	0	0	37	66	115	4

\*Others refers to community leader or health personnel

This study found mean score was high in all dimension as well as the total mean score in which the high mean score refers to high level of perceived social support.(Table 3)

**Table 3: The participants’ perceived social support by dimensions (n =481)**

Social support dimensions	Mean (SD)	95%CI
1. The provision for attachment/intimacy	2.91 (0.16)	2.89, 2.91
2. An indication that one is valued	2.66 (0.35)	2.63, 2.67
3. The feeling of being an integral part of group	2.66 (0.34)	2.63, 2.69
4. The opportunity for nurturing	2.58 (0.35)	2.55, 2.61
5. The availability of information, emotional and material help	2.74 (0.27)	2.71, 2.76
Total mean score	2.71 (0.22)	2.69, 2.73

From the bivariate analysis, the factors related to perceived social support were perceived health status, having no depression, being a member of the elderly club, and having higher ADL or being independent. (Table 4).

**Table 4: Factors related to social support**

Factor	Perceived social support			p-value
	N	Mean	SD	
<b>Gender (N=446)</b>				
Males	178	2.69	0.24	0.128
Females	268	2.72	0.22	
<b>Age (N=436)</b>				
60-69	252	2.72	0.21	0.261
70-79	132	2.71	0.24	
>80	52	2.66	0.24	
<b>Marital status (N=446)</b>				
Single	22	2.66	0.23	0.469
Married	258	2.72	0.22	
Widowed	161	2.70	0.23	
Separated	5	2.80	0.14	
<b>Educational level (N=428)</b>				
No schooling	3	2.70	0.32	0.598
Primary school	395	2.71	0.22	
Secondary school	17	2.68	0.26	
Bachelor degree	13	2.79	0.21	
<b>Career (n=480)</b>				
Unemployed	200	2.69	0.23	0.084
Employment	239	2.73	0.21	
<b>Family caregivers (n=442)</b>				
No	26	2.70	0.27	0.712
Yes	416	2.71	0.22	
<b>Perceived health status (n=445)</b>				
Very good	18	2.79	0.15	0.002*
Good	261	2.72	0.21	
Moderate	149	2.71	0.24	
Poor	7	2.52	0.31	
Need care	10	2.50	0.34	
<b>Fall (N=416)</b>				
No	378	2.70	0.23	0.806
Yes	38	2.71	0.20	
<b>Chronic diseases (N=415)</b>				
No	296	2.71	0.22	0.811
Yes	119	2.72	0.22	
<b>Depression (N=447)</b>				
No	359	2.75	0.19	0.001*
Yes	88	2.53	0.26	
<b>Being a member of an elderly club (N=436)</b>				
No	57	2.60	0.30	<0.001*
Yes	379	2.73	0.20	
<b>ADL (N=398)</b>				
Independent	386	2.72	0.22	0.001*
Dependent	12	2.39	0.35	

\*statistically significant at 0.05

The results from multivariate linear regression analysis found that factors significantly related to perceived social support were having no depression, being a member of an elderly club, and having higher ADL. (Table 5)

**Table 5: Multivariate analysis of factors associated with perceived social support**

Factors	Standardized coefficients (B)	95% confidence interval for $\beta$		p-value
		Lower bound	Upper bound	
Perceived health status	-0.02	-0.50	0.03	0.065
Depression	-0.33	-0.24	-0.14	<0.001*
Elderly club member	0.14	0.02	0.15	0.004*
ADL	0.17	0.10	0.36	0.001*
Constant	2.471			
R square	0.24			
F	19.10			
p-value	<0.001b			
N	379			

\*statistically significant at 0.05

## Discussion

This study found the elderly perceived a high level of social support. This is similar to the study among Taiwanese elderly<sup>[10]</sup>. This may due to the study area of an urban community where the living environment and demographic variables affect the perception of social support among elderly people<sup>[11]</sup>.

This study revealed personal resources when the elderly had the crisis such as financial problems or being ill and then not able to carry out the usual activities. Family was found to be the major source of support as this was also shown in a previous study<sup>[12]</sup> and the support was made available by their family members as the first carers<sup>[13]</sup>. In case of having the financial problems, it was confidential needs, thus, only from family members that the elderly might accept the support. In terms of being ill and not able to carry out the usual activities, in Thai culture, it was a duty of family caregivers, this was perceived as the family caregivers' activities and tasks<sup>[14]</sup>. In addition, the elderly required friends when they needed someone to talk with. Due to the support from friends, this makes the elderly have life satisfaction, happiness, and self-esteem more than children and family support<sup>[15]</sup>.

In part of factor related to perceived social support, these results were confirmed by Patil et al<sup>[16]</sup> which revealed a significant negative correlation between perceived social support and depression. For elderly club in a community, this is a place that gives their

elderly members an opportunity for social interaction which consequently affects their social relationships and ultimately influences the flow of resources to each member. In addition, similarly to the elderly in Turkish society who have a higher quality of life, they were also found having a higher level of social support, higher ADL and lower depression levels<sup>[17]</sup>. According to Bozo et al<sup>[18]</sup>, this study found that higher ADL and higher perceived social support predicted lower depression, and the elderly who have a lower level of perceived social support and lower level of ADL was associated with depressive symptoms<sup>[19]</sup>.

## Conclusions

The elderly people have good perception towards their social support. The significant associated factors with the perceived social support are having no depression, being a member of the elderly club and having higher ADL.

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# Effectiveness of Health Education in Reducing *Plasmodium Vivax* Malaria Recurrence in Sentani Papua

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## Abstract

**Objectives:** *Plasmodium vivax* is a type of Plasmodium that is difficult to eliminate because it has a hypnozoite phase in the human liver and responsible for malaria recurrence<sup>[1]</sup>. Health education is one of method that can be used to improve adherence to primaquine treatment. In doing so, the *vivax* malaria recurrence rate can be decreased significantly. The aim of this study was to examine the effectiveness of health education in reducing *Plasmodium vivax* malaria recurrence.

**Method:** A quasi-experimental method was conducted in January-August 2019 at Sentani Papua. Patients from community health care had been diagnosed with *P.vivax* malaria by microscopy, age  $\geq 1$  year, treated according to national standards with DHP for 3 days and primaquine 14 days, were recruited. Patients were divided into 2 groups, namely, the standard therapy group (ST) and the standard therapy group with health education (HE) group. Then patients were followed-up for 90 days.

**Results:** Among 105 patients, 50 were in the ST group and 55 were in the HE group. Patients recovered without serious adverse effects. The incidence rate of recurrence in the HE group was much lower compared to the ST group (2.04/10,000 person-days vs 21.51/10,000 person-days,  $p < 0.05$ ). The risk of recurrence was 9 times higher among patients from ST group compare to HE group (AHR =9.44, 95% CI: 1.2-78.0).

**Conclusion:** The existence of health education by health workers after the administration of standard drugs is effective in increasing adherence to 14 days of primaquine treatment to prevent the recurrence of *P. vivax* malaria. The reduction in *P. vivax* malaria recurrence is in line with the reduced malaria transmission and morbidity in endemic areas.

**Keywords:** Health Education, Recurrence of malaria, Papua.

## Introduction

*Plasmodium vivax* is a type of plasmodium that is difficult to be eliminated because it has a hypnozoit phase in the human liver. This parasite is responsible for malaria recurrence in both the short and long term. The cases of *Plasmodium vivax* in tropical regions generally occur in about 3-6 weeks. The time interval of malaria is calculated from infection until the first relapse <sup>[2]</sup>. The nature of *vivax* malaria recurrence in Indonesia is also classified as frequent and fast which most of cases

occur on day 21<sup>th</sup> after diagnosis and 75% or more occur before on day 28<sup>th</sup><sup>[3]</sup>. The recurrence is greatly influenced by ineffective and incomplete treatments.

Since 2004 until now, the treatment used to prevent recurrence of *plasmodium vivax* in Indonesia, especially in Papua province is by administering DHP (*dihydroartemisinin-piperaquin*) for 3 days and primaquine for 14 days<sup>[4]</sup>. The duration of primaquine treatment is believed to cause low level of medication adherence. In a previous study conducted in the Peruvian

Amazon, it was found that the proportion of adherence to *primaquine* drug was only 62.2%. One reason is because after the first 3 days of treatment, the symptoms of malaria disappear and the patient feels healthy [5]. Health education/counseling is one of method that can be used to improve adherence to 14 days *primaquine* treatment. By doing so, the *vivax* malaria recurrence rate can be decreased significantly.

## Method

**Study Site:** This study was conducted in December 2018 to August 2019 in the Sentani Health Center, of West and East Sentani areas of Jayapura Regency, Papua Province.

**Randomization and Treatment:** Quasi-experimental design was used as the design of this study which this study is an experimental study without performing a random allocation of control groups and intervention groups. Both groups were determined based on the similarity of service characteristics and coverage areas. The intervention group was a group consisting *vivax* malaria patients who examined themselves at the Sentani Public Health Center where after the diagnosis they received treatment instructions and health education. The control group was a group consisting *vivax* malaria patients who examined themselves at the Sentani Barat Health Center where after being diagnosed they received standard treatment instructions. The subjects of the study were selected by consecutive sampling by making all *vivax* malaria patients diagnosed at the local health center and met the inclusion criteria as samples until the number of samples was met. All patients received national standard *vivax* malaria treatment, as recommended by the Ministry of Health, namely 1 tablet of DHP per day for 3 days and *primaquine* 0.25 mg/kg/day for 14 days.

**Data Collection:** HE group was a group intervened by providing a health education shortly after being given a standard treatment. The study was done 3 times for each patient, namely on days 0, 3, and 7. Meanwhile, the ST group became the group that was given a standard treatment only by health workers. Demographic data and clinical data of patients were obtained through interviews. All patients who met the inclusion criteria would be followed-up for 90 days where day 0 is the first day to go to the health center. During the follow-up period, patients from the two groups would be visited or asked to return to the local health center by

the staffs. Then, the blood from finger would be taken on day 3, 7, 14, 28, 60, and 90 for examination of the presence or absence of malaria parasites. If during the follow-up period the patient experienced symptoms of malaria, the patient would be instructed to go to the local health center. All examination regarding the presence or absence of malaria parasites in the blood were done using a gold standard which is microscopic examinations.

**Statistical Analysis:** The analysis was performed using SPSS 16 of Univariate analysis that displays the distribution of patient frequencies based on the variables studied. Meanwhile, bivariate analysis shows the Kaplan Meier curve or cox regression to see the risk of recurrence according to the variables studied. The difference between the two groups can also be seen by performing chi-square test, T-test and Mann-Whitney test, depending on the distribution and type of data. This study aims to look at recurrence risk which is affected by time, so multivariate analysis was performed using Cox Proportional Hazard Regression.

## Results

There were 105 patients registered as *P.vivax* malaria patients at the local health center from January-July 2019 which were then divided into 2 groups: the HE group (55 patients) and the ST group (50 patients). Although the random allocation was not performed, there were no differences in the proportion of age, sex, number of parasites and duration of symptoms between the HE group and the ST group (chi-square:  $p > 0.05$ ), except for ethnicity variable [Table 1].

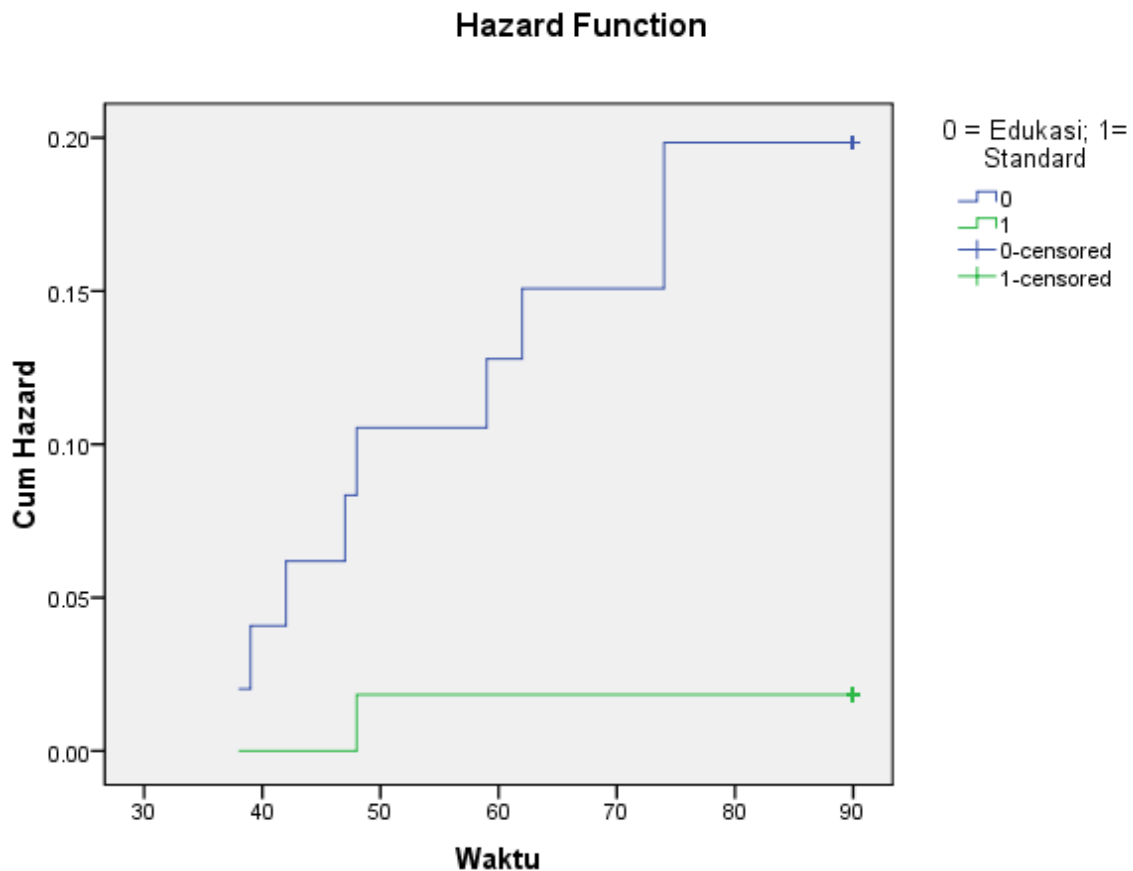
The risk of recurrence was significantly higher in the group of patients who received standard treatment without health education (ST group) compared to patients who were given health education (HE group). With the value of Adjusted Hazard Ratio/AHR 9.44, 95% and CI 1.2-78.0 [table 2]. Meanwhile, the incident rate on days 28, 60.90 in the HE group at 0, 2.24, 2.24, compared to the ST group at 0, 14.12, 21.51, per 10,000 person-days [Figure 1].

In bivariate analysis, the variables of ethnicity, sex, age, number of parasites, and duration of symptoms did not have a significant relationship with *P. vivax* recurrence (Table 2). However, the rate variable is still included in the multivariate analysis because the value of  $p < 0.25$ . From the result of multivariate analysis, there is a significant relationship between therapeutic intervention method and the recurrence of *vivax* malaria.

The risk of *P.vivax* malaria recurrence was significantly 9 times higher in the ST group compared with the HE group (adjusted HR 9.44, 95% CI 1.2-78.0).

**Table 1: Baseline characteristics, by treatment group (N=105)**

Variables	Health Education (He)	Standard Therapy (St)	P Value
<b>Number of Patients</b>	<b>n = 55</b>	<b>n = 50</b>	
<b>Sex</b>			
Female	21 (42)	21 (38,2)	0.842
Male	29 (58)	34 (61,8)	
<b>Age group</b>			
1 to <5 years	15 (30)	14 (25,5)	0.132
5 to <15 years	24 (48)	19 (34,5)	
≥15 years	11 (22)	22 (40)	
<b>Ethnicity</b>			
Papuan	43 (86)	54 (98,2)	0.048
Non-Papuan	7 (14)	1 (1,8)	
<b>Parasite count at day 0</b>			
<10000/ul	38 (76)	41 (74,5)	1.000
≥10000/ul	12 (24)	14 (25,5)	
<b>Duration of symptoms before treatment</b>			
<3 days	29 (58)	32 (58,2)	1.000
≥3 days	21 (42)	23 (41,8)	



**Figure 1: Cumulative hazard curve, by treatment group**

**Table 2: Crude and adjusted hazard ratio (HR) and 95% confidence interval (CI) for factors related to *P. vivax* reappearance**

Variables	Reappearance	Crude HR	Adjusted HR
	N (%)	(95% CI)	(95% CI)
<b>Treatment Group</b>			
HE (Therapy with health education)	1 (1.8)	1	1
ST (Standard therapy)	9 (18)	10 (1.3-84.3)	9.44 (1.2-78.0)
<b>Ethnicity</b>			
Non-Papuan	2 (25)	1	1
Papuan	8 (8.2)	0.28 (0.60-1.33)	0.70 (0.32-1.55)
<b>Sex</b>			
Female	7 (11.1)	1	
Male	3 (7.1)	0.624 (0.16-2.41)	-
<b>Age Group</b>			
1 to <5 years	3 (10.3)	1	
5 to <15 years	5 (11.6)	0.56 (0.09-3.35)	-
≥15 years	2 (6.1)	1.07 (0.25-4.48)	
<b>Parasite count at day 0</b>			
<10000/ul	8 (10.1)	1	
≥10000/ul	2 (7.7)	1.33 (0.28-6.28)	-
<b>Duration of symptoms before treatment</b>			
<3 days	6 (9.8)	1	
≥3 days	4 (9.1)	1.12 (0.31-3.97)	-

## Discussion

This study found a cumulative incidence of *P. vivax* malaria recurrence by 18% in the ST group (standard therapy) and 1.8% in the HE group (standard therapy with health education) with 90 days of follow-up [Table 2]. All patients received national standard treatment of 1 DHP tablet for 3 days and 14 days of *primaquine* 0.25 mg/kgBB/day. These results are not much different from previous study that used DOTS intervention which the cumulative of recurrence incidence in the standard therapy group was 11.2% and 2% in the standard therapy with DOTS group<sup>[6]</sup>. Studies in the endemic area of Columbia had found a cumulative incidence of recurrence in 16.2% of patients whose treatments were supervised but with *chloroquine* and *primaquine* regimens<sup>[7]</sup>. The results of another study showed a higher incidence rate of recurrence at 33.8% in the group whose treatment was unsupervised. The high incidence rate from this study might because of some patients were given treatments without *primaquine*<sup>[15]</sup>.

The adherence on medication was measured on day 7 and 14 by interviewing patients. In the ST group

(Standard Therapy) medication non-compliance was 12%. This result is likely has been underestimated because the method used was interviewing patients. The patients might lie or forget. While in the HE group (standard therapy with health education) treatment non-compliance was 2%. The proportion of non-adherence in the HE group is much smaller than in the ST group because the HE group is the group that was given a health education intervention by a doctor, nurse, or analyst for three times. At the first time *P. vivax* was diagnosed, the patients were given education about the importance of treating of *P. vivax* malaria thoroughly. Education was carried out again at the day 3<sup>th</sup> and day 7<sup>th</sup> of follow-up by health workers with an emphasis on medication adherence. Each patient was given a leaflet to read and take home. By educating patients, the patients' knowledge and adherence to treatment will improve [8]. If proper and complete medication adherence increases, recurrence of *P. vivax* malaria can be prevented. In this study, it was found that educational method was effective in reducing the recurrence of *P. vivax* malaria. The group that was given counseling had a risk of recurrence 9 times lower than the group that received standard therapy



alone in 90 days of follow-up. Previous study had found that a health education intervention using posters and videos can improve treatment adherence<sup>[9,14]</sup>. Likewise, the DOT (Directly Observed Therapy) strategy has also been shown to be effective in increasing adherence to 14 days of *P.vivax* malaria *primaquine* treatment, thus reducing the number of recurrence cases<sup>[6]</sup>. Another study in Ethiopia showed that recurrence in the group whose treatment was not supervised (standard therapy) was lower than in the group whose treatment was directly supervised<sup>[10]</sup>. Health education can be an effective and efficient choice for increasing adherence to *P.vivax* malaria treatment for 14 days. It is because this method is relatively easier and cheaper than daily supervision method or DOT (Directly Observed Therapy) strategy. This study also explores several potential risk factors for the recurrence of *P.vivax* malaria. Among them are sex, age, ethnicity, parasites counts at day 0, and duration of symptoms before treatment. The duration of symptoms before treatment were not significantly related to recurrence of *P.vivax*, in contrast to previous study which stated that there was a significant relationship between the duration of symptoms and the recurrence of *P. vivax*<sup>[6]</sup>. The number of parasites on day 0 in this study was not significantly related to recurrence of *P.vivax* malaria. However, Idarraga's research was different from Simoes's findings which states that the higher number of parasites (*hyperparasitemia*), the higher risk of recurrence<sup>[11,12]</sup>. While other demographic factors such as gender, age, ethnicity also did not significantly increase the risk of recurrence. These results are in line with the study of Idarraga et al<sup>[11]</sup>. Other factors such as parasitic resistance to *primaquine* were not assessed in this study. Because in a recent study conducted in Papua, the efficacy of malaria drugs namely DHP and *primaquine* was very good<sup>[13]</sup>.

However, *primaquine* is still the main drug in killing *plasmodiumvivax* up to the *hypnozoite* phase. Therefore, adherence to *primaquine* treatment for 14 days is very important in maximizing the cure from *P. vivax* malaria. Patient education is an option that can be considered by policy makers to prevent recurrence so that malaria morbidity and transmission is significantly reduced to a malaria-free Indonesia.

### Conclusion

This study proves that health education is effective in increasing patient adherence to treatment so that it can reduce the recurrence of *P.vivax* malaria. If recurrence

is reduced, malaria transmission is also significantly reduced. There is a striking difference in the recurrence of *P.vivax* malaria in patients who received standard treatments (self-administrated treatments) compared with patients who received standard treatments with health education about the importance of a complete treatment.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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**Ethical Clearance:** The ethical committee of Public Health University of Indonesia reviewed and approved this study(Ref: 680/UN2.F10/PPM.00.02/2018). Patients were informed of the study purpose and provided written consent before participating.

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# Effects of Topical No Toner and Essence on Skin Changes in the Subjects with Acne Vulgaris

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## Abstract

**Background:** Acne vulgaris (AV) is a very common condition with an estimated lifetime prevalence of 85% and occurs predominantly during adolescence. The aim of current study was to investigate how the NO-containing essences and toners change the skin condition of AV patients using nitric oxide (NO) with these various positive effects.

**Method:** The experiment proceeded with 25 subjects in the acne skin experimental group with NO essence and toner (AE), 25 subjects in the normal skin experimental group with NO essence and toner (NE), and 20 subjects in the normal skin control group without any application of the products (NC). Skin analyzer (Mark-Vu, Korea) was used to examine the skin changes.

**Results:** The changes in pores, sebum, inflammation, wrinkles, flush, skin tone, radiance brightness, and radiance area before and after the experiment between three groups were statistically significant decreased and melanin increased in both AE and NE. A statistically significant change was only seen in AE ( $p < 0.05$ ). There was a statistically significant decrease in NE and a statistically significant decrease in brown was only seen in NE ( $p < 0.05$ ). After 8 weeks, Pore size and future wrinkles were significantly reduced in AE compared to the other groups ( $p < 0.05$ ). There was a statistically significant difference in pore sizes, future wrinkles in AE and NC in the post-test using the Sheffé test ( $p < 0.05$ ). After the experiment, sebum, inflammation, wrinkle decreased in AE and NE, but there was no statistically significant decrease between the three groups.

**Conclusion:** Essences and toners containing NO were found to be effective in improving AV and normal skin.

**Keywords:** *Acne vulgaris, Skin, Nitric oxide, Essences, Toner*

## Introduction

Acne vulgaris (AV) is a disease affecting the pilosebaceous unit and forms a variety of scar tissues, including noninflammatory lesions such as open and closed comedones and inflammatory lesions such as papules, pustules, and nodules<sup>1</sup>. Acne causes residual scarring, which can lead to having a poor self-image, depression, and anxiety and can affect the quality of life and severe morbidity associated with psychological disturbances<sup>2-4</sup>.

For the treatment of mild cases of AV, benzoyl peroxide (BP) or topical retinoids are used. More aggressive treatments, such as topical or oral combination therapy for BP, antibiotics and retinoids are used in moderate or more severe cases<sup>5</sup>. Since medical treatments with antibiotics have problems with developing resistance and there are different causes of acne, it is recommended that various method such as change of habits that worsen acne, proper guidance on the use of products such as cosmetics, education of

dietary habits, and stress management are carried out in combination with the treatment<sup>5-7</sup>

New therapies for treating AV patients are being continuously developed, and among them, products containing effective ingredients for acne in the form of ointments and creams have been actively tried<sup>8</sup>. The newest agents of this type include minocycline foam, topical nitric oxide (NO)-releasing agents, and cortexolone 17 $\alpha$ -propionate. These latest method are undergoing various clinical stages of testing and there is a need for further studies<sup>1</sup>. Currently, there is a growing interest in products containing NO, including new patents on the development and delivery method of NO-containing substances for acne treatment<sup>9</sup>. However, few clinical studies have been conducted on topical NO-releasing agents.

NO can pass through the epidermal layers. Due to these properties, products containing NO have been studied to determine whether they improve dermatitis or acne with their antibacterial effects<sup>8,10</sup>; NO also has vasodilatory, melanogenesis, wound healing promotion and anti-inflammatory effects<sup>11</sup>, and it has been used for aesthetic purposes and treatment of medical conditions. However, no research has been conducted on the development of a multi-purpose essence product containing NO, which is readily available for the general population without the need of prescription. Therefore, we tried to investigate how the NO-containing essences and toners change the skin condition of AV patients using NO with these various positive effects.

## Method

**Subjects:** This study was conducted on adult females who volunteered to participate in the study through recruitment of women in their 20s to 60s.

Subjects were recruited by posting a recruitment notice for people with acne and healthy skin. Interviews were conducted to explain the detailed research plan, time required, and progress of the experiment. Informed written consent was received from all study participants. From the procedure, subjects with acne were graded from 1 to 3 on the Comprehensive Acne Severity Scale<sup>12</sup>. Subjects were selected with an inter-rater reliability of 0.75 or higher. Patients with cardiovascular diseases, immediately after surgery (6 months of a surgery), skin diseases, infectious diseases, cerebral infarction, severe depression, mental disorder, and pregnant women were excluded from the study for safety reasons.

Homogeneity was tested between the groups on the general age, body weight, and height. The general characteristics did not differ statistically between the two groups at baseline ( $p > 0.05$ ).

**Experimental Procedure:** The experiment proceeded with 25 subjects in the acne skin experimental group with NO essence and toner (AE), 25 subjects in the normal skin experimental group with NO essence and toner (NE), and 20 subjects in the normal skin control group without any application of the products (NC). In both AE and NE, 2 ml of natural NO toner was sprayed at least 3 times a day with a nebulizer across the face, and 2 ml of essence was applied 3 times per day (or 3 times or more) to the entire face and left for absorption. The NC received no treatment and all 3 groups continued with their daily lives.

**Tool:** Skin analyzer (Mark-Vu, Korea) was used to examine the skin changes. Four different measurement positions were used: the center of the lower third of the forehead, the nose wing, nose bridge, and the middle of both cheeks. These permits analysis of the whole face, and quantitative comparative analysis was performed by presenting numerical data. For the measurement method, the total mean value from three measurements was used.

**Statistical:** Data are expressed as mean  $\pm$  SD values. All variables were tested for normality using the one-sample Kolmogorov-Smirnov test. The paired t-test was performed to compare differences within groups before and after interventions. One-way ANOVA was used to compare the differences in the changes after intervention in each group, and Sheffé was used for the post-hoc test. The collected data were analyzed using a statistical package program (SPSS ver. 21.0). A two-tailed probability of  $p < .05$  was considered statistically significant.

## Results

The changes in pores, sebum, and inflammation before and after the experiment between three groups were statistically significant decreased, in both AE and NE. After 8 weeks, pores, sebum volume, and inflammation were compared (Table 1). Pore size was significantly reduced in AE compared to the other groups ( $p < 0.05$ ). There was a statistically significant difference in pore sizes in AE and NC in the pos t-test using the Sheffe test ( $p < 0.05$ ). The changes in wrinkles and future wrinkles before and after the experiment between three groups showed statistically significant decreases in both

AE and NE. After 8 weeks, when wrinkles and future wrinkles were compared (Table 2), future wrinkles were significantly reduced in AE compared to the other groups (p <0.05). There was a statistically significant difference in future wrinkles in AE and NC in the post-test using the Sheffe test (p <0.05). The changes in melanin before and after the experiment between three groups showed an increase in melanin in AE and NE but a statistically significant change was only seen in AE (p < 0.05) and for pigmentation (Table 3). There was a statistically

significant decrease in NE before and after the experiment (p < 0.05). Flush was statistically significantly decreased in AE and NE (p < 0.05) and a statistically significant decrease in brown was only seen in NE (p < 0.05). The changes in skin tone, radiance brightness, and radiance area before and after the experiment between three groups showed statistically significant decrease of all of them in AE and NE (p < 0.05)., however, after 8 weeks there was no significant difference between the 3 groups (Table 4).

**Table 1: Changes of pore size, sebum and porphyrin after application of essence with nitrogen oxide (unit: %).**

	AE (n=25)		NE (n=25)		NC (n=20)		F	p
	Pre	Post	Pre	Post	Pre	Post		
Pore size (%)	53.80±5.01	47.08±5.72	52.88±4.57	48.84±4.27	52.80±5.55	52.05±5.55	5.14	0.00†
t	8.19		7.01		1.22			
p	0.00*		0.00		0.24			
Sebum (%)	20.99± 9.82	16.75±7 .77	19.46± 6.00	17.40±5 .61	19.78± 9.68	20.51± 10.34	1.38	0.25
t	4.84		3.72		-0.91			
p	0.00*		0.00*		0.38			
Porphyrin (%)	14.02±9.11	8.51±5.86	6.86±2.86	6.16±2.61	6.37±3.42	6.05±2.60	1.67	0.19
t	5.24		2.80		1.19			
p	0.00*		0.01*		0.24			

Value are mean±SD. \*p<0.05 †Significantly different for post-intervention compared 3 groups (p<0.05) AE: Acne experimental group with NO essence and spray, NE: normal skin experimental group with NO essence and spray, NC: normal skin control group

**Table 2. Changes of wrinkle and future wrinkles after application of essence with nitrogen oxides (unit: %)**

	AE (n=25)		NE (n=25)		NC (n=20)		F	p
	Pre	Post	Pre	Post	Pre	Post		
Winkle	27.08±2.81	23.76±2.22	26.08±2.46	23.92±2.44	26.20±2.56	25.05±2.39	1.91	0.15
t	10.21		6.35		1.92			
p	0.00*		0.00*		0.69			
Future wrinkle	12.41±4.34	9.77±3.42	12.92±3.21	10.48±2.83	13.22±3.13	12.09±3.12	3.12	0.05†
t	7.78		7.73		1.83			
p	0.00*		0.00*		0.08			

Value are mean±SD. \*p<0.05 †Significantly different for post-intervention compared 3 groups (p<0.05) AE: Acne experimental group with NO essence and spray, NE: normal skin experimental group with NO essence and spray, NC: normal skin control group

**Table 3. Changes of skin color after application of essence with nitrogen oxides (unit:%).**

	AE (n=25)		NE (n=25)		NC (n=20)		F	p
	Pre	Post	Pre	Post	Pre	Post		
Melanin	34.87±7.74	37.98±6.74	34.14±35.42	35.42±6.05	34.47±6.82	34.44±6.85	1.81	0.17
t	-4.82		-1.75		0.08			
p	0.00*		0.09		0.93			
Pigmentation	31.31±32.45	32.45±10.37	32.66±6.93	29.96±7.25	30.12±30	30.09±6.49	0.68	0.50

	AE (n=25)		NE (n=25)		NC (n=20)		F	p
	Pre	Post	Pre	Post	Pre	Post		
t	-0.93		4.20		0.08			
p	0.36		0.00*		0.93			
Redness	16.956± 14.70	14.70±5.47	15.11±5.13	14.02±3.66	13.89±5.37	13.80±4.68	0.23	0.79
t	4.26		2.37		0.33			
p	0.00*		0.03*		0.74			
Brown spot	19.23± 18.83	18.83±4.10	19.58±4.72	17.45±4.35	18.08±4.21	18.58±4.22	0.73	0.48
t	0.97		3.82		-1.86			
p	0.34		0.00*		0.07			

Value are mean±SD. \*p<0.05, AE: Acne experimental group with NO essence and spray, NE: normal skin experimental group with NO essence and spray, NC: normal skin control group

**Table 4.:Changes of skin brightness and tone after application of essence with nitrogen oxides (unit:%).**

	AE (n=25)		NE (n=25)		NC (n=20)		F	p
	Pre	Post	Pre	Post	Pre	Post		
Tone	52.72±53.80	53.80±3.74	53.56±3.58	55.40±2.94	53.40±3.50	54.10±3.33	1.57	0.21
t	-2.61		-4.47		-0.95			
p	0.01*		0.00*		0.35			
Brightness	59.74± 61.73	61.73±3.35	60.46± 3.89	62.82±3.26	61.16±3.88	61.77±10.65	0.79	0.45
t	-4.10		-3.89		-0.73			
p	0.00*		0.00*		0.47			

Value are mean±SD.\*p<0.05, AE: Acne experimental group with NO essence and spray, NE: normal skin experimental group with NO essence and spray, NC: normal skin control group

### Discussion

This experiment was conducted to investigate how the essence and toner containing a small amount of NO changed the AV condition and affected normal skin.

When NO essence and toner were applied for 8 weeks, the pore size, sebum and inflammation in the AE and NE groups were significantly reduced before and after the experiment, indicating that NO essence and toner were effective for both acne and normal skin. In particular, the pore size showed a statistically significant decrease in the AE group compared to the NC group when compared between the three groups, demonstrating a positive effect in reducing the pore size of acne patients. Previous studies have shown that NO-containing products have potent antibacterial effects that not only eliminate bacteria of atopic dermatitis but also modulate inflammatory components<sup>10</sup>. In this study, the reduction of sebum and porphyrin in AE with NO-containing essence and toner is thought to be due

to the NO component inhibiting NLRP3 inflammasome assembly and downstream production of cytokines, suggesting that these main cytokines in AV development were inhibited from acting as a driving force blocking the acne pores<sup>8</sup>.

In AE, the AV group with NO-containing essence and toner, the pore size was reduced statistically significantly before and after the application. When acne develops, the pore size increases due to inflammation, and it is thought that due to the use of the NO essence and toner, the inflammation reduced and the continuous use of the toner induced astringent effect, reducing the pore size in AE. NO upregulates collagen synthesis of dermal fibroblasts without affecting collagen breakdown activity. These results indicate that NO is metabolized in wounds and synthesized by wound-derived fibroblasts<sup>13</sup>, and such action of NO is thought to have led to the decrease in pore sizes.

Wrinkles and future wrinkles showed statistically

significant decrease before and after the experiment in the AE and NE groups, indicating that the products were effective in improving wrinkles. This action is known to play an important role in reducing the adverse effects of skin aging and carcinogenesis<sup>14,15</sup>. In addition, it is thought to reduce the formation of wrinkles by causing the increase of type I collagen synthesis in fibroblasts<sup>16</sup>. The continuous use of toners and essences leads to increased moisturization and enhancement of skin tone, which in turn reduces wrinkles.<sup>17,18</sup>

The results of this study showed an increase in melanin in AE and NE with NO essence and toner, and especially AE showed statistically significant increase. This is because NO-releasing materials act as non-UV-based tanning agents to stimulate melanogenesis, which leads to an increase in endogenous pigmentation, thereby reducing the UV-induced photo damage and skin cancer risk at the same time, and this results in attaining the positive effect of melanin increase<sup>19,20</sup>. Flush also showed significant decrease in AE and NE. Inflammation is characterized by vasodilation, swelling, redness and fever, and AV is accompanied by inflammation and this in turn in most times causes the redness, a representative symptom of inflammation<sup>21</sup>. These symptoms disappear naturally as inflammation improves or heals. In this study, flushing was reduced when NO essence and spray were applied in AE and NE, suggesting an anti-inflammatory effect on AV.

This study had several limitations. First, no pre-clinical experiments were conducted on essences and toners containing NO. If pre clinical experiments were conducted to investigate the extent of skin penetration according to various NO concentrations and the resulting skin changes, more clinical effects could be obtained based on more effective concentrations and skin penetration method in this study on acne patients. Second, there was a limit in the reliability and validity of the measurement method for skin changes. The reliability of the measuring equipment was very high, but there was a lack of practical research on its validity.

### Conclusion

Essences and toners containing NO were found to be effective in improving AV and normal skin. Further studies are required to study the optimum amount of NO and the effects of the penetration method.

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**Conflict of Interest:** Nil

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# Is There Any Correlation between Stress Levels and Sleep Pattern?

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## Abstract

**Background:** Stress is a condition when someone try to adapt and give reaction to stressors that they receive in their life. There are life event and stressful life event. This research aimed to analyze whether stressors in student's life can or cannot make stress condition that affect their sleep patterns.

**Method:** This research was using Analytic-Observational design. The samples were junior high school students and senior high school students in Surabaya which conducted by total sampling. Observation of stress scale and sleep duration among students were done to contain the data before analyzing that using Statistical Package for the Social Science (SPSS) software version 16.0.

**Results:** There were 320 subjects those have means of stress level by 105,37 which categorized as low stress rate. They had sleep duration means during work day by 6,53, during weekend by 8,14 and both day means by 14,65. The result with spearmen correlation analysis was  $p > 0,05$  which means there is no significant correlation between stress scale and sleep pattern.

**Conclusion:** There is no significant correlation between stress level and sleep pattern among junior high students and senior high school students Surabaya in 2017

**Keywords:** *Stress, Sleep pattern, Stress level, sleep duration, Stress of junior high school student, stress of senior high school student.*

## Introduction

Sleep is one of the basic human needs and means to recover the body from all activities. Sleep deprivation can have a negative impact on his life.<sup>1</sup>The most common sleep disorder is insomnia which cause by biological factors and psychological factors<sup>2, 3</sup>A survey conducted

by the National Institute of Health in America in 1970 showed that the total population experiencing insomnia was 17% of the population, the percentage of people with insomnia was higher in older people, of which 1 in 4 at the age of 60 experienced serious sleeplessness.<sup>4</sup><sup>5</sup>Epidemiological surveys showed that 35% of the population is indicated to experience insomnia in the past year, and 10% experience insomnia in the past 6 months.<sup>6</sup>

Sleep disorders most often occur among adolescents (73.4%), namely those who are in the junior high school to high school level and experience an increase.<sup>7</sup>Based on a study using Sleep Disturbances Scale for Children (SDSC), the prevalence of sleep disturbances experienced by junior high school students (aged 12-15 years) was 73.4% which was associated with pressure or

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burden obtained during school.<sup>7</sup>

**Method**

This study aims to prove the relationship between stress levels and sleep pattern among secondary school students. A quantitative method with observation analytical approach was used. Period of research was September 2017 in Public Middle School 1 Surabaya (SMPN 1), Public Middle School 19 Surabaya (SMPN 19), Public Senior High School 5 Surabaya (SMAN 5) and Senior High School of Trimurti Surabaya (SMA Trimurti). This study received a certificate of ethical clearance from ethical commission No: 032/EC/KEPK/FKUA/2017, on 20<sup>th</sup> January 2018.

**Participant:** Research samples were students of Public Middle School and Senior high school in Surabaya taken using a cross-sectional formula regarding unknown detail proportion of population. The size of participant were 320 students. The inclusion criteria was students of secondary school who have agreed to join this research and was giving sign on inform consent. While the exclusion criteria include students who had high levels of stress.

**Instrument and Analysis:** The instruments used were the Holmes and Rahe questionnaire Stress Scale for non-Adult (Youth) and the long sleep questionnaire by interview method. The normality test was carried out by the Kolmogorov-Smirnov non-parametric one-sample statistical method. Distribution was to be normal if the value of Z (K-S) is in  $p > 0.05$ .<sup>8</sup> Others test which used in this study, were Healy Pearson test for determining homogeneity of sample, F and T statistics test for gaining signification of variables. All statistical tests used Statistical Package for the Social Science (SPSS) version 16.0 (SPSS.Inc., Chicago, IL)

**Results**

Total of participant in this research was 320 students which spreads into four schools. Characteristics of respondents according to sexuality were 55.6% (178 students) of boys and 44.4% (142 students) of girls.

(Table 1) This study involved two variables, namely, Stress and Sleep Pattern. Stress here is measured using Holmes and Rahe Non Adult Stress Scale. Sleep patterns here are measured by the length of sleep of each individual, namely from sleeping at night and waking up in the morning. (Table 2)

The normality test of the data used the Kolmogorov-Smirnov test, because the sample was 320 subjects (more than 60 subjects). The results were 0.00 which illustrates that all variables were abnormally distributed, because the *p* value was less than 0.05 ( $p \leq 0.05$ ). The data was normally distributed if the *p* value was more than 0.05 ( $p > 0.05$ ). This could occur because the differences were huge different between one subject and another subject, resulting in abnormal data distribution. (Table 3)

Spearman correlation test was used to analyze the relationship between numeric variables that were not normally distributed. The correlation coefficient was represented in letter *r*. The correlation value was between 0-1. Value of 0 showed that the two variables had no correlation and 1 was a strong or perfect correlation. Correlation could also contain (-) which has the opposite meaning between variables. The significance used was 5% and denoted by *p*. If the *p* value was less than 0.05, the correlation between variables was meaningful, but if more than 0.05 the correlation between variables was not meaningful. Spearman correlation test was performed on the amount of sleep on weekdays and weekends with a variety of activities. This aimed to show whether there was a correlation or relationship between the level of activity and the circadian rhythm. (Table 4)

The analysis of the variables was as follows: The test between the stress variable and sleep on weekdays had a weak inverse relationship (- 0.088) and was not significant (0.116). The test between the stress variables with sleep at the weekend was -0.097 which meant there was a weak inverse relationship and not significant (0.084). Tests between stress variables and sleep time on workdays had a weak inverse relationship (-0.023) and not significant (0.687).

**Table 1: Distribution of Participants**

	Gender		Total	Mean	Std Deviation
	Boy	Girl			
Senior High School of Trimurti Surabaya	53	27	80	1.34	.476
Public Senior High School 5 Surabaya (SMAN 5)	69	31	80	1.39	.490

Public Middle School 19 Surabaya (SMPN 19)	44	36	80	1.45	.501
Public Middle School 1 Surabaya (SMPN 1)	32	48	80	1.60	.493

**Table 2: Average and Standard Deviation of Stress Value and Sleep Length**

	Stress		Sleep length in the weekdays		Sleep length in the weekends		Sleep length in both period	
	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation
Senior High School of Trimurti Surabaya	118,66	91,686	6,59	1,309	8,18	2,163	14,76	2,630
Public Senior High School 5 Surabaya (SMAN 5)	79,51	73,659	6,29	0,944	8,21	1,992	14,50	2,556
Public Middle School 19 Surabaya (SMPN 19)	128,31	72,953	6,96	1,335	8,20	2,015	15,16	2,830
Public Middle School 1 Surabaya (SMPN 1)	94,97	72,767	6,27	,981	7,96	1,879	14,16	2,264
Total	105,37	80,162	6,53	1,185	8,14	2,008	14,65	2,592

**Table 3: Normality Test of Stress and Sleep Pattern**

	Kolmogorov-Smirnov	Shapiro-Wilk
	Sign	Sign
Stress	0.000	0.000
Sleep length in the weekdays	0.000	0.000
Sleep length in the weekends	0.000	0.000
Sleep length in both period	0.000	0.001

**Table 4: Correlation and Significance of Stress and Sleep Patterns**

	Correlation	Stress
Stress	r=	-1.000
	p=	.
Sleep length in the weekdays	r=	0.088
	p=	0.116
Sleep length in the weekends	r=	-0.097
	p=	0.084
Sleep length in both period	r=	-0.023
	p=	0.687

**Discussion**

Having enough sleep could be useful for repairing damaged body cells (Natural Healing Mechanism), the growth of new body cells, giving the organ time to rest, and maintaining the balance of metabolism and biochemistry of the body. A person’s sleep time is normally 7-8 hours, therefore the body can rest enough. Many things can affect the regularity of one’s

sleep, including psychological needs, activities and environment. The regularity of one’s sleep patterns influences their quality of life. Controlling the above factors can help achieve the positive impact of regular sleep.<sup>3, 9-11</sup>The length of sleep each student in this study looked at at what time he slept at night and what time did he wake up in the morning

Some of the factors above can be a clue to assess the regularity of one’s sleep. One of the factors used in this study was the psychological state or stress value of these secondary students. The stress value used in this study was based on Holmes and Rahe Non Adult Stress Scale, which each number has its own meaning. Every child has its own stress value and produces their own length of sleep. This method was quite easy to monitor secondary students. The stress value of each person after that will be compared with the length of sleep everyday. There were variations in sleep duration for each participants. The average number of sleep a day a student had on weekdays was 6.53 hours which was still below normal for one day’s sleep (around 7 or 8 hours). But for the average number of sleep a day a student had on weekends was 8.14 which was enough for a student to sleep for a day. These two things will be different because the weekend was a school holiday which causes more free time than the working day used for school and other activities. Based on psychological, insomnia in adolescents can be due to lack of psychic needs from the environment, namely the environment when adolescents cause a lot of pressure because of the many demands present. Stress, depression and suppression are

psychological factors that cause sleep disorders.<sup>12-14</sup>

In this study was using stress factors as a comparison. This stress factor was assessed using Holmes and Rahe Non Adult Stress Scale. Each stress value on this scale means, namely: value 150 or below meant that the stress rate is still small; value 150-299 meant that the number of stress is moderate or the stress value by 30% below was the stress level above; while the stress numbers 300 and above meant severe stress. Each individual in this study had a different number of stresses. The average stress score in SMAN 5 was 79.51 (small stress rate), in SMA Trimurtiwas 118.66 (small stress rate), in SMPN 1 was 94.97 (small stress rate), in SMPN 19 was 128.31 (small stress rate). Whereas the average of the total stress numbers of the four schools was 105.37 which meant it was still in the category of small stress figures. It was also found that there was no significant relationship ( $p \leq 0.005$ ) of each variable. It can be explained that although there are significant differences in stress between one individual and another does not affect a person's sleep duration. Subjects who have activities one day longer than others do not mean having longer sleep and vice versa. This is different from what explained in the theory from Morin et al. Depression arises from the presence of severe stress, for particular in daily life-threatening external events (work pressure). This stressor affects sleep patterns and increases arousal before going to bed or when suddenly awakening to eventually lead to insomnia (sleep disturbance).<sup>5, 15</sup>

The results of this study were different from the existing theories because of many other causative factors. Firstly, because the activities, environment and genetics of each individual were different, even though the level of an individual was higher. If the students had less activity then they can sleep early. Likewise, environmental factors can influence.

### Conclusion

There is no significant correlation between stress level and sleep pattern among junior high students and senior high school students Surabaya in 2017

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# The Use of Mosquito Nets Associated with Malaria Cases in Donggala Regency, Central Sulawesi 2018

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## Abstract

**Context:** Donggala Regency is a malaria endemic area, there are 434 malaria positives in Donggalaon 2014, 279 positives on 2015, and 152 positives in 2016. Various prevention efforts have been conducted including the “kelambunisasi” program aimed to provide mosquito nets to the community to prevent transmission of malaria in Donggala Regency area. This study was aimed to analyze the association of the use of Mosquito nets and malaria cases in Donggala Regency. This is an observational analytic study with 94 samples. Sampling method is proportional random sampling. Data were analyzed using Chi-Square test. There were 32 respondents did not use mosquito nets, and among these 32 respondents who did not use mosquito nets, there were 22 respondents (68.8%) who suffered from malaria, and 10 respondents did not suffer from malaria (31.2%). Among respondents using mosquito nets there are 57 respondents (91.9%) did not suffer from malaria, and 5 respondents (8.1%) suffered from malaria ( $p = 0,000$ ). As conclusion, this study found a relationship between the use of mosquito nets with malaria cases in Donggala Regency.

**Keywords:** Mosquito Net, Malaria, Donggala

## Introduction

Malaria is a disease that spreads very widely, between longitude 60° in the North and 40° in the South with an area of more than 100 tropical and sub-tropical countries.<sup>1</sup> Public health problems, especially in developing countries such as Indonesia are based on two main aspects, physical aspects such as health facilities and treatment of diseases, while the second is non-physical aspects that involve health problems.<sup>2</sup>

Risk factors for malaria involving the epidemiological triangle where the agent, host, and environment play an important role in the incidence of malaria and in line with the theory of H.L. Blum that 4 (four) factors can influence health status, which can also increase malaria

incidence in an area, namely environment, behavior, health services and heredity / genetics.<sup>3</sup>

One of mosquito-borne diseases is malaria, which is one of the types of Re-emerging Disease, which until now is still a challenge to improve the health of the community, especially in the tropical and sub-tropical regions. Malaria is still an infectious disease that is a concern of the World Health Organization (WHO) to be eradicated. Most regions in Indonesia are still malaria endemic areas, including East Indonesia such as Papua, Maluku, Nusa Tenggara, Sulawesi, Kalimantan and even some areas in Sumatra such as Lampung, Bengkulu, Riau. Malaria is one of the public health problems that can cause death, especially in high risk groups, such as infants, toddlers, and pregnant women. In addition, malaria can directly cause anemia and reduce work productivity.<sup>4</sup>

Malaria is a type of infectious disease caused by parasites (Plasmodium) and is transmitted by vector bite, namely malaria mosquito (Anopheles sp.). This disease can affect all age groups, infants, children and adults,

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both male and female, which can affect the magnitude of infant and child morbidity and mortality and childbirth and can lead to Extraordinary Events.<sup>5</sup>

Central Sulawesi Province with population of 2,707,549 individuals spread across 13 districts /cities are malaria endemic areas. The case of malaria in the last 3 years in the province of Central Sulawesi tended to decrease from 3,204 patients in 2014 to 2,339 patients in 2015 and 1,478 in 2016.<sup>6</sup>

Donggala Regency is a malaria endemic area, geographically supporting factors for malaria vector Anopheles mosquitoes, because in this area it is close to rice fields, rivers and mountainous areas. Donggala District has 434 malaria positive patients in 2014, 279 positive patients in 2015 and 152 positive people in 2016. 2017 sufferers as many as 201. Various prevention efforts have been carried out including kelambunisasi

programs that provide mosquito nets to the public in order to prevent transmission of malaria. Distribution of mosquito nets in Donggala Regency in 2013 was 6,050, 2014 with 3,912 and 2016 totaling 3,912. If seen from the data for the last 3 years there have always been people with malaria and the cases have always been high.<sup>7</sup>

## Method

The study was conducted in 4 (four) Subdistricts in Donggala Regency namely South Banawa Sub-District (Lembasada Village), Sindue District (Toaya Village), Tombusabura District (Batusuya Village) and Sirenja District (Tompe Village). This type of research is observational analytic with a sample of 94 people. Sampling is proportional random sampling, by drawing a simple random population. Samples are taken by making a list of elements or members of the population randomly.<sup>8</sup> Data analysis using *Chi-Square*.

## Result and Discussion

**Table 1: Characteristics of sample**

Characteristics	Category	n	Sufferer malaria	percentase (%)
Sex	Men	48	16	57
	Women	46	11	43
Educational attainment	Illiterate	2	2	2,1
	elementary	37	15	39,4
	Junior School	17	2	18,1
	Senior School	33	8	35,1
	Diploma	0	0	0
	College	5	0	5,3
Occupational	Government employees	5	0	5,3
	Trader	4	3	4,3
	Farmer	35	13	37,2
	Laborer	12	4	12,8
	Unemployment	3	1	3,2
	other	35	6	37,2

Primary Data: Jul – Sep 2018

Results of the study in Table 1. It shows that male respondents (57%) suffered more malaria compared to women (43%). Based on the latest education respondents with the latest education graduated from elementary

school (39.4%) suffered the most malaria, while based on the work of farmers (37.2%) were the jobs of the respondents most suffering from malaria.

**Table 2. Bivariate chi-square analysis the use of mosquito nets associated malaria cases**

Usage Mosquito Nets	Malaria					P
	Not Sufferer malaria		Sufferer malaria	Total		
	n	%	n	%	n	0,000
Not Use	10	31,3	22	68,7	32	
Use	57	91,9	5	8,1	62	
Total	67	71,3	27	28,7	94	

Primary Data: Jul-Sep 2018

Results of the research in Donggala, 94 respondents said that men (57%) had more malaria than women (43%). These results are not in line with SaliuBalogun et al., 2016 study that households with female heads of households use fewer mosquito nets compared to male family heads in Nigeria.<sup>9</sup> but are in line with Saranath Lawpoolsri et al., (2011-2017) that men suffer more from malaria than women in Thailand and Myanmar<sup>10</sup> Work as a farmer (37%) often requires farmers to go out at night to the garden or rice fields. This condition makes farmers very likely to be in contact with malaria mosquitoes, because when they are in the garden or paddy field at night farmers sleep not using mosquito nets. This is in line with Edmund WedamKanmiki et al. 2014-2015 farmer’s work is a factor associated with malaria incidence in northern Ghana.<sup>11</sup> Sally Peprah et al 2016 in the study said that work as a farmer was related to the incidence of malaria in West Nyanza Province of Kenya.<sup>12</sup>

The incidence of malaria caused by outdoor activities at night is related to the habits of some mosquito species that seek blood feed outside the home at night. Mosquitoes that are looking for blood feed are mosquitoes that bite a lot outside the home, but can enter the house if humans are the preferred main host. This group of mosquitoes is *An. barbirostris* (one of the species found in Central Sulawesi), *An. sinensis* and *An. aconicus*. Besides *An. barbirostris*, also found *An. maculatus* which is in West Kalimantan. *An. maculatus* is actively biting between 9:00 p.m. to 3:00 p.m.<sup>13</sup>

Respondents with elementary school education level (39.4%) suffered the most malaria, this was due to the lack of knowledge of respondents to efforts to prevent transmission of malaria, including the use of mosquito nets when sleeping at night. Education is an effort of persuasion and learning to the community so that people

want to take actions (practices) to maintain or overcome problems and improve their health. Changes or measures for the maintenance and improvement of health produced by health education are based on their knowledge and awareness through the learning process.<sup>14</sup> This is in line with the research conducted by AbdouTalipou et al. in Yaounde Cameroon 2017 that people with high or secondary education levels have better knowledge about malaria prevention, treatment measures compared to those at the primary level.<sup>15</sup>

Among 94 respondents who did not use mosquito nets as many as 32 respondents (34.0%) while using mosquito nets as many as 62 respondents (66.0%). One way to avoid mosquito bites is to use a mosquito net while sleeping. The results of the univariate test showed that 66.0% of respondents in Donggala used mosquito nets when sleeping at night. This habit is an effective effort to avoid and prevent direct contact between mosquitoes and healthy people while sleeping at night, while respondents who do not use mosquito nets for several reasons include the habit of sleeping at night without using mosquito nets and the reason for feeling hot if using a mosquito net. This is in accordance with peat KarolusNgambut et al, 2011 research in Kupang which said that the reason given by respondents not regularly using mosquito nets was the use of troublesome mosquito nets during sleep and heat. The use of mosquito nets during night sleep is one of the risk factors for malaria.<sup>16</sup> The study are in line with Rahmadiliyani N, et al (2013) that there is a relationship between the use of insecticide-treated bed nets and the incidence of malaria in TelukKepayang Village, KusanHulu Sub-District, Tanah Bumbu Regency. From the results of the Chi-square statistical test, the value of  $p = 0,000$  obtained  $p < \alpha$  then there is a relationship between the use of bed nets and the incidence of malaria. This shows that not using mosquito nets, mosquitoes will be easier to bite and can transmit malaria males, while those using mosquito nets will be more protected from



mosquito bites.<sup>17</sup> The results of this study are in line with research conducted by Hamzah Hasyimet *al.*, 2011 in the District Lahat South Sumatra shows that there is a significant relationship between the use of bed nets and malaria incidence<sup>18, 19</sup>

Malaria surveillance in Donggala has been running well, and is used by program holders in planning malaria prevention activities. Surveillance is an important activity that must be carried out continuously as an effort to implement the Early Awareness System (SKD) and case monitoring for planning effective and efficient countermeasures.<sup>20</sup>

The malaria vector control activities in Donggala Regency are distribution and use of mosquito nets with funding from the Global Fund. The results of the study in Tomohon City, North Sulawesi and in the North Maluku region showed the same results, that vector control was carried out only with distribution and use of mosquito nets.<sup>21, 22, 23</sup>

### Conclusion

As conclusion, this study found a relationship between the uses of mosquito nets with malaria cases in Donggala Regency.

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**Conflict of Interest:** The authors declare that they have no competing interests.

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# Standardized Antenatal Care and Utilization of Skilled Birth Attendants in Indonesia

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## Abstract

**Context:** Delivery with skilled birth attendants (SBAs) can lower maternal mortality rates. By 2013, the utilization of SBAs in Indonesia had reached 87.1%. This figure was still below the target of the Ministry of Health. The aim of this study was to determine the association of standardized antenatal care (ANC) with the utilization of SBAs. The study design was cross-sectional. The study sample consisted of respondents ( $N = 2,986$ ) to the 2012 Indonesia Demographic and Health Survey (IDHS) (i.e., married women aged 15–49 years) who had a live birth a year prior to the survey. The data were analyzed by logistic regression. The results showed that almost all women (93.9%) utilized SBAs. The association of standardized ANC with the utilization of SBAs differed according to region, with women who attended four ANC visits and received the full complement of ANC services having the greatest opportunity to choose health workers as birth attendants as compared with women who did not attend four-visits and did not receive all components of ANC services.

**Keywords:** *Standardized ANC, utilization of SBAs*

## Introduction

Delivery with skilled birth attendants (SBAs) is a critical strategy aimed at reducing maternal mortality<sup>1</sup>. A previous study suggested that increased utilization of SBAs was associated with decreased morbidity and maternal mortality<sup>2</sup>. In Indonesia, 87.1% of deliveries in 2013 were assisted by SBAs. However, there were variations in the rate of utilization of SBAs in provinces across Indonesia. Moreover, there was a dramatic gap in the highest and lowest rates of utilization of SBAs (i.e., 99.9% in the province of Daerah Istimewa Yogyakarta and 57.7% in Papua)<sup>3</sup>.

The utilization of SBAs is related to uptake of standardized antenatal care (ANC)<sup>4</sup>. Previous research showed that mothers who attended at least four visits as part of ANC, at least once in the first trimester, once in the second trimester, and twice in the third trimester, had a greater opportunity to utilize SBAs<sup>5</sup>. The utilization of SBAs was also associated with antenatal service components. The utilization of SBAs was more common among women who availed of components of antenatal services<sup>6</sup>.

Maternal health programs in Indonesia recommend that pregnant women should attend at least four visits during pregnancy, with at least one visit in the first trimester, one visit in the second trimester, and two visits in the third trimester. In 2012, 74.0% of pregnant women in Indonesia attended four visits. This figure was below the target (95%) of the Ministry of Health for 2012<sup>7</sup>. In addition, there was a large difference across provinces in the proportion of women who attended four visits, with the highest in Daerah Istimewa Yogyakarta (85.5%) and

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lowest in Maluku (41.4%)<sup>3</sup>.

Although many studies have examined the association of ANC with the utilization of SBAs, these studies focused only on the number of ANC visits as a marker of ANC uptake<sup>5,9</sup>. Only a few studies have examined the relationship between components of antenatal services and the utilization of SBAs. The aim of the present study was to determine the association of standardized ANC with the utilization of SBAs. In this study, two aspects of standardized ANC were measured: the number of ANC visits and receipt of components of antenatal services.

### Material and Method

This cross-sectional study used secondary data from the 2012 Indonesia Demographic and Health Survey (IDHS). The dependent variable was the selection of a birth attendant and the main independent variable was standardized ANC. The potential confounding variables were age, education level, occupation, joint decision maker, wealth index quintile, parity, pregnancy and delivery-related complications, residence area, region, insurance, and birth preparedness.

The selection of birth attendants was divided into two categories, namely health workers and non-health workers. Health workers included obstetricians, practitioners, midwives, and nurses. Non-health workers included traditional birth attendants or *dukun*, family or friends, others, and no attendants. Standardized ANC was considered as four-visits, at least once in the first trimester, once in the second trimester, and twice in the third trimester (*kunjungankeempat* i.e. K4). The antenatal service components included weight or height measurements, blood pressure measurements, uterine height measurements, laboratory examinations (blood or urine tests), iron supplements, tetanus toxoid immunization, and information about pregnancy-related complications (“7T” in Indonesia). Standardized ANC was categorized as follows: 1) not K4 and not 7T, 2) not K4 but 7T, 3) K4 but not 7T, and 4) K4 and 7T.

The sample in this study consisted of women aged 15–49 years ( $N = 2,986$ ) from 25 households in selected census blocks who had a live birth within 1 year before the 2012 IDHS.

The data were analyzed using a binomial regression statistic test where an interaction assessment and confounding test were conducted. The interaction

between standardized ANC variable and potential confounding variables were assessed using the forward method, in which the interaction variables were entered one by one into logistic regression model. Variables were considered to interact if they had a  $p$ -value  $< 0.05$ . The assessment of confounders was done by removing candidate confounding variables one by one, starting from the variable with the highest Wald  $p$  value. If the variable after being issued from the model caused an *odds ratio* (OR) of standardized ANC variable change greater than 10%, the variable was considered a confounder and remained in the model.

### Results

The majority of mothers (78.2%) were in a non-risk age group (20–35 years). Among the study group, 1,747 (58.5%) respondents had a secondary school level education, 1,621 (54.3%) were unemployed, 662 (22.2%) were in the lower middle wealth index quintile, and 2,075 (69.5%) had 1–2 parity.

Of the 2,986 women included in this study, majority of them (62.8%) were “K4 but not 7T”. Only 282 (9.4%) respondents were “K4 and 7T”, 52 (1.7%) respondents were “not K4 but 7T”, and 776 (26.0%) respondents were “not K4 and not 7T”. The most common antenatal service components were uterine height measurements (2,955/99.0%), blood pressure measurements (2,910/97.5%), and weight or height measurements (2,879/96.4%).

Almost all the women (93.9%) chose health workers as birth attendants. The most commonly selected health workers were midwives (65.8%), obstetricians (25.9%), practitioners (1.1%), and nurses (1.1%), whereas the most widely selected non-health workers were *dukun* (5.2%).

The multivariate analysis showed that there were nine confounding variables in this study, namely age, education level, joint decision maker, quintile of wealth index, parity, pregnancy and delivery-related complications, location (urban vs. rural), insurance, and delivery planning. In this study, the relationship between standardized ANC and the utilization of SBAs differed according to region. However, in all locations, women who attended four visits and received all antenatal service components had the greatest opportunity to choose health workers as birth attendants as compared with that of women who did not attend four-visits and did not receive the full complement of antenatal services.

The results showed that women with a high-school education were 2.6 times more likely to utilize SBAs as compared with those with no school education or just a primary-school education. Women in the highest wealth index quintile were 4.3 times more likely to utilize SBAs as compared with those in the lowest wealth index quintile. Women with 1–2 parity were 2.2 times more likely to utilize SBAs as compared with women with parity > 4. Women with pregnancy- and delivery-related complications were 2.1 more likely to utilize SBAs as compared with women with no complications. Women living in urban areas were 1.7 times more likely to utilize SBAs than those living in rural areas. Women with a complete birth preparedness plan were 2.5 times more likely to utilize SBAs as compared with those who had no birth preparedness plan.

### Discussions

The majority of respondents (62.8%) attended four visits and did not receive all antenatal service components. In the study, 72.3% of women attended four visits (95% CI = 70.6–73.8%). This figure was still below the stated target of the Ministry of Health in 2012, which was 95%<sup>7</sup>. Various factors may explain the low proportion of four ANC visits. These include difficulty accessing health care facilities, low maternal knowledge of the importance of pregnancy checkups, cost issues<sup>10</sup>, low maternal autonomy in health decisions, and violence in health services<sup>11</sup>.

Women who attended four visits and received the full complement of antenatal service components had the greatest opportunity to choose health workers as birth attendants as compared with that of women who did not attend four visits or receive all antenatal service components. This finding was consistent with that of previous studies<sup>4</sup>. Antenatal care provides an opportunity for contact with health personnel and encourages pregnant women to give birth with SBAs. Contact with health personnel during pregnancy visits was associated with increased utilization of services at health facilities<sup>12</sup>. Mothers who had frequent pregnancy check-ups and who felt comfortable with the service they received were more likely to utilize SBAs<sup>11</sup>.

The opportunity to utilize SBAs was associated with education level, with the opportunity increasing in accordance with an increase in the education level of the mother. Educated mothers had better knowledge and information about health services than uneducated

mothers<sup>6</sup>. Higher education levels resulted in increased concern and awareness of the importance of SBAs in childbirth. Knowledge of the importance of maternal health services enabled educated mothers to access high-quality services and to make decisions regarding the place of birth (hospital) and presence of birth attendants<sup>13</sup>.

There was a significant association between decision makers and the utilization of SBAs. Mothers who made decisions about health problems, including pregnancy-related issues, with their husbands preferred health workers as birth attendants. This may be due to the fact that a prospective mother who discusses the issue of birth attendants with her husband receives financial and psychological support from her partner, in contrast to cases where others (i.e., mother, mother-in-law) make the decision regarding maternity helpers<sup>14</sup>.

The higher the quintile of the mother's wealth index, the greater the opportunity to utilize SBAs. It may be explained by mothers with higher incomes in high wealth index quintiles having easier access to health services, resulting in increased utilization of SBAs<sup>15</sup>.

The lower the parity of the mother, the more likely the mother was to utilize SBAs. Mothers who had given birth to many children had much experience of childbirth and therefore may prefer to give birth without the help of SBAs<sup>16</sup>. Multiparous mothers may assume that birth is a natural process, which does not require the presence of health personnel as birth attendants. Furthermore, poor experiences of childbirth with health workers in the past may cause multiparous mothers to prefer to give birth without the help of health workers<sup>17</sup>.

Pregnancy and delivery-related complications were significantly associated with the utilization of SBAs. Mothers with complications during pregnancy and childbirth chose to deliver with SBAs<sup>18</sup>. Childbirth with SBAs was a critical intervention in the survival of mothers with labor-related complications because the majority of complications were not predictable<sup>19</sup>.

Mothers living in urban areas more likely to utilize SBAs as compared with their counterparts living in rural areas. The finding is likely to be explained by a combination of higher income and easier access to health personnel in urban areas<sup>20</sup>. Women living in rural areas may have reduced access to health services.

In this study, having health insurance was not

significantly associated with the utilization of SBAs. The discord may be related to issues pertaining to access to health facilities and other costs. Indirect expenses, including transportation costs and unbundled service costs, may cause mothers to choose home births with the help of non-health workers<sup>21</sup>.

Mothers who were well prepared for delivery were more likely to prefer delivery with SBAs than less well-prepared counterparts. The various components of birth preparedness plans influence access to health facilities. For example, planning transportation well in advance of delivery will benefit prospective mothers, especially those who live in rural areas far from health facilities<sup>22</sup>.

The mother's occupation was not a confounder variable. This may be due to both employed and unemployed mothers having health insurance. In a previous study, health insurance was positively associated with the utilization of SBAs<sup>23</sup>.

### Conclusions

Once the data were controlled for age, education level, joint decision maker, quintile of wealth index, parity, pregnancy and delivery-related complications, urban versus rural location, health insurance, and delivery planning variables, women who attended four visits and received all antenatal service components had the greatest opportunity to utilize SBAs as compared with women who did not attend four visits and did not receive all antenatal service components.

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# Density Flies and Helminth Infection at Child in Muara Angke

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## Abstract

**Context:** Infection due to worms can lead to anemia, nutritional disorders, growth, and intelligence which in the long run will reduce the quality of human resources. This study aims to determine relevant of density of flies to helminthiasis and to know relevant between risk variables (gender, age, latrine availability, cleanliness of nails, footwear habits, parental education, socio-economic conditions, floor conditions, food sanitation). This study was an observational analytic study with a cross sectional approach with a total sample of 97 people taken from the age of 7-15 years. Stool examination results showed that students who tested positive for helminthiasis were 5 people (5.2%) and negative as many as 92 people (94.8%). Based on statistical analysis was concluded that there was irrelevant between fly density, sex, age, latrine availability, hygiene of nails, footwear habits, mother's education, and food sanitation.

**Keywords:** *Musca domestica*; *synanthropic flies*; *mechanical transmission*; *soil-transmitted helminth*

## Introduction

Indonesia is a tropical temperate developing country with a wide range of problems, one of which is a health problem caused by intestinal infections. Intestinal infections are the most common infections in developing countries <sup>(1)</sup>. Globally it is known that worm infections and intestinal protozoa are important problems for public health <sup>(2)</sup>. This type of worm infection transmitted by soil is ascariasis, trikuriasis, and mine worms, which can cause clinical disorders in humans. Based on recent prevalence data suggests that about 1.2 billion people have infected worms *Ascaris lumbricoides* <sup>(3)</sup>.

A child living in a poor area is likely to be infected with one of three types of worms transmitted by land <sup>(4)</sup>. Worm infections can lead to another significant illness

in infected individuals, among them being the cause of impaired cognitive growth, physical disorders and anemia in children. In addition, *S. stercoralis* infection can result in severe and fatal hypererection of the host experiencing impaired immune system <sup>(5)</sup>. Similar research has also been conducted in North Jakarta in 2017 and the results found there are worm infections *A. Lumbricoides* of 37.5% and *T. Trichiura* worm infections amounting to 36.5% in elementary school age children <sup>(6)</sup>.

One of the places that has the risk of helminthiasis disease is where fish landing. Environmental conditions in the place of fish landing is poor environmental sanitation, often occurs flooding this into one of the factors that are vulnerable to helminthiasis disease. In addition, the population density is still high and the number of flies cannot be kept away from the fish landing site. A fly is a potential mechanical vector for STH infection, and therefore its role in the transmission of the disease should not be underestimated.

## Method

This type of research is analytical research with observational method and using cross sectional design

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that is done in the settlement around the fish auction site in Muara Angke, North Jakarta and implemented from April-June 2019. At least 44 samples in total, because of this study using hypotheses of different proportions, the number of samples doubled from a large sample to a minimum of 88 samples. To anticipate that there is an exclusion of research subject, it needs to be added 10% from the number of samples obtained so that the total sample of 97 people. Samples were taken using method probability sampling method with cluster

sampling technique. For sample unit selection on each cluster is selected by simple random sampling. Based on the samples obtained, questionnaires will be conducted with questionnaire interviews and stool sampling, so the sample of feces as the number of elementary school children is the subject of research to be conducted at home interviews. After the research, the results of the research will be processed using the data analysis program Univariat.

## Results

**Table 1: Respondents characteristics distribution**

Variables	Category	Total	
		N	Percentage (%)
Sex	Female	55	56.7
	Male	42	43.3
Age	>10 years	24	24.7
	≤ 10 years	73	75.3
Mother's education	High Education	17	17.5
	Low Education	80	82.5
Socio-economic conditions	Height > Rp 2.5 million,-	47	48.50
	Low ≤ Rp 2.5 million,-	50	51.50

Source: primary data

According to table 1 shows that most female-type respondents were 55 respondents (56.70%) With the age of respondents most aged less than 11 years. Age group categories are divided into two by looking at median value results in the research data obtained, cut off point for age the using median value because of abnormal variable age data distribution. Mother education in this research is distinguished into two groups namely higher education and low education. The number of respondents with a low education of mothers has a more percentage

than higher education respondents with a low percentage of education of 82.50% while respondents with higher education as much as 17.50%. If viewed from the social economic condition respondents are more at a low socio-economic level where the opinion of the family is still below the average income of other respondents is Rp. 2.5 million,-as many as 50 respondents (51.50%) Have a low socio-economic level, cut off point for a variable of socio-economic state using the median data of this because the variable data socio-economic condition is abnormal.

**Table 2: Distribution of flies and helminthiasis density**

Variables	Category	Total	
		N (97)	Percentage (%)
Density of flies	Low	30	30.9
	High	67	69.1
Infections of worm eggs	Positif	92	94.8
	Negatif	5	5.2

Source: primary data

Table 2 shows the density of flies around the population settlements in Muara Angke region belonging to the high category of 67 houses (69.10%) As for the infection helminthiasis most of the elementary school age children around the area of Muara Angke is not infected helminthiasis. Respondents research 97 people and only

as much as 5 children (5.20%). Because in this research samples of feces elementary school age children who are positively infected helminthiasis only as many as 5 samples then the analysis of this quantitative research data can not be continued into sufficient or multivariate analysis.

**Table 3: Distribution of risk factors for helminthiasis disease in elementary school age children in Muara Angke year 2019**

Variables	Category	Total	
		N	Percentage (%)
Washing hands	Good	16	16.49
	Bad	81	80.51
Nail hygiene	Clean	53	54.6
	Not Clean	44	45.4
Habits of wearing footwear	Good	45	46.4
	Bad	52	53.6
Access of latrines	Good	32	33.0
	Bad	65	67.0
Floor Conditions	Good	18	18.6
	Bad	79	81.4
Food Sanitation	Good	18	18.6
	Bad	79	81.4

Source: primary data

Table 3 shows the majority of respondents have a habit of washing hands with still bad soap that is 81 children (80.51%) With the nail cleanliness of the good respondent, which is as many as 53 children (54.60%). Most of the respondents had the habit of not wearing a footwear of 52 children (53.60%). This research shows that respondents who access the bad bridge were as much as 65 respondents (67.00%). The condition of the House floor of respondents showed that most of the respondents had poor home floor conditions of 79 respondents (81.40%). As for food sanitation shows most of the respondents had poor food sanitation of 79 respondents (81.40%). Bivariate analysis In this study is not possible because it is caused by a homogeneous dependent variable data.

**Discussion**

High density of flies at home respondents could be due to the distance of housing or settlement close to the place of fish processing, so that flies easily breed and stay in the House of citizens. In addition, unqualified

housing sanitation conditions can also be a cause of high density flies. Based on the results the study showed that there were 5 sample stool (5.20%) Helminthiasis and there are 92 samples of feces (94.80%) A negative helminthiasis. There are several types of intestinal nematodes included in STH namely Worm bracelets (*Ascaris lumbricoides*), quarries (*Ancylostoma Duodenale* and *Necator americanus*), canine worms (*Tricuris tricuris*) and some species *Tricostromylus* (7). Factors affecting the absence of relationship between the age of respondents to the Helminthiasis is the age group that is most infected helminthiasis. But in fact helminthiasis can infect all ages, but the most infected age group helminthiasis by type of worm is children aged 3 – 8 years for *Ascaris Lumbricoides*, 5 – 14 years for *Enterobius Vermicularis*, 5 – 15 Year for *Trichuris Trichiura*, and for worms type Hookworm can infect all ages especially in children (8).

The habits of children playing soil contaminated with worm eggs can cause the child’s hands and nails to

become dirty. The dirty nails will be a nest for the worm eggs, so that the habit of children who bite the nails and put fingers into his mouth will facilitate the worm eggs to get into the body. Based on the results shows that there are 50 respondents (51.50%) Low economic level and as many as 47 respondents (48.50%) Have a high economic level. This is in line with other studies stating that the income of parents in a month is not closely related to the incidence of helminthiasis infections in the study of elementary school students in Tehran <sup>(9)</sup>.

The parents level of education is instrumental in the growth, development and formation of hygiene behaviors of children. If a mother has a good education especially the field of health certainly understand healthy living and know how to give good nutritional intake for her family <sup>(10)</sup>. Generally the community that is near the market and the school has a House floor is made of cement/ceramics, while on the sea side of the water is generally a house with floors made of wooden planks, and the ground floor <sup>(11)</sup>. Based on several indicators of questions posed to respondents about food sanitation, most respondents behaved unwell on 6 question items. As much as 52.60% and 50.50% of the respondents were not cutlery after completion of use, this proved because the community often piled the laundry plates in front of the house so that many flies that hinged. As many as 50.50% of respondents did not wash their hands before processing food, they said they only occasionally wash their hands before cooking and usually coincided with vegetable washing. A total of 57.70 respondents often consume raw foods, foods that are often consumed by respondents are a type of fresh vegetables such as cabbage, lettuce, cucumber. A total of 62, 90% of respondents often accumulate garbage in a home especially kitchen, this causes many flies to enter the house of respondents and cause food contaminated bacteria that exist in the body of flies and it is supporting the kitchen question Respondents were a lot of flies of 69.10%.

### Conclusion

Elementary school age children in the settlement around the fish auction place in the Wilaayah Muara Angke, can be concluded as follows: The density of flies in the area of Muara Angke has a high density of about 6-20 flies based on the results of measurements carried out around the respondent's house by taking an average of the 10 point location of the measurement. The results of research in the settlement around the fish auction site

in the area of Muara Angke there is no link between the density of flies with the Helminthiasis incident. Other risk factors such as gender, age, soap-wearing habits, nail hygiene, footwear wear, latitorial availability, maternal education, family socio-economic conditions, House floor conditions, and sanitation factors Food shows that there is no significant relationship between risk factor with the occurrence of helminthiasis in the Child elementary School in the area of Muara Angke.

**Ethical Clearance:** This systematic review study has been approve from the ethical review procedures in ethical committe at the Faculty of Public Health Universitas Indonesia, and is declared feasible to be carried out with letter number 485/UN2.F10/PPM.00.02/2019.

**Conflict of Interest:** There is no conflict of interest at this reasearch.

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# Policy Implementation Analysis of District Health System to Improve Health Services: Study in North Central Timor Regency, East Nusa Tenggara Province, Indonesia

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## Abstract

**Context:** Improving degree of public health in a region requires quality health services. For this reason, district health system has been formed which can be implemented comprehensively to the target community. A study is needed to find out the factors that influence policy implementation so that quality of health services can be improved.

This study used quantitative method with structural equation models to find patterns of the relationship between the district health system and health services.

The results showed that there are 7 indicators that are part of the district health system factors, 2 indicators that are part of the responsiveness factor, 8 indicators that are part of the policy implementation factor, and 3 indicators that are part of the health service factor. These indicators have loading factor  $\geq 0.5$ . The district health system consisting of 7 subsystems if properly implemented will have a positive impact on health services by 1.98. Contribution of policy implementation in improving health services will be great if the district health system is implemented together with responsiveness, so that the total effect becomes 2.20.

**Keyword:** Health Service, District Health System, Responsiveness, Policy Implementation

## Introduction

Life Expectancy of Birth is indicator that reflects the degree of public health in a region including infrastructure, access, health quality. If this number increases, it means that the community's health status is getting better. In the period 2010 - 2018, life expectancy

at birth in Indonesia increased by 1.39 years or by 2%, from 69.81 years to 71.20 years<sup>(1)</sup>. However, when compared to countries in Southeast Asia, in 2015 life expectancy at birth in Indonesia (69.4 years) was lower than in Singapore (83.2 years), Brunei (77.4 years), Viet Nam (76.5 years), Malaysia (75.5 years), Thailand (75.5 years), while higher than Cambodia (69.3 years), Philippines (69.2 years), Laos (67.0 years), Myanmar (66.7 years)<sup>(2)</sup>. This provides an initial overview for the Indonesian government to formulate a health system with the aim of: (1) improving public health status; (2) increasing responsiveness; and (3) community protection against social and financial risks in the health

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sector. The health system is made to be used as a reference in making various policies and guidelines that needed to fulfill the health demands of individuals, families, groups and communities. This health system is run by the government, private sector and the community<sup>(3)</sup>.

Policy on the health system must be implemented in order to achieve the desired goals. Policy implementation is an action taken by individuals or groups to carry out decisions to achieve certain goals and objectives desired by certain means and in a certain time sequence. Therefore if properly implementing policies on the health system makes it possible to achieve the goal of a high degree of public health through the efficient use of available resources. Conversely policies will only be in the form of dreams or good plans that are neatly stored in the archive, if not implemented<sup>(4)</sup>. Based on the Health System Improvement Performance assessment in 2000, the achievement and performance of Indonesia's health system is relatively low. Achievement of the health system is measured through indicators: the level of health achieved by the system and the level of system response, placing Indonesia at number 106 of 191 WHO member countries. While the health system performance is measured through indicators: distribution of health status, distribution of system responses, and distribution of health financing, placing Indonesia at number 92 of 191 WHO member countries<sup>(5)</sup>.

In an effort to improve the performance of the health system that aims to prioritize the quality of health services to the community, there needs to be an approach to implementing policies that tend to benefit them. Now, the public can easily give an assessment of the quality of any public service or provide advice and criticism of the bureaucracy. This encourages the bureaucracy to be able to anticipate and develop new policies and services that are more responsive. A more responsive bureaucratic format is characterized by three levels namely, the level of openness, the level of adaptation, and the level of environmental support. The level of openness is characterized by the high responsiveness of health workers in handling and resolving complaints raised by service users, as well as the availability of channels for sending suggestions and complaints<sup>(6)</sup>. Thus researchers want to find out the factors that influence policy implementation so that quality of health services can be improved.

## Material and Method

This research was conducted using quantitative method. The stages of the study began with identification of health service problems in the community related to responsiveness and implementation of District Health System policies in the region, then analyzed using structural equation models using AMOS 20.0 program to determine the effect of health system implementation on public health services.

The conceptual model was formed by 4 latent variables, namely: exogenous latent variables were the district health system and responsiveness, while endogenous latent variables were policy implementation and health services. The four variables latent were observed through 20 indicators. District health system variable with 7 indicators: information management and health regulation, human resources of health, health financing, pharmaceutical supplies and medical equipment, health efforts, research and development of health, empowerment and community participation. Responsiveness variable with 2 indicators: responsiveness and improvement in efficiency and fairness. Policy implementation variable with 8 indicators: policy standards and targets, resources, inter-organizational relations, implementing agency characteristics, socio-economic and politics, disposition and bureaucratic structure. Health services variable with 3 indicators: access coverage, quality of safety, occurrence of health improvement.

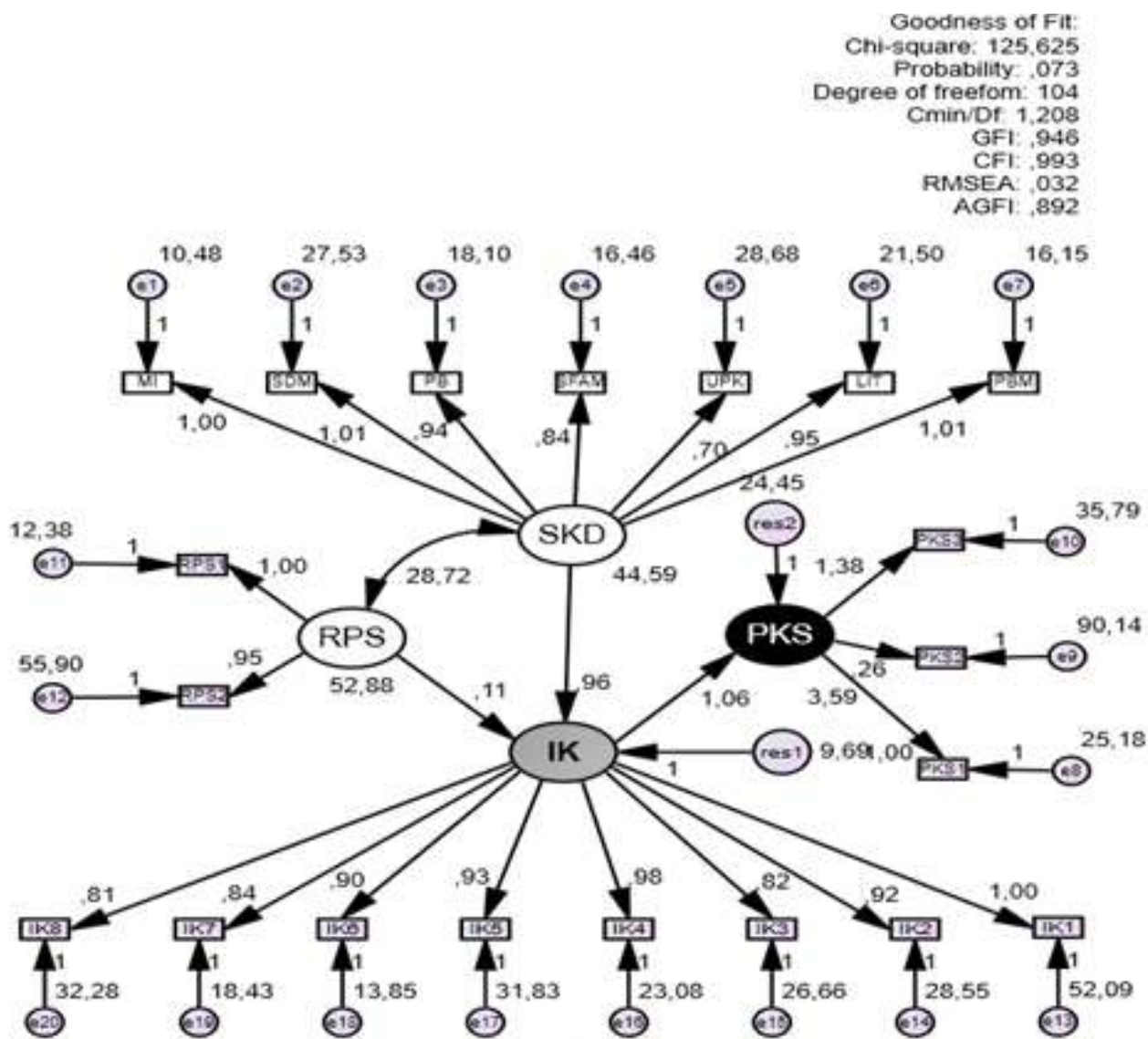
The sample size is calculated using "rule of the thumb" for structural model equation analysis, which is 5-10 samples per indicator, so this study are used 208 health workers in puskesmas and district hospitals in North Central Timor Regency, East Nusa Tenggara Province, who were selected using simple random sampling technique. Data collection was carried out in 2018 using validated questionnaires.

## Results

Characteristics of the respondents are shown, majority of respondents were female (72.1%) and aged over 25 years (94.8%), also most respondents (70.2%) had educational background in Diploma-3 and 79.3% have employment status as civil servants with more than 5 years of work.

After tested the normality assumption, then analyzed using the structural equation model, the results of model fit are obtained for the implementation of district health

system policy in health services, with a probability value = 0.073 > 0.05 and other values for the fit index model close to 1 (shown in Figure 1)



**Figure 1: Results from Analysis of the Structural Equation Model for District Health System Policy Implementation on Health Services**

Test results from the measurement model for each latent variable obtained 20 indicators are a valid part of each latent variable with a loading factor value  $\geq 0.5$  (shown in Figure 1), where there are 7 indicators are part of the district health system factors, 2 indicators are part of responsiveness factor, 8 indicators are part of policy implementation factors, and 3 indicators are part of health service factors.

Causality effect analysis based on table 1 shown the Policy Implementation (IK) is a moderator variable of the District Health System (SKD) towards Health Services (PKS). District Health System (SKD) and

Responsiveness (RPS) has a direct effect on Policy Implementation (IK) respectively of 0.96 and 0.11, while Policy Implementation (IK) directly affected Health Services (PKS) of 1.06.

The effect of Policy Implementation (IK) from the District Health System (SKD) on Health Services (PKS) has total effect of 1.98. Contribution of Policy Implementation (IK) in improving Health Services (PKS) will be great if the District Health System (SKD) is implemented together with Responsiveness (RPS), so that the total effect becomes 2.20.

**Table 1: Results of Effects Calculation on the Structural Equation Model of District Health System Policy Implementation on Health Services**

No	Variable	Direct Effects	Indirect Effects	Total Effects
1	District Health System (SKD) → Policy Implementation (IK)	0.96	0.00	0.96
2	Responsiveness (RPS) → Policy Implementation (IK)	0.11	0.00	0.11
3	Policy Implementation (IK) → Health Services (PKS)	1.06	0.00	1.06
4	District Health System (SKD) → Policy Implementation (IK) → Health Services (PKS)	0.96	1.02	1.98
5	Responsiveness (RPS) → Policy Implementation (IK) → Health Service (PKS)	0.11	0.12	0.23

**Discussion**

This study showed that the policy of district health system consisting of seven subsystems namely: information management and health regulation, human resources of health, health financing, pharmaceutical supplies and medical equipment, health efforts, research and development of health, empowerment and community participation, if properly implemented will have a positive impact on health services by 1.98. The indicators in policy implementation factors that have influenced health services include: policy standards and targets, resources, relationships between organizations, characteristics of implementing agencies, socio-economic conditions, implementor dispositions, communication, and bureaucratic structures, all of these indicators must be considered to produce quality health services. There are essentially three components in the health system that are interconnected, namely: health policy, policy actors and the policy environment (7). It is very likely that the same policy is interpreted and implemented differently by implementing agency in different regions so that the results will not be the same. Often the policies that have been made by the central government, however, their implementation in a region is carried out based on the policies of each regional head therefore the output of implementation also varies. Thus capabilities, interests, and perceptions of regional actors greatly influence the results of implementation(8)(9).

Furthermore, from this study it is known that successful implementation of the district health system policy in improving health services is determined among other things: (1) objectives and standards of policy of the district health system are clear, namely breakdown of targets to be achieved through the policies and standards used to measure its achievements; (2) resources (fund

and incentives) that can facilitate the implementation effectiveness; (3) quality of inter-organizational relations that allows control from a higher structure so that implementation can proceed according to established goals and standards; (4) characteristics of implementing institutions or organizations including competence and size of implementing agent, level of hierarchical control where there is lowest implementing unit at implementation time, political support from executive and legislative institutions, and formal and informal links with policy-making institutions; (5) political, social and economic environment which includes sufficient economic resources, policy that can affect socio-economic conditions, the government’s response to the policy, and political elites that support implementation; (6) the disposition/response/attitude of implementors, including knowledge and understanding of the contents and objectives of the policy, their attitudes related to the policy and intensity of their attitudes; (7) Communication in implementing policy covering three important things, namely transmission, clarity, and consistency. (8) bureaucratic structure is not too long and not complex or simple, consequently it is easy to control.

The results of this study also reinforce the Van Metter and Van Horn policy implementation model which presuppose that policy implementation runs linearly from public policy, implementors and performance. Policy implementation variables that affect performance in the model consist of six variables: policy standards and objectives, policy resources, inter organizational communication and enforcement activities, the characteristics of the implementing agencies, the economic, social, and political environment affecting the implementing jurisdiction or organization, and



the disposition of implementors for the carrying out of policy decision<sup>(10)(11)</sup>. In addition, the results of this study also support four factors in the George Edward III policy implementation model that affect the successful policy implementation, namely communication, resources, disposition, and bureaucratic structure<sup>(12)</sup><sup>(11)</sup>. Likewise, the implementation of the district health system policy also tends to be top down and suitable to be implemented at the level of bureaucracy that is structured in government institutions, where each level of hierarchy has a role in accordance with the function in the elaboration of policies to be implemented and facilitates the implementation of a policy at each level.

To avoid obstacles in the implementation of district health system policy, it is necessary the ability of policy makers to respond to the community's need for health is the key to the success of health services. The results of this study indicate that if the district health system was implemented simultaneously with responsiveness, the value of health services would increase to 2.02. Responsiveness is a willingness to help customers and provide prompt service, which is a process oriented measure and results of concern to the customer/client. Indicators of responsiveness factors that must be considered include: staff friendliness, physical building, adequate equipment, comfort, personality, privacy, waiting time, skilled and competent officers, appearance of officers and management, working according to standard operating procedures, cleanliness of the service environment, also improvement in efficiency and fairness. Whereas specifically for indicators on responsiveness factors associated with increased efficiency and fairness, the factors that influence it are health financing. If the amount and distribution of health costs do not match the needs of the group and / or work area served, then justice in health financing will not be achieved<sup>(13)</sup>.

If the responsiveness factor is in optimal condition, then it can be ascertained that the performance of health services will be satisfactory. The role of responsiveness factors in the implementation of district health system policy, among others: (1) increasing the achievement of policy standards and objectives; (2) implementing agencies are able to overcome the limitations of human resources, time, and finance so as to improve the smooth administration of policy implementation; (3) persuasive implementors so as to improve communication with the people; (4) bureaucratic structure is able to support reward systems according to hierarchical level. Finally,

we emphasize the importance of the local wisdom, cultural, political and socioeconomic context of people-system interaction. Examples of contextual influences include key political priorities<sup>(14)</sup>, available resources and cultural norms and traditions<sup>(15)(16)(14)</sup>, welfare level<sup>(17)</sup>, and specific interventions such as advocacy measures<sup>(18)</sup>. These altogether determine the access coverage of health service, improved health level and equity, social financial risk protection and fairly. In addition, contextual factors influence to shape the nature of organisational and professional service cultures, inform people's expectations and frame the environment within which social relations and interactions occur between the people and their health systems.

## Conclusions

Based on the findings of this study, the authors underscore the importance of district health systems are implemented not only itself, but also together with the responsiveness factor. As this study has shown, district health system factor and responsiveness factor, both simultaneously direct effect on policy implementation, which increases health services.

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**Ethical Clearance:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the Health Research Ethics Committee Faculty of Public Health Airlangga University.

**Informed Consent:** Informed consent was obtained from all individual participants included in the study.

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# Hypertention with Left Atrium abnormalities, Left Ventricular Hypertrophy, QT Interval and the Smoker

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## Abstract

**Context:** Nicotine in cigarettes stimulates the release of the hormone adrenaline thereby increasing blood pressure. Hypertension or increase in blood pressure increases the pressure in the left ventricular muscle. Hypertension appears as hypertrophy. Then an increase in left atrial pressure is followed by left atrial dilatation. Hypertensive people who smoke cause disruption of the process of ventricular depolarization and repolarization of the heart. This study aims to analyze hypertension with left atrial abnormalities, left ventricular hypertrophy, and QT interval in smokers at Tower Hanyar Health Center. The observational study design uses descriptive method with cross-sectional design. The sample consisted of 60 research subjects and was divided into two groups, namely the group of smokers with hypertension with a total of 30 people and the group of non-hypertensive smokers with the number of 30 people. Obtained by consecutive sampling method. In the study found the relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with  $p$  value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center. left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with  $p$  value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center. left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with  $p$  value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center.

**Keywords:** Left atrial abnormality, Left ventricular hypertrophy, QT interval, smoking, hypertension

## Introduction

Based Health Research (Riskesdas) in 2013 showed cardiovascular vascular disease (CVD) was seventh

highest for non-communicable diseases (PTM) in Indonesia.<sup>1</sup> CVD is most strongly associated with hypertension or high blood pressure is often referred to as a death without symptoms for someone who has hypertension who had for years often do not realize it until a fairly severe complications that can lead to death hypertension.<sup>1</sup> largest contributor to the deaths of nearly 9.4 million deaths annually. One of the largest contributors to the province of South Kalimantan hypertension is approximately 44.1% of patients with hypertension in

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London there are 75,556. Patients with hypertension based on data taken as much as 26.5% of the villagers suffer from hypertension.<sup>2</sup> Hypertension increases the pressure on the heart muscle in the left ventricle that looked as stiffness and hypertrophy, which increases atherosclerosis in the coronary arteries. The combination of increased need and decreased ability to increase the incidence of ischemic heart resulting in an increased incidence of myocardial infarction, sudden death, arrhythmias and congestive failure at hypertension.<sup>3</sup>

Based on data from the World Health Organization (WHO), Indonesia is the country with the third largest number of smokers in the world after China and India.<sup>4</sup> Smoke tar or nicotine yields did not reduce the risk of cardiovascular disease. Although the harmful effects of tobacco exposure on cardiovascular disease and risk factors are clear and well known, important elements found in cigarettes and pathophysiological mechanisms involved are not known.<sup>1</sup>

More recently, the depths of negativity terminal P wave in V1 (DTNPV1) has emerged as the left atrial abnormalities that can predict the occurrence of atrial fibrillation (A-Fib), stroke, and death from CVD. The emergence of DTNPV1 sign indicates left atrium pathophysiological process that forms the substrate for thromboembolism through the addition to dis-rhythm that characterizes A - Fib. Terminal negativity in the P wave in V1, as a marker of left atrial abnormalities, easily assessed on a routine EKG and several studies have shown the depth of deflection down (terminal part) of DTNPV1 associated with fibrosis of left atrial dilation, and increased filling pressure atrium.<sup>5</sup>

Hypertrophy of the heart muscle is a form of chronic left ventricular adaptation to increased cardiac load, both load pressure and volume load, or as a result of the influence of neurohumoral factors. Sanjaya and Soerinata revealed that the most common cause of LVH in the general population is hypertension.<sup>6</sup> Hypertension increases the pressure on the heart muscle or myocardium on left ventricular hypertrophy appears as stiffness and, that increase atherosclerosis in coronary blood vessels.<sup>3</sup>

Hypertension in people who smoke cause depolarization and ventricular repolarization process of

the heart, can be seen on the EKG QT interval prolongasi. The QT interval is the time measured from the beginning of the Q wave to the end of the T wave to see the time taken in the process of ventricular depolarization and repolarization. In people suffering from disorders of the QT interval will cause arrhythmias and long QT syndrome.<sup>7</sup>

This study was conducted to determine the relationship of hypertension with abnormalities of the left atrium, left ventricular hypertrophy and QT interval in smokers. The advantages of the research conducted has not been studied in South Kalimantan region. Need to do this research because he saw the high prevalence of smoking and the effects of smoking, namely hypertension. One of the effects of hypertension is to the left atrial abnormalities, left ventricular hypertrophy and QT interval abnormalities in the heart. This study was conducted to analyze and prove the relationship of hypertension, smoking, abnormalities of the left atrium, left ventricular hypertrophy and QT interval.

## Research Method

The design of this study design using analytical observation with cross-sectional design.

The population in this study is whole smokers in Puskesmas Tower Hanyar Banjarmasin. The research subject can be divided into two groups: smokers who suffer from hypertension and smokers who do not have hypertension. Subjects selected using consecutive sampling technique with the following inclusion criteria:

1. Men aged 35 to 50 years.
2. Cooperative, subject to cooperative research to conduct research procedures.

The sample size used in theory Gay and Diehl minimal amount to 30 people / groups so that the total sample in this study amounted to 60 people.

## Results and Discussion

Research relationship with abnormalities of left atrial hypertension, left ventricular hypertrophy and QT interval in smokers was conducted in October 2019 in the clinic sieve hanyar Banjarmasin research subject as many as 60 people.

**Table 1: Distribution of age against hypertension and distribution of smoking duration of hypertension**

Age	Hypertension		not Hypertension	
	N	%	N	%
35-39 years	8	26	11	37
40-45 years	7	24	8	26
46-50 years	15	50	11	37
Total	30	100	30	100
Old Smoking	Hypertension		not Hypertension	
	N	%	N	%
10-15 years	2	7	25	83
16-20 years	21	70	5	17
21-25 years	7	23	0	0
Total	30	100	30	100

In this study conducted in people aged 35-50 years and obtained the results as shown in Table 1. Abnormality incident left atrium, left ventricular hypertrophy and QT interval in smokers age berdasarsarkan significant and continues to increase with increasing age.

Blood pressure will tend to be high as the passage of age thus greater risk of developing hypertension. Increasing age resulted in an increase in blood pressure, because the arterial wall will be thickened causing the buildup of collagen in the muscle layer, so that the blood vessels to constrict slowly and become rigid. Hypertension often does not cause symptoms, while blood pressure is constantly high in the long term can lead to complication.<sup>8</sup>

**Table 2: Left Ventricular Hypertrophy incidence in smokers smoke at the health center by the Old Tower Hanyar**

old smoke		HVK +	HVK -	p *
10-15.	nonnotensive	0	25	0003
	Hypertension	2	0	
16-20	nonnotensive	1	4	0137
	Hypertension	13	8	
21-25	nonnotensive	0	0	-
	Hypertension	2	5	

\* Fischer Exact Test

**Table 3: Characteristics of Respondents Based on the Old Smoking in normotensive and Hypertension at Health Center Tower Hanyar**

old smoke		QT interval		P
		Normal	lengthwise	
10- 15 Years	nonnotensive	25	-	0.074
	Hypertension	1	1	
16-20 Years	nonnotensive	5	-	.281
	Hypertension	13	8	
21- 25 Years	nonnotensive	-	-	100%
	Hypertension	4	3	

\* Statistical analysis: Fisher’s Exact test Test

Based on the results table get the highest smoking duration in patients with hypertension are smokers over 15 years by 70% and in normotensive subjects under 15 years of 83%. In the table showing the old smoke has a statistically significant relationship in > 15 years and an increase in the > 20 years.

old cigarette consumption is one of the results which can significantly affect the increase in blood pressure or hypertension, substances contained in cigarettes can damage the lining of the arterial wall plaques. It cause narrowing of arterial blood vessels to increase blood pressure. Nicotine can cause hormone epinephrine increased and resulted in a narrowing of the arteries. Karbonmooksidanya can cause the heart to work harder to replace the oxygen supply to the body’s tissues. Heart work harder Tantu can increase blood pressure. Various studies have shown cigarettes are at risk for heart and blood vessels. With smoke a cigarette it will have a major influence on the increase in blood pressure or hypertension. This can be caused by CO gas generated by cigarette smoke can cause blood vessels “cramp” so that the blood pressure rises, it’s due to narrowing of the arteries due to nicotine causing the heart to work hard. As a result of heart rate and increase blood pressure.<sup>9</sup>

**Table 4: Results Interpretation Left atrial abnormalities in smokers**

		LAA		P
		No (%)	There is (%)	
Hypertension	No	29 (98.4%)	1 (1.6%)	0,00
	there is	11 (33.3%)	19 (66.7%)	

\* Test x2 / significance

**Table 5: Results Interpretation Left Ventricular Hypertrophy in Smokers**

Left Ventricular Hypertrophy	HVK (+)		HVK (-)		Total		P
	N	%	N	%	N	%	
Hypertension	18	60	12	40	30	100	0.0000 *
nonnotensive	1	3	29	97	30	100	
amount	19	31.7	41	68.3	60	100	

\* Test  $\chi^2$  / significance

**Table 6: Results of the QT interval average QT interval on Hypertension and Non Smokers Hypertension and Analysis Test T Not Pair**

Smoker	The number of patients	Average $\pm$ SD
not Hypertension	30	411.000 $\pm$ 16.942 ms
Hypertension	30	432,433ms $\pm$ 31.322

\* Significant test T Not Paired = (P = 0.002).

According to the table 9 on the sample consisted of 60 smokers who dibagi be 30 hypertensive patients and 30 non-hypertensive. Obtained 66.7% of hypertensive patients also experience abnormal left atrium.

This is largely attributable due to nicotine, carbon monoxide, and hydrocarbons are the main components of tobacco smoke that increase the arrhythmogenic potential of smoke. Especially nicotine, because simpatomimetiknya effect on cardiac autonomic function and oxidative stress, thus increasing the chances of suffering from systemic hypertension is characterized by increased blood pressure caused by increased peripheral resistance. This leads to increased peripheral resistance after load resulting increase in compensation in the form of left ventricular hypertrophy in order to maintain cardiac output to remain normal. Disruption of left ventricular hypertrophy and left ventricular diastolic function, increased left atrial pressure menyebabkan followed by dilation of the left atrium space. So electrocardiographically, it can be seen that there is a change in the shape of the P wave in leads II or V1.<sup>10</sup>

The incidence of left ventricular hypertrophy in smokers by smoking duration in health centers Hanyar Tower can be seen in Table 10. The group had smoked 10-15 years old and 16-20 years of test analysis using the Fischer Exact Test. In the 10-15 year old group smoked, showed a significant (p <0.005). In the group of 16-20 years old smoke, the result that is not related (p> 0.05). In the group of 21-25 years old smoke, found 40% had left ventricular hypertrophy.

Hypertension is a risk factor very large for heart and blood vessel disease. Smoking is one of the causes of hypertension and contribute to the development of left ventricular hypertrophy.<sup>11</sup>

In pathological conditions, such as hypertension called insufisuensi aortic pressure load or load volume called, can lead to left ventricular hypertrophy because there is an increase in the volume of cardiac myocytes and increased in size along with changes in the quality of the matrix collagen component.<sup>3</sup>

Cardiomyocytes have  $\beta$ -adrenergic receptor ( $\beta$ -AR) and  $\alpha$ 1-adrenergic ( $\alpha$ 1-AR). Activation of  $\alpha$ 1-AR can increase the contractility mediated by the activation of Gq protein. Then, the activation of phospholipase C activates the hydrolysis of phosphatidyl inositol in the membrane, then stir 2 pieces messenger, diacylglycerol and inositol triphosphate. Inositol triphosphate stimulates the release of Ca + 2 from the sarcoplasmic reticulum, where diacylglycerol activates protein kinase C (PKC) and further induces hypertrophy.<sup>3</sup>

In table 11 obtained the average value of the QT interval on smokers Longer hypertension compared to smokers who do not have hypertension. Based on the unpaired t test showed sig. (2-tailed) of 0.002, it can be concluded that the H0 is rejected and Ha accepted therefore concluded that there were significant differences between the QT interval in smokers with hypertension and hypertension. The results show that the QT interval in smokers with hypertension were significantly longer than smokers who were not

hypertensive. In patients with hypertension changes in ion channel Na<sup>+</sup> (sodium ion), K<sup>+</sup> (potassium ion) and Ca<sup>2+</sup> in the left ventricle, causing prolongation of the duration of the action potential (DPA) and elongation dispersion of repolarization transmural (DRT) of the left ventricle, which would cause a disruption of cardiac relaxation diastolic.<sup>12</sup>

### Closing Conclusion

in this study heart defects increased and statistically significant with age and the longer consume cigarettes. There is a significant relationship between hypertension with atrial abnormalities, left ventricular hypertrophy and QT interval in smokers in health centers hanyar banjarmasin sieve with the result  $p = 0.000001$ . Suggestion: In patients with hypertension are advised not to smoke and smokers are advised to quit smoking.

**Conflict of Interest:** There is no conflict of interest in this study.

**Source Of Funding:** Domestic government

**Ethical Clearance:** This study obtained a label of ethics escaped by the number: 527/KEP-FK UNLAM/EC/X/2019 on Oktober 28, 2019.

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# Lead Exposure in Community Well Water of Open Dumping Solid Waste Cipayung, Indonesia

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## Abstract

**Background:** Lead is a heavy metal toxic can causes environmental contamination and health problems. It is accumulative and can affect to several body systems. Lead can be sourced from nature and human activities. It is can remain attached to soil particles or sediments in water for a years. The movement of lead from soil particles into groundwater may occur if it is exposed to acid rain. One source of lead exposure is the activity at solid waste treatment (TPA: Tempat Pemrosesan Akhir Sampah), which is to be sourced from waste processing leachates which still use the open dumping system. Leachate can infiltrate into shallow groundwater (well) consumed by nearby residents and potentially pollute the shallow groundwater.

**Material and Method:** This research aims to calculate the risk (RQ and ECR) of lead exposure in well water consumed by residents living around to Cipayung landfill, uses the EHRA (Environmental Health Risk Assessment) method with a cross-sectional study design. The Respondents was 104 people with a total environmental sample of 49 wells.

**Findings:** The results of risk quotient (RQ) on 104 respondents is RQ real time  $\leq 1$ , RQ lifespan for 40 years indicates RQ $>1$  and ECR (Excess Cancer Risk) value for 50 years show smaller than  $10^{-4}$ .

**Conclusion:** Well water nearby the Cipayung landfill is still safe from lead exposure for the risk of non-carcinogenic health problems. However, in the 40 years later there will be risks if the population continues to consume the well water nearby the Cipayung landfill. While the carcinogenic risk for the 50 years later is still within safe limits.

**Keywords:** Lead; Risk Quotient; Cipayung landfill; leachate; open dumping

## Introduction

Landfill (TPA) is the final destination of all waste from all areas. One method of waste management system in TPA is to use an open dumping system. The open dumping system is not a fully comprehensive

waste management process. It is causing various kinds of pollution like water, air and soil pollution. Water pollution caused waste generation is mostly organic waste causes the formation of wastewater which can contain various kinds of heavy metals such as Cr (Chromium), Cd (Cadmium), Hg (Mercury), Pb (Lead), Ni (Nickel), As (Arsenic), Ca (Calcium), Mg (Magnesium), Fe (Iron), Mn (Manganese), Na (Natrium), K (Kalium), Zn (Zinc), Al (Aluminum), and other heavy metals<sup>(1)</sup>. Groundwater pollution can affect the quality of the groundwater, primarily if the groundwater is used as a source of drinking water for residents. At high levels of exposure, the lead can damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women,

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can cause miscarriages. Also, it can damage the organs responsible for sperm production; can cause finger, wrist or ankle weakness, anemia, and a slight increase in blood pressure, especially in middle-aged and older people<sup>(2)</sup>.

Lead in the environment can remain attached to soil particles or sediments in water for years. The movement of lead from soil particles into groundwater occurs when rain falls on the soil is acidic. Therefore, lead can enter the human body directly through the ingestion process because it consumes drinking water sourced from groundwater. The increase in population is directly proportional to the amount of waste generated due to human activities. The amount of waste generated in TPA is increasing every day, resulting in an increased concentration of lead in leachate. This certainly causes health problems for residents, especially those exposed to lead through well water that is consumed directly by them. The location of Cipayung landfill in Depok city and accommodates garbage or solid waste from all residents at Depok city. It has been established since 1984 and still operating today in an area of 10.8 Ha. The waste processing method carried out in this landfill is still using an open dumping system, to allow seepage of leachate into the groundwater around the landfill. Therefore, it is necessary to analyze the level of risk (RQ and ECR) of lead exposure in well water consumed by residents living around to Cipayung landfill to know safe or unsafe consumption of lead-exposed well water.

## Material and Method

This research using the Environmental Health Risk Assessment (EHRA) method. Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain time frame. The scope of EHRA can cover the health impacts of chemical pollutants and contaminants in the air, water, soil, and food; pathogenic microbiological contaminants in food and water; radiation sources; electromagnetic fields (EMFs); climate and climate change. EHRA priority is attached to evaluating the potential human health impacts. The method used in EHRA are inherently conservative and highly protective of public health. This is especially true of screening type risk assessments, which tend to use the most conservative assumptions about exposure and risk<sup>(3)</sup>. There is 4 step to calculating risk value are identifying hazards from lead exposure, analyzing doses response, calculating lead exposure

intake, and calculating the risk value (Risk Quotient/ RQ)<sup>(4)</sup>

This research was conducted on the residents living around to Cipayung landfill, which is precisely the population at RW 07. The sample was 104 respondents; they are the residents who had settled at that location for at least one year, consumed the groundwater/well water for daily drinking water, adults  $\geq 18$  years old, not pregnant and have chronic diseases, and willing to become respondents by signing informed consent. There are some data needed to perform risk level calculations, that is the lead concentration (C) data in well water, the lead duration time (Dt) data, the lead frequency of exposure (fE) data, the weight of body ( $W_b$ ) respondents data, the drinking water rate (R) data and reference dose (Rf D) at the lead ingestion process. The lead concentration data was obtained through measurements made by Laboratorium Kesehatan Daerah DKI Jakarta using the ICP (Inductively Coupled Plasma) method with the APHA 3120B/22/2012 methodological standard. Well water samples were taken from all respondents wells, so that the total number of wells from 104 respondents was 49 wells. The lead duration time data, the lead frequency of exposure data, the weight of body respondents data, the drinking water rate data can be obtained from interviews using questionnaire instruments. All of the data can be used to calculating lead intake with the.

$$\text{Formula: Lead intake or LADD} = \frac{C \times R \times fE \times Dt}{W_b \times t_{avg}}$$

$t_{avg}$  for noncarcinogenic effect is default value 30-year  $\times$  365 days/year and for carcinogenic effect is default value 70-year  $\times$  365 days/year. After all the data is collected, calculating of lead RQ by dividing the exposure intake of lead with lead Rf D, and calculating of lead ECR by multiply lifetime average daily dose (LADD) or intake for carcinogenic effect with Cancer Slope Factor (CSF) for the lead.

$$\text{RQ for lead} = \frac{\text{Lead Intake}}{\text{Rf D}}$$

$$\text{ECR} = \text{LADD} \times \text{CSF}$$

Rf D and CSF use the values listed in the Integrated Risk Information System (IRIS), which can be accessed on the website [www.epa.gov/iris](http://www.epa.gov/iris). However, the value of lead Rf D and CSF for ingestion exposure was not found<sup>(5)</sup>, so the lead Rf D can using the calculations

or data from previous research<sup>(4)</sup>. This research using Rf D from the results of the research by Nukman, 2005 in Pratiwi, 2015<sup>(3)</sup>, which was calculated based on the average anthropometric data of the Indonesian population. Obtained Rf D value of 0.0014 mg/kg/day. The value for lead CSF taken from the Office of Environmental Health Hazard Assessment-California is  $8.5 \times 10^{-3}$  mg/kg/day<sup>(6)</sup>. The RQ calculation value will indicate the conclusion a safe risk or unsafe risk.  $RQ > 1$  means that the well water consumed by residents living around to Cipayung landfill is not safe from lead exposure, and if  $RQ \leq 1$  then the well water is safe from the risk of lead exposure<sup>(7)</sup>. Estimates of risk can also be calculated for the next few years called lifespan RQ. The ECR calculation value will indicate the amount of risk for carcinogenic effect throughout life<sup>(4)</sup>.

**Findings:** This research conducted to residents living around to TPA Cipayung, Depok city with characterization which can be seen in Table 1 below.

**Table 1: Distribution and Frequency the Characterization of Respondents Living Around to Cipayung Landfill, Depok City, 2019**

Variable	Total of Respondents (n)	%
Age (year)		
18-30 year	17	16.3
31-40 year	27	26.0
41-50 year	37	35.6
51-60 year	14	13.5
61-70 year	7	6.7
71-80 year	1	1.0

Variable	Total of Respondents (n)	%
81-90 year	1	1.0
Gender		
Male	32	30.8
Female	72	69.2
Total	104	100

**Source:** The results of interviews with a questionnaire which has been processed using computer software

According to table 1, the respondents in this study were at most 41-50 years old, and women. This affects the frequency of exposure because most women in the area are housewives who are in the neighborhood every day. So that more exposure to lead through drinking water compared to other respondents. The first step of the EHRA is to identify hazards by measuring the concentration of lead exposure in well water. The following are the results of the measurement can be seen in Table 2 below. The second step is to do a doses response analysis by determining the value of Rf D and CSF. This value is not yet found in EPA, so the value of Rf D refers to previous research conducted by Nukman (2005) in Pratiwi (2015) that is equal to 0.0014 mg/kg/day. The CSF value refers to the standard used by the Office of Environmental Health Hazard Assessment-California, which is equal to  $8.5 \times 10^{-3}$ . The third step is to do a response dose analysis that is calculating lead exposure intake that enters the respondent's body by previously calculating the rate of drinking water rate (R), frequency of exposure (fE), duration of exposure (Dt) and weight of the respondent (Wb). All of this data can be seen in Table 2 below.

**Table 2: Distribution and Frequency of Lead Concentration, Lead Intake, Respondent Consumption Rate, Exposure Time, Exposure Duration, Weight of Body Respondents Living Around to Cipayung Landfill, Depok City, 2019**

Variable	Total of Respondents (n)	Mean	SD	Min-max
Lead Concentration (C in mg/L)	104	$6 \times 10^{-3}$	$33 \times 10^{-3}$	$5 \times 10^{-4}$ - $1.72 \times 10^{-2}$
Consumed Rate (R in liter/day)	104	2.06	0.77	0.7 – 4.4
Frequency of Exposure (fE in day/year)	104	361.78	7.75	317 – 365
Duration Time (Dt in a year)	104	30.34	15.92	2 – 85
Weight of Body (W <sub>b</sub> in kg)	104	59.27	11.26	35-91

**Source:** The results of the measurement of Laboratorium Kesehatan Daerah DKI and the results of interviews with a questionnaire which has been processed using computer software

The data in the table above are used to calculate the exposure intake of lead in well water consumed by respondents in this study. The fourth step is to perform

a risk characterization by calculating the RQ value. The results of calculating the intake and RQ of lead exposure in well water can be seen in Table 3 below.

**Table 3: Intake and Value of Risk for Respondents Living Around to Cipayang Landfill, Depok City, 2019**

Variable	Total of Respondents (n)	Intake		RQ	
		Mean	Min-max	Mean	Min-max
Rea Time	104	$2 \times 10^{-4}$	$6 \times 10^{-6} - 9.9 \times 10^{-5}$	$0.17 (\leq 1)$	$4 \times 10^{-3} (\leq 1) - 0.71 (\leq 1)$
Lifespan 30 year	104	$2.24 \times 10^{-5}$	$0 - 1.1 \times 10^{-4}$	$0.16 (\leq 1)$	$8.4 \times 10^{-4} (\leq 1) - 0.80 (\leq 1)$
Lifespan 35 year	104	$2.61 \times 10^{-5}$	$0 - 1.3 \times 10^{-4}$	$0.19 (\leq 1)$	$9.8 \times 10^{-4} (\leq 1) - 0.94 (\leq 1)$
Lifespan 40 year	104	$2.98 \times 10^{-5}$	$0 - 1.5 \times 10^{-4}$	$0.21 (\leq 1)$	$1.11 \times 10^{-2} (\leq 1) - 1.07 (> 1)$
Lifespan 45 year	104	$3.36 \times 10^{-5}$	$0 - 1.7 \times 10^{-4}$	$0.24 (\leq 1)$	$1.25 \times 10^{-2} (\leq 1) - 1.21 (> 1)$
Variable	Total of Respondents (n)	LADD		ECR	
		Mean	Min-max	Mean	Min-max
50 year	104	$1.6 \times 10^{-5}$	$0 - 8 \times 10^{-4}$	$1.36 \times 10^{-7}$	$1 \times 10^{-8} - 6.8 \times 10^{-7}$

**Source:** The results of data processing using computer software

The RQ value reflects the risk of being safe and unsafe from exposure to the environment. According to the results in table 3, it was found that the average respondent had a safe RQ value, which was located  $< 1$ . However, the results of the calculation of RQ lifespan 40 years there are already respondents who have the results of unsafe RQ calculation  $> 1$ . The results of further observations showed that the respondents were women who had been exposed for 25 years to consume well water that had the highest lead concentration based on the measurement of lead levels in well water. The location of the well is 130 meters from the open dumping TPA Cipayang. The condition around the house that has the well is a field that allows the entry of acid rain and helps absorb lead into the groundwater and pollutes the well water of the population. So that if the respondent is exposed to lead through drinking water for 40 years, then in the next 15 years there is a risk of non-carcinogenic health problems. If children consume the well water, in the next 40 years there is a risk that it will not be safe to consume water exposed to lead and is also at risk of developing health problems that are non-carcinogenic. There was a similar study conducted by Pratiwi, 2015 on populations living in industrial and non-industrial areas in Gresik, East Java, Indonesia obtaining real-time RQ, but with a duration of exposure for 30 years for the age of RQ is  $> 1$ <sup>(8)</sup>. Other studies by Tias, 2017 for people who live in TPA Namo Bintang, North Sumatera, Indonesia,

obtaining the maximum real-time RQ is 12.5, it means  $RQ > 1$ , so people who live around TPA Namo Bintang risk being unsafe to consume water from wells<sup>(9)</sup>. The ECR calculation for 50 years the maximum value is smaller than  $10^{-4}$ <sup>(4)</sup>. It means that in the next 50 years of exposure, residents who consume lead-exposed well water are still safe from the risk of health problems that have carcinogenic effects. There are not many studies that calculate environmental health risks due to exposure to lead in drinking water, so it is hoped that this study can illustrate that although current conditions do not create unsafe risks, the potential for unsafe risks can occur at any time. Especially if the main exposure source is not immediately stopped.

Based on this, risk management is needed to protect residents from unsafe risks when consuming well water containing high lead exposure. One effort is to improve the waste management system in the landfill so that leachate does not pollute shallow water or community well water and look for alternative drinking water sources that are free of heavy metals, especially tin, and for the government to look for other method for better waste management systems other than open dumping or moving landfill to new areas with a better waste management system.

## Conclusion

Well water nearby the Cipayung landfill is still safe from lead exposure for the risk of non-carcinogenic health problems. However, in the 40 years later there will be risks if the population continues to consume the well water nearby the Cipayung landfill. While the carcinogenic risk for the 50 years later is still within safe limits.

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# Does Parent's Gender Shape Adolescent's Behavior? a Study among Indonesian Migrant Worker Families Left Behind

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## Abstract

**Background:** Migration is known of its contribution to overcome poverty. Despite the benefits, migrated parent(s) who leave their children behind, create a new shape of public health problem: adolescent problem behavior, i.e smoking, early sexual activities, unhealthy diet, poor physical activity, violence and criminal.

**Purpose:** This research aims to define the relationship of parent's gender and the length of working period of parent overseas, to adolescent behavior.

**Method:** This observational survey use cross-sectional design, involves 65 respondents of adolescent in Gumelar sub-district, part of Banyumas District in Central Java, Indonesia. Four villages are chosen to represent the sub-district situation. Data collected is analysed in univariate, bivariate and multivariate.

**Results:** Multivariate analysis result shows the Odds Ratio (OR) value of the variable parents who work abroad is 16.5. It means that mothers who work abroad will cause teens to have risk behaviors by 16.5 times higher than teens who were left by fathers for working overseas.

**Conclusion:** Mothers who work abroad increase the potential for adolescents 16.5 times more likely to have risky behavior, compared to if fathers left overseas.

**Keywords:** *Children left behind, risk-behavior, Indonesian migrant workers*

## Introduction

Parents who migrate to other countries to work, despite getting remittances and other benefits, simultaneously also have a negative impact on health,

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change ties in the family and social environment and increase the burden on the health system<sup>1</sup>. Migration becomes an event that can cause problems for families and children, because the separation of children from parents is the worst consequence of parental migration. Children in migrant worker families are the group most vulnerable to emotional and psychological stress, feelings of neglect, and low self-confidence. These three things have a very strong potential to undermine children's overall development and socialization patterns<sup>2</sup>. The international organization, UNICEF - UNDP, in 2006 specifically conducted a review of the impact of remittances on children and women in migrant households in the countries of origin of migrant workers,

which shows that parental migration poses a risk to children and impacts on children’s rights that cannot be resolved only by remittance<sup>3</sup>.

Adolescent is a phase where a person experiences big changes in social interactions and relationships with others. This period is a phase in an individual’s life, and not a permanent period, a phase in which the individual is no longer a child, but also has not yet reached adulthood<sup>4</sup>. During adolescence also changes the relationship between children (adolescents) with parents<sup>5</sup>. The child’s relationship with the family, especially the child’s relationship with the mother, will affect the child’s early emotional development<sup>6</sup>.

**Method**

**Research Design:** This research is a cross sectional study conducted in 4 villages in Gumelar District, Banyumas Regency, Central Java, Indonesia. The study were conducted from May to August 2019. The independent variables were parents who work abroad (father or mother), length period of parents working, and peer influence. The dependent variable is risk behavior in adolescent migrant worker children.

**Population and Samples:** The population in this study was 96 adolescents aged 11-18 years who were left behind by one of their parents working abroad. The sample selection is done by inclusion and exclusion criteria. The inclusion criterion is a parent has been working abroad for at least 6 months, the exclusion criterion is that when the research was carried out parent who worked abroad had been returned to Indonesia.

**Sample Size:** Total sampling technique was used and recruited 65 adolescents who meet the inclusion criteria.

**Instruments:** This study used a questionnaire of adolescent’s risk behavior and factors that influence it. The questionnaire was compiled based on the main references from (1) Indonesian Demographic and Health Survey 2012 on Adolescent Reproductive Health, compiled by the Central Statistics Agency, National Population and Family Planning Agency, Ministry of Health and ICF International, (2) 2017 Youth Risk Behavior Survey compiled by the Center for Disease Control (CDC) Division of Adolescent and School Health, and (3) Global School-based Student Health

Survey (GSHS), compiled by WHO and the Center for Disease Control (CDC) in collaboration with UNICEF, UNESCO, and UNAIDS

**Data Collection:** Structured interview was applied to collect data, done by interviewing respondents using the questionnaire.

**Statistical Analysis:** Data was analysed in (1) univariate, to describe each variable, (2) bivariate with Chi square test, carried out to select variables to be tested in the multivariate stage, and (3) multivariate, to analyze the variables that had the most influence on risk behavior in adolescent migrant worker children.

**Result**

Total of 65 respondents in this study were left behind adolescent aged between 11-18 years. The risk factors to their risky behavior analysed were (1) parent working abroad (migrant parent), (2) length of parent’s working, and (3) influence of peers. Bivariate analysis was carried out to select variables to be included in multivariate analysis. The result of bivariate test is shown in Table 1.

**Table 1: Risk Factors of Adolescent Risky Behavior**

No	Variables	n	%	p - value
1.	Parent working abroad (migrant parent)			0,022*
	Mother	60	92.3	
	Father	5	7.7	
2.	Length of parent’s working			0,259
	>3 yrs	45	69.2	
	≤3 yrs	20	30.8	
3.	Influence of peers			0,002*
	Risky	32	49.2	
	Not risky	33	50.8	

The variables included in the multivariate analysis stage were the variables with p value <0.25. The results of the bivariate analysis showed that the variable with a p value <0.25 were the variable of parents working abroad (0.022) and the peer influence (0.002). The variable of length of parent’s working abroad had a p value of 0.259 so that was not included in the multivariate analysis. Multivariate analysis used multiple logistic regression prediction models. The result of multivariate analysis is shown in Tabel 2 as follows:

**Tabel 2: Final Result of Multivariate Analysis**

Variables	B	p-value	OR	95% CI
Parent working abroad (migrant parent)	2,806	0,033	16,5	1,2-215,7
Influence of peers	2,900	0,018	18,1	1,6-199,8

The result of multivariate analysis showed that variables significantly related to adolescent behavior were variables of parents who worked abroad and peers. The analysis results obtained Odds Ratio (OR) from the variable of parents who work abroad is 16.5, meaning that mothers who work abroad, as the risky category, will cause adolescent to be engaged in risky behavior by 16.5 times higher than those who were left by fathers who work abroad. Odds Ratio (OR) value of influence of peer variable is 18.1, meaning that peers who have risk behaviors will cause adolescent behavior to engage risky behavior by 18.1 higher than peers with no risk behaviors. The results of this initial modeling show that the two variables have a p value <0.05 so that the model is accepted as a model of relation between parent working abroad and influence of peers to adolescents behavior.

### Discussion

One of negative effect of parent migration is changing ties in the family<sup>1</sup>. It becomes an event that can cause problems for families and children, because the separation of children from parents is the worst consequence of parental migration. Children left behind (CLB) is the most vulnerable group to emotional and psychological pressure, feelings of neglect, and low self-confidence. These three things have a very strong potential to undermine children's overall development and socialization patterns<sup>2</sup>.

UNICEF<sup>7</sup> summarized effects of migration on children left behind. It differs fathers to mothers leaving overseas. When mothers migrate, it will affect children psycho social health, education, risk to be abused, domestic gender division and family break up. While the children left by fathers are more likely to be affected by poverty in female headed household which leads to a households vulnerability.

Adolescent, in particular, is also affected by parental migration. They often experience difficulties in social relationships and put themselves close in small groups with peers who have the same situation. They are also

often left together with responsibilities that are not resolved by their parents, regardless the mother or father migrate<sup>2</sup>.

This study found that parent working overseas related to adolescent behavior. In particular, adolescent who are left by migrated mothers have higher potential to be engaged to risky behavior. Regarding the family structure, a research showed that family structure influences the experience of sexual intercourse in adolescents<sup>8</sup>. Smoking, alcohol consumption, and sexual behavior were found higher among adolescent in single parent families<sup>9</sup>.

Previous studies on children left behind are in line. It is found in South China the problems of risk behavior and suicidal ideation in CLB in rural areas<sup>10</sup>. The problem of mental disorders in CLB is also a problem in Sri Lanka<sup>11</sup>. Other studies showed that migrating mothers are risk factors for the mental condition of their children<sup>12, 13</sup>. A study in Italy concerning mothers and children who had been physically separated as mothers worked in other countries, and then reunited, showed that the length of time separated was relevant, because it led to change the meaning and family life between countries, which also change the role of children in the family<sup>14</sup>.

Parents, especially mothers, who work, are a threat to the relationship between parents and children. If the child is entrusted to the caregiver and the child feels happy, then the mother will feel unhappy. Meanwhile, if the child feels unhappy and happy with the caregiver, the child will hate the mother or parents who do not care for him<sup>15</sup>.

Other finding of this study is the influence of peers on adolescent risky behavior. Risk behavior is a type of behavior that endangers health and tends to increase in adolescence<sup>5</sup>. Increased involvement in health risk behaviors is a marker of adolescence. Factors that encourage adolescents to take risks on themselves are social and cultural factors, including changes in family, poverty and racism<sup>16</sup>. Include in risky behaviors are: tobacco consumption, poor diet, low physical activity,

alcohol consumption, drug abuse, sexual behavior and risky behavior in accidents. These risky behaviors are the biggest causes of adolescent death which generally begin early in adolescence and peak at the end of adolescence and early twenties<sup>17</sup>.

Although it against the norm, some risky behaviors are behaviors that adolescents learn from their social environment, supported by their social environment, and can be controlled both individually and by their social environment. These behaviors also have a special function for adolescents in achieving normal development goals: to show the independence of their parents, to be accepted by their peers, reject conventional values in their environment, and perhaps the most important thing is to be a marker of changing to become more mature<sup>18</sup>.

Understanding the impact of risky behaviors during adolescence to their future, it needs to highlight that family is always the most important social influence for children, although they have developed relationships with the environment outside the home. Close relationships in family will have more influence on children than other social influences. Children are also more dependent on parents for safety and happiness. If the child's relationship with parents deteriorates, the consequences will be bad, too. In particular, the relationship between mother and child has a stronger influence. This is because to most mothers the child is very dependent<sup>15</sup>.

**Study Limitations:** This study did not analyse the age of respondents when they were left behind, so that the study cannot explain whether the behavior among respondents is a natural expression due to a lifespan development or caused by migrated parent in particular. It is suggested to next studies to search further of the impact of migrated parent to the behavior of children left behind in every stage of age. This study then expected to recommend community how to respond the needs of children left behind of affection from family, caregiver, or community.

## Conclusion

Parent, in particular mothers, who work abroad, and influence of peer increase the potential for adolescents to have risky behavior. When migrating is inevitable, it is important to maintain the family relationship even though there is a distance between parent overseas and the children in home country. Adolescent, especially, needs to be supported to undergoing their journey of lifespan.

So that they can get through the conflicts and achieve the highest standard of well-being.

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# Kurdish Women's Experiences of Health Care Needs with Breast Cancer: A Qualitative Interview Study From the Kurdistanregion of Iraq

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## Abstract

**Purpose:** Poor accessibility to health services, lack of sufficient health-related information, and problems related to socioeconomic, infrastructural, geographical, and ethnic variations may lead to delayed diagnosis and treatment of breast cancer. Through real experiences of women patients admitted in an oncology department, we aimed to identify and better understand the health care needs that women with breast cancer face during their treatment journey.

**Method:** The present qualitative study was carried out using inductive content analysis. Data was obtained from 12 women in oncology departments in two different hospitals in the city of Erbil, in the Kurdistan Region of Iraq. In-depth semi-structured interviews were conducted and thematic analysis of the collected data resulted in the extraction of themes and subthemes.

**Results:** Analyzing the transcripts of the interviews revealed four main themes: Emotional, spiritual, and psychological needs; Physical and body image change needs and Information needs

**Conclusions:** During their search for health care services, patients with breast cancer in the Kurdistan Region of Iraq are faced with Understanding the phenomenon of 'living with breast cancer' seems to be crucial for nurses to help women with breast cancer to find themselves in confronting the consequences of the changes associated with the illness. That needs to be resolved in order to enable delivering of a higher quality of health care to these patients.

**Keywords:** Breast neoplasm; qualitative research; oncology women; Kurdistan; Iraq.

## Introduction

A diagnosis of breast cancer becomes one of the most dreadful events to occur in a women's life, and coping with it can be psychologically exhausting. The word "cancer" alone, can cause much dread. The global

statistics in 2012 revealed 14.1 million new cases of cancer annually resulting in 8.2 million deaths. These figures are expected to double by 2032.<sup>1</sup> According to the most recent reports by the World Health Organization, the breast cancer prevalence rate is one per eight women.<sup>2</sup> Since breast cancer is the most common type of cancer in women; it is the second leading cause of cancer deaths among females. In 2006, a total number of 191,400 cases of breast cancer were diagnosed among women in the USA leading to the death of 40,800.<sup>3</sup>

The rapid changes in lifestyle and geopolitics over recent years have resulted in an increase in prevalence of breast cancer in the Kurdistan Region of Iraq; such that

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breast cancer is currently one of the most prevalent types of malignancy among the Iraqi population, resulting in about one-third of the registered cancers in females and almost one quarter of female deaths from cancer.<sup>4, 5</sup> Affecting all age groups, breast cancer had a prevalence rate of 26.6 per 100,000 Iraqi women in 2000, which rose to 31.5 per 100,000 in 2009.<sup>6</sup> Breast cancer is now considered one of the major threats to health among Iraqi women. It is more prevalent among middle-aged women and is characterized by advanced stages and aggressive pathology with a high rate of mortality.<sup>4, 7</sup>

There is very little known about the needs that oncology patients with cancer face while trying to access the health care system in the Kurdistan region of Iraq. A qualitative study was conducted, aiming to identify and better understand the health care needs that women with breast cancer face during their treatment journey.

## Method

**Study Design:** In the present qualitative study Kurdish women's experiences of health care needs about breast cancer were investigated through an inductive content analysis method.<sup>8</sup>

**Participants:** The sample consisted of 12 oncology women who willingly participated in the study. All interviews were conducted among in-patients, at a participant-chosen time and location within hospital settings, from July 2018 to January 2019. The participants were selected from among women with breast cancer based on the following inclusion criteria: diagnosed above six months; admitted in oncology department in the city of Erbil; having experience of providing health care services; being residents of the Kurdistan Region; and having begun chemotherapy. The study participants comprised 12 Kurdish-speaking women with a median age of 37 years (range 24-50 years). Regarding their educational degree, three were illiterate, five were primary and high school graduates and four were college graduates. Exclusion criteria included women aged less than 18 years, and those who had difficulty with understanding and answering the interview questions for data collection.

**Data Collection:** In-depth semi-structured interviews were conducted by the principle investigator. All of the interviews were conducted in Kurdish and were carried out in the oncology departments of N. Hospital and R. Hospital located the Erbil, in Iraqi Kurdistan. Data collection continued until data saturation was

obtained and no new concepts emerged. Individual answers provided were used to shape subsequent follow questions which were aimed at eliciting more detailed explanations. The subsequent questions included "Could you please give me an example?", "Could you please explain more?", "What do you mean?", "How was it?", and "How did you feel about that?" To give the participants more time to think and give better explanations and remember more details of their experiences, the researcher kept silent from time to time. The duration of each interview was from 33 to 70 minutes. All of the interviews were recorded, and were subsequently transcribed and analyzed.

**Data analysis of the Study:** Data analysis was carried out using the qualitative content analysis method.<sup>13</sup> Recorded interviews were transcribed verbatim, and then the transcriptions were translated into English by an experienced translator familiar with medical texts and issues. After that, the transcribed interviews were analyzed via inductive content analysis method. To depict all aspects of the content, the codes and themes were produced freely. Afterwards, during the second stage of creating themes, the transcripts were reread several times, which led to merging of similar headings, a decrease in the number of themes, and the production of broader themes. During the last stage, which was abstraction, a hierarchy for the developed themes was formulized. Finally, all themes and their subthemes were labeled with a proper name according to their content, which resulted in the highest possible level of abstraction.<sup>9</sup>

**Trustworthiness:** The level of soundness or adequacy of studies carried out through qualitative approaches such as content analysis method is called trustworthiness, requiring an accurate description of the data analysis procedure and justification of the reliability of the results.<sup>9, 10</sup> In the present study, trustworthiness was ensured by conducting the interviews at appropriate times and places, winning the participants' trust and establishing good relationships with them, benefiting from the complementary opinions of experts, and reviewing the transcripts. Therefore, two professors were requested to reconsider the transcriptions and the extracted codes.

**Ethical Considerations:** The present research study was ethically approved by the Ethics Committee of College of Nursing, Hawler Medical University (Project No. 3, approval date: 16<sup>th</sup> March 2016. Before

selecting the final participants, the researcher provided the potential participants with a thorough explanation of the study objectives, data collection method, and confidentiality of the information they provided, and their right to quit the study whenever they wished to.

## Results

### Emotional, Spiritual, and Psychological Needs:

**Emotional and Spiritual Needs:** Breast cancer has profound emotional impacts on patients and their families. Women with this illness have to face a disease fraught with fatalistic meanings, which gives rise to a series of negative emotions (fear, anger, pessimism, anxiety, and suffering), externalized in their state of mind. Oncology women in general experience spiritual loneliness due to the loss of hope, belief, and faith. Often it is difficult for patients to find meaning in their illness.

*“I believe that God does not love me, and that is why I got afflicted by the disease in the first place.”* (Participant 11)

**Psychological Needs:** Participants did not initially accept having cancer, but gradually had to. Some perceived being anxious about their future, and being irritated and apprehensive about health. Participants thought that it would be difficult for them to live with the disease, and that it was an additional burden for themselves and their families due to treatment expense and care giving burdens.

*“There is a feeling of being an outsider, it feels that the illness and near death isolates them from the healthy world.”* (Participant 5)

*“Not knowing how illness will treat me, will there be pain, how death will happen? Many patients like me have also expressed that in the end I am alone with my diagnosis.”* (Participant 3)

**Physical and Body Image Change Needs:** Breast cancer treatments with chemotherapy, radiotherapy, and surgery are associated with numerous side effects including pain, fatigue, vomiting, disabilities, edema, and hair fall. These side effects greatly influence patients' general conditions and outlook. Women acknowledged their needs, and continued to hope for life-saving interventions, but their quality of life was negatively affected by the side-effects of their cancer treatment, especially pain, fatigue, lack of energy, muscle weakness, nausea, infections, and lymphedema,

which placed limitations on their level of functioning and participation in daily life.

*“I am tired of the strength of chemotherapy and complain about the side effects, so I refuse receiving the treatment.”* (Participant 12)

*“With after radiotherapy effects, you can get very tired... it becomes a collected thing, and you suddenly feel dreadful, you feel nauseous.”* (Participant 2)

**Information Needs:** Participants discussed how they obtained information about their cancer, how they checked whether their symptoms were normal, and ways to manage side-effects. However, women who did not want to be reminded of the negativity of metastatic disease were sometimes fearful about accessing information about breast cancer because they wished to avoid negative messages.

*“I only see the patients when they are referred to the hospital, and since patients need guidance most of the time, there should be some centers in the city to help them outside the hospital.”* (Participant 7)

## Discussion

Throughout the last 16 years and due to complex political affairs in the Middle East, the Kurdistan Region of Iraq has been a hot spot for increased growth and comparatively quick economic advancement. Within the same period of time, the region has been affected by nearby wars and immigration waves from inside and outside Iraq. It is important and interesting to map the oncology care of breast cancer patients in this region.

It was noted that many patients experienced having strong negative spiritual and social needs.

Fear, depression, anxiety, and social roles instabilities are among psychological challenges that women experienced.<sup>11, 13</sup> One of the stressful at the same time genuine worries that these women had even after years of the treatment completion was fear of the future. In addition, the jeopardy of shortened life following on cancer recurrence was another concern.<sup>14, 15</sup> The most repeatedly stated concern in every phase of experiencing breast cancer is fear. Physical symptoms as pain, invasive treatments, the likelihood of cancer reappearance, and the possibility of death are causing patients to experience fear.<sup>12</sup> Fear of recurrence and symptom distress are predictive of the appraisal of cancer as stressful.<sup>16</sup>

Another theme emergent from the reported life experiences was the negative impact of physical complications of cancer treatment such as pain, fatigue, nausea, hair fall, and other disabilities. This finding is in accordance with those reported by Heydarnejad and colleagues who reported the negative and side effects of cancer therapy that had on the patients' quality of life.<sup>17</sup>

Breast cancer experience is a complex experience of affected women; it has an impact on all the life aspects throughout and even after the treatment. Even though each woman experiences breast cancer in a unique way, the common views they share is linked to the functional and physical adverse impacts of cancer treatment. The most well-known concerns of survivors of breast cancer are restriction of upper extremity motion, limitation of activity, fatigue, pain, lymphedema, and "chemotherapy-induced peripheral neuropathy (CIPN)"<sup>18,22</sup>

Other important themes and subthemes acknowledged in our study include patient education/information/communication needs. Patients and caregivers also identified a lack of education and knowledge about lung cancer diagnosis and treatment as a barrier to their care. Patients and caregivers were not always fully knowledgeable about breast cancer, treatment options, or the duration of treatments. They relied on the health care provider to disclose such information or direct them to credible sources. In many instances, patients were misinformed about the causes of breast cancer. Post-treatment care, for example, exercise, diet, and follow-up are that information that the survivors felt in need for it. Comparable findings were noted in the previous studies.<sup>23</sup> Information about signs and symptoms of recurrence of cancer was a need.<sup>24</sup>

### Conclusion

During their search for healthcare services, patients with breast cancer in the Kurdistan Region of Iraq provided insight into their experiences and needs as breast cancer survivors. The participants have undergone traumatic experiences during diagnosis, treatment, and post-treatment phases. The study findings throw light on the fact that the breast cancer survivors have major psychosocial, information, physical and family support needs. Recognizing the experiences and needs of the breast cancer women, their family members, health care workers, community members, and policy makers after the end of treatment is important to facilitate optimal delivery of health care at the community settings to

improve the quality of life of breast cancer survivors.

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# Translation, Cross-Cultural Adaptation, Validity and Reliability of the Malay Version of the Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (Rockas-St-M)

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## Abstract

**Objective:** To translate and culturally adapt the Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (RoCKAS-ST) into Malay and evaluate the reliability of the Malay version of the survey (RoCKAS-ST-M) in high school-age athletes age under 18 year old.

**Study Design and Setting:** The RoCKAS-ST was forward and backward translated, and culturally adapted into Malay language on 32 high-school athletes (contact and non-contact sports) under age 18 years old and participated at various level of sports competitions. All participants completed the translated RoCKAS-ST-M (Malay) that was administered twice at 14 days interval after first attempt. The internal consistency, face validity and test-retest reliability were calculated using Cronbach's alpha value, discussion and intraclass correlation coefficient (ICC), accordingly for RoCKAS-ST-M.

**Results:** The RoCKAS-ST-M show considerable acceptable moderate internal consistency with CKI and CAI score range between 0.40 and 0.66 of Cronbach's alpha. The reliability of CKI and CAI shows a good reliability value exceed 0.60 of ICC. The RoCKAS-ST-M scale was valid, and reliable among high school athletes that involved in various sports participation.

**Conclusion:** This study showed that the cross-cultural adaptation of the English version of RoCKAS-ST was successful and this score could be useful to evaluate the level of knowledge and attitude of high school athlete toward sports concussion.

**Keywords:** Concussion, concussion knowledge, concussion attitude, high-school athletes, reliability

## Introduction

High school-age athlete that involve in sports especially in contact sports are at greater risk exposed to sports related concussion and more vulnerable to experience second impact syndrome (SIS) that may lead to catastrophic condition if not treated early<sup>1,2</sup>. It estimated that the incidence of sports related concussion among youth is between 1.3 to 3.8 million per year

in United State of America and not representing any specific age group<sup>3</sup>. To date, the overall estimate of the incidence of sports concussion at young athletes is not available due to several reasons. This include variation of definition use, inability to identify the sign and symptom of this condition, and underreporting behaviour among athletes in high school setting which lead to assumption of the occurrence of sports related concussion may be under estimate in this population<sup>2,3</sup>.

Nowadays, more information is available about sports related concussion regarding its aetiology, signs and symptoms, early management and return to sports criteria that has been made available and distributed to the sports personnel, coach and parents<sup>4-6</sup>. There is also more action taken by authorities to distribute, create an awareness program and preventive measure regarding sports related concussion management among high-school athletes. However, it is unclear whether the program is effective to increase the knowledge, awareness and to modify the unsafe behaviour about concussion among high school athletes<sup>7-8</sup>.

In addition, little has been done to examine the knowledge and attitude toward sports related concussion among high school athletes population<sup>9</sup> particularly in Malaysian context. A systematic review warranted the need of further study to examine the sports related concussion knowledge and safe reporting behaviour among sports administrative team and high school athletes<sup>2</sup>. Rosenbaum and his colleagues<sup>7</sup> developed and validated a Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (RoCKAS-ST) which evaluate the Concussion Knowledge Index (CKI) and Concussion Attitude Index (CAI) of the high school athletes. The result of the survey aims to provide information for potential education intervention program specific for this athlete's population. As consequence, a Malay version of (RoCKAS-ST-M) would be very useful for evaluating the concussion knowledge and attitude the high school athletes in the Malay-speaking population. Therefore, the primary aim of this study was to translate, cross-culturally adapt and establish the face validity and reliability of the RoCKAS-ST-M within Malaysian context.

## Materials and Method

**Study Design:** This study was conducted in two stages. At the first stage, the translation and cross-cultural adaptation of the RoCKAS-ST into Malay version was performed according to the five stages proposed in the Guidelines for the Cross-Cultural Adaptation Process<sup>10</sup>. In the second stage, the measurement of RoCKAS-ST-M properties was performed following a purposive sampling model. This study was conducted at selected high school, which consists of 32 high-school athletes (contact and non-contact sports) under 18 year old and participated at various level of sports competition. The sample size was determined following minimal requirement to pre-testing the complete questionnaire

that may provide some quality improvement in content validity<sup>10</sup>. Each participant was informed about the study procedure and all participants are recruited based on volunteer basis. Informed consent form from each participant was obtained prior the conduction of the study.

**Translation and Cross-Cultural Adaptation:** The translation and cross-cultural adaptation procedure of RoCKAS-ST followed an international guideline that consist of five stages<sup>10</sup>. At the first stage, forward translation of original RoCKAS-ST into Malay language by two independent translators with a command of English. The informed translator (T1) was a physiotherapist and the non-informed translator (T2) was a language teacher. Both translator have a good English command and spoke fluent Malay language as their mother tongue. In the second stage, both the original RoCKAS-ST and Malay version (T1 & T2) were compared and reviewed by both translators with the third independent observer. Any issues or inconsistencies in translation were resolved through consensus in order to establish the first version of RoCKAS-ST-M (T-12). In the third stage, the backward translation of T-12 were establish by two independent translators that were asked separately to translate back the RoCKAS-ST-M (T-12) into English version (BT-1 & BT-2) as a process of validity check in recognizing any inconsistencies of conceptual error in the first version translation of RoCKAS-ST-M. In the fourth stage, a group of discussion were made between the expert in the methodological, physiotherapist and all four translators including language expert. These group experts compared and reviewed all four versions of the survey and establish the new RoCKAS-ST-M for field-testing. In the final stage, the test of pre-final version of the RoCKAS-ST-M survey was performed in  $n = 32$  high-school athletes that involved in contact or non-contact sports. The COSMIN checklist were used for further assessment on the measurement properties of the RoCKAS-ST-M<sup>11</sup>.

**Participants:** Participants of this study are all high school athletes. The eligibility criteria were as follows: (i) age must be under 18 year, (ii) involved in contact or non-contact sports, and (iii) each individual were recruited under volunteer basis. The final version of the RoCKAS-ST-M were administered twice by appoint researcher at 14 days interval after the first attempt. Before collection of the survey, each participant were reminded to complete the survey at their best effort.



**Statistical Analysis:** Descriptive analyses were presented as mean, standard deviations and percentages. The internal consistency was measured using Cronbach's alpha with value ranging from 0.70 to 0.90 that considered as good to greater indicator. The value exceeding 0.90 was considered as high correlation<sup>12</sup>. The face validity were established through discussion, judgement and agreement between expert group and participant's feedback session. The test-retest reliability of RoCKAS-ST-M were calculated using the intraclass correlation coefficient (ICC) with corresponding of 95% of confidence interval using two-way random effects model in order to determine the intersession repeatability between measurements<sup>12,13</sup>. The value of reliability were rated as poor ( $r = 0.00 - 0.20$ ), fair ( $0.21 - 0.41$ ), good ( $0.41 - 0.60$ ), very good ( $0.61 - 0.80$ ) and excellent reliability ( $0.81 - 1.0$ )<sup>14</sup>. Feasibility of the RoCKAS-ST-M were estimated using the time to fill up the questionnaire. Statistical significant p value were pre-set at 0.05. Data were analysed using IBM SPSS Statistics 21.0 software.

## Results

### Cross-Cultural Adaptation And Face Validity:

The expert group and five high school athletes that involved in contact and non-contact sports were interviewed in separate group discussion. Feedback from each group discussion reached a similar consensus that the questionnaire was easy to understand and there is no specific cultural adaptation required. Furthermore, based on discussion in expert group, it concluded that the construct of the RoCKAS-ST-M questionnaire were pertinent for the purpose of questionnaire and intended population.

**Study Participants:** Total of 38 participants were included in this study, but 6 participants provided invalid answers on the RoCKAS-ST-M questionnaire. Therefore, only 32 questionnaires were evaluated in this study. From 32 participants (19 males and 13 females) were aged between 16 and 17 year old. In total, twenty-four participants were involved in contact sports and eight were from non-contact sports.

**Internal Consistency:** Analysis of internal consistency for the translated CKI score comprising of 37 items presented with the Cronbach's alpha,  $\alpha = 0.40$ . Analysis of the internal consistency of the translated CAI score comprising of 18 items considered as having a good reliability with Cronbach's alpha,  $\alpha = 0.66$ . Most items needed to be preserve, except for item in section

4, question number 2, where the deletion of this item would increase the alpha value to  $\alpha = 0.71$ . Therefore, the elimination of this item should be considered.

**Test-retest Reliability:** Mean score of CKI is 16.09 ( $\pm 2.25$ ) and 14.41 ( $\pm 2.15$ ) for first and second attempt, respectively. The test retest reliability indicated good reliability of CKI score with ICC of 0.64 (95% CI 0.26 – 0.83),  $p < 0.05$ . Mean score of CAI is 59.4 ( $\pm 5.21$ ) and 58.4 ( $\pm 6.02$ ) for first and second occasion, respectively. The result of test-retest reliability revealed a similar result with a good reliability of CAI score presented with ICC of 0.69 (95% CI 0.37 – 0.85),  $p < 0.05$ .

## Discussion

The purpose of this study was to establish the face validity and reliability of the RoCKAS-ST-M within Malaysian context in a sample of high school athlete that involve in contact and non-contact sports. The qualitative analyses of measure of RoCKAS-ST-M resulted in acceptable and good reliability and suggest this questionnaire is a stable and acceptable measure of concussion knowledge and attitude among high school athletes involved in contact and non-contact sports. The mean score of CKI is slightly differ from first measurement and this could reflects the facts that some athletes providing a different responses from first measurement and second measurement. The reason probably the athlete does not know the correct answers to the given questions and start guessing on both measurements<sup>7</sup>. In addition, the analysis of internal consistency using Cronbach's alpha showed a good consistency between both measurements.

Therefore, this study has successfully translated and validates the Malay version of RoCKAS-ST-M. This is an important procedure in order to improve understanding on the question and increase the relevancy of the provided answers. Moreover, the level of English proficiency among Malaysians was still considered low<sup>15</sup>. In fact, this is a global problematic in various fields include higher institutions and industrials especially for non-English native<sup>15-17</sup>. Therefore, by translating to own native language, lower misunderstanding and higher accuracy of the answer could be achieved. In addition to that, the relevant answers enhance the quality of intervention framework in future.

The intervention of sports concussion education program requires an accurate assessment of current population knowledge gaps before development of

specific educational strategies<sup>1</sup>. The goals of educational program are two-fold; to improve the individual concussion knowledge and to change the unsafe attitude by encouraging self-reporting behaviour among athletes with self - suspected concussion during training or competition. Athlete that receive a formal education program related to sports concussion were more likely to report concussion-related symptoms<sup>7</sup>. Previous studies also suggested the important of the role of the coach, teammates and parents were encouraging the reporting behaviour<sup>18</sup>. Therefore, the intervention of education program should not focus entirely to high school athlete but also consider including both coach and parents altogether. The sports concussion risk factor were graded as high among athlete with history of previous concussion and increased risk high impact collision in matched play compared to training, with age, gender, playing position and player level are indicated as low risk of sports concussion<sup>19</sup>. The future education program should consider these factors for targeted intervention to the athlete with high risk of sports concussion. According to Consensus statement on Sports Related Concussion that was held in Berlin<sup>4</sup>, schools are encouraged to imply the SRC policy which include the education, prevention and management for sports concussion for coach, teachers, staff and parents in providing appropriate supports to athletes recovering from SRC.

### Conclusion

The RoCKAS-ST-M was found to be reliable and valid tools to measure concussion knowledge and attitude level among high school athletes in Malaysia setting. Most importantly, it allows the evaluation of knowledge and attitude on sports concussion which essential in examination of the effectiveness of concussion education program, reporting behaviour and sports concussion management. Future researcher will be able to use this questionnaire to assess the athletes understanding on sports concussion on a large scale and identify athlete with high-risk behaviour. It is important for early detection of unsafe attitude toward sports concussion in this young athlete particularly those who involved in contact sports.

**Ethical Clearance:** This study was approved by the university research committee (Code Project: 2017-0241-107-01) and Educational Planning and Research Division Ministry of Education Malaysia (Ref. No.: KPM.600-3/2/3-eras (130)).

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**Declarations of Interest:** Nul.

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# Changes in Blood Serum Levels of IGF1 in Type 2 Diabetes and Alzheimer's Disease in Saudi Population: An Observational Study

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## Abstract

**Context:** The prevalence of Alzheimer's disease (AD) in the Middle East including Saudi Arabia is increasing rapidly, heightening the importance of finding effective preventive therapies and identifying the possibility risk factors such as Type 2 Diabetes (T2DM). Over the last few years it has been suggested that T2DM and AD are linked. Many researchers suggested insulin growth factor (IGF1) and insulin signaling could be the relation between the two pathologies. To gain insights on this relation, an observational study was initiated. We recruited and interviewed 300 research participants (age  $\geq 65$  years): 100 controls, 100 T2DM and 100 AD. We assessed the association between glycated hemoglobin (HbA1c) and MiniMental State Examination (MMSE) with IGF1 for all groups. No significant differences between groups were observed for age and body mass index (BMI) ( $p < 0.0001$ ). AD patients have significant decrease in MMSE among other groups. T2DM group had the highest level of HbA1c% (7.83) among other groups. The highest level of IGF1 were found in control group. MMSE score was negatively related with HbA1c% while positively correlated with IGF1. Negative relation was found between HbA1c score and IGF1. These results suggest that blood serum levels of IGF1 decreased in patients with T2DM and AD and this may be the shared cellular and molecular connections between T2DM and AD in Saudi population. AD was associated with poor glycemic control, blood serum levels of IGF1. Further investigation into this area may unravel important clues to the nature of these diseases to improve public health worldwide.

**Keywords:** Type 2 diabetes, Alzheimer's disease, IGF1, insulin, Saudi Arabia.

## Introduction

Dementia, including AD, is one of the most global public health problems especially in Middle East. The World Health Organization dementia report expect 125% increase in patients by 2050 in the Middle East and North Africa (Abyad 2015<sup>1</sup>). According to Basheikh 2014<sup>2</sup> the estimated number of patients with AD in Saudi Arabia is more than 50 thousand and most of them are women. AD is a gradual neurodegenerative disease identified by the progressive decline of memory, cognitive functions and changes in behavior and personality (Kandimalla *et al.* 2017<sup>3</sup>).

Substantial epidemiological evidence and studies such as Talbot *et al* 2012<sup>4</sup> and Bomfim *et al* 2012<sup>5</sup> suggest that T2DM are strongly correlated with AD and insulin

resistance and IGF1 signaling could be the association between them. Insulin works as a growth factor in the brain (Holscher 2011<sup>6</sup>). IGF1 is mainly secreted by the liver but could be synthesized in the brain (Bassil *et al.* 2014<sup>7</sup>). Insulin and IGF improve neuronal growth, survival, differentiation, migration, metabolism, gene expression, protein synthesis, cytoskeletal assembly, synapse formation, plasticity and myelin production (De la Monte 2009<sup>8</sup>).

The realization that AD is associated with both insulin/IGF1 deficiency and insulin/IGF1 signaling which led us to the conclusion that AD represents a brain-specific or brain-restricted form of diabetes mellitus (De la Monte 2009<sup>8</sup>). Numerous studies in targeting insulin/IGF1 signaling has showed that they are actually anti-diabetics and administration of insulin and IGF1 agonists

reverses signaling abnormalities and has positive effects on replacement markers of neurodegeneration and behavioral outcomes (Craft *et al.* 2011<sup>9</sup>).

### Objectives:

1. To investigate the relation between MMSE and HbA1c in normal, T2DM and AD elderly people in Saudi population.
2. To determine the serum levels of IGF1 in elderly patients and examine its associations with MMSE and HbA1c in T2DM and AD in Saudi population.

### Material and Method

**Selection of Participants:** An observational population study was conducted among selected 300 elders (168 women) who attended outpatient clinics at King Abdulaziz Hospital and Mental health hospital in Jeddah, Kingdom of Saudi Arabia. The targeted sample was all patients aged  $\geq 65$  without cognitive or perceptual disabilities during the period from July 5, 2018 and January 27, 2019. The sample was divided into 3 groups: the control group comprised of (100) healthy individuals (75% females) were selected from the staff of the hospitals and attendances. They had no history of T2DM or AD. The T2DM group comprised of (100) patients suffering from T2DM (50% females). The T2DM patients were diagnosed on the basis of World Health Organization criteria (with a target HbA1c of  $\geq 7\%$ ). The AD group comprised of (100) patients suffering from AD (67% females). Diagnosis of probable AD was according to standard clinical procedures and followed the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association criteria. Cognitive performance and alterations were evaluated according to Arabic version of MMSE.

All subjects included in the study were Saudi Nationality and none of them was taking any medication or had any sign of metabolic disease other than obesity.

**Anthropometric Measurements:** Demographic data, including age, sex and duration of diabetes were recorded. Weight was measured using a digital scale (803, Seca Clara, Germany) in light clothing without shoes with an accuracy of 100 g. Height was measured without shoes using a stadiometer (206, Seca, Germany) with an accuracy of 0.1 cm. All subjects were evaluated by BMI; weight in kilograms divided by the square of height in meters.

**Mini-mental State Examination:** Participants were screened using the Arabic version of Folstein MMSE, which is a brief 30-point questionnaire test that is used to screen for cognitive impairment. The total score of the exam ranges from 0–30 points. Subjects showing scores of 25–30 out of 30 are considered normal (no cognitive impairment); 21–24 as mild cognitive impairment; 10–20 as moderate cognitive impairment and  $<10$  as severe impairment.

**Biochemical Measurements:** About 5 ml of the blood was drawn from a forearm vein of subjects between 10 AM and 2 PM after 10–12 h overnight fasting for all groups. The blood samples were allowed to clot for 10 minutes at room temperature, and then centrifuged at (at 2000g at a temperature of 4 °C for 20 minutes). The separated serum was drawn, divided into aliquots and stored in a deep freezing ( $-40^{\circ}\text{C}$ ) until time of use. All biochemical measurements were performed in the biochemistry lab at King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia.

HbA1c% were taken from the subjects hospital files'. Spectrophotometric assays were performed in duplicate using a Lambda EZ 210 spectrometer (Perkin-Elmer, Foster City, CA, USA). IGF1 (ng/ml) were determined by quantitative human immunoassay ELISA kit (Cat # ELH-IGF1, RayBio, Norcross, Ga, USA). Detection limit of the assay was 0.1 ng/ml for IGF1. The percentage coefficients of variation ranged from 12% (inter-assay) and 10% (intra-assay).

**Ethical Considerations:** Our study protocol was approved by Researches unit in Directorate of Health Affairs in Jeddah (document number 00914/A00580). The researchers were worked on this study had a certificate from The National Institutes of Health, Office of Extramural Research certifies (document number 2664385).

**Statistical Analysis:** A *Statistical Package for the Social Sciences* Software (SPSS) for Windows (version 13.0, SPSS Inc., Chicago, IL, USA) was used for statistical analysis of data. z-Test: two-Sample for means was used for comparing the means of quantitative variables in two groups. Data are expressed as means  $\pm$  standard deviation. The strength of association between pairs of variables was assessed using Pearson's correlation coefficient. The level of  $P \leq 0.01$  was considered significant and highly significant at  $P \leq 0.005$ .

**Results**

**Anthropocentric and Biochemical Results:** The mean age was (73 ± 6.9). The female percentage was 64% and the mean of T2DM duration was 14±8.48 in T2DM group. There were no significant differences in age and BMI among the 3 studied groups (Table 1).

HbA1c% levels were significantly higher in T2DM than in control and AD groups. MMSE levels were significantly lower in AD comparing with control and T2DM groups ( $p < 0.001$ ). IGF1 levels were significantly higher in control group comparing with T2DM and AD groups ( $p < 0.001$ ).

**Table 1: Anthropometric and Biochemical Variables of the 3 Studied Groups.**

Parameter	Control Group	T2DM Group	AD Group	P-Value (P< 0.001)
No.	100	100	100	-
Female [n (%)]	75	50	67	-
Age (yr)	72 ± 8.49	72 ± 4.52	75 ± 7.79	-
BMI (kg/m2)	27.6 ± 6.07	27.67 ± 2.65	27.9 ± 3.28	-
Diabetes Duration (yr)	-	14 ± 8.48	-	-
HbA1c %	5.57 ± 0.79	7.83 ± 1.27	5.86 ± 0.74	a, c
MMSE	29 ± 0.8	26 ± 1.93	14 ± 4.63	b, c
IGF1 (ng/ml)	177.7 ± 26.14	127.8 ± 26.75	44.4 ± 14.20	a,b,c

Abbreviations; BMI: body mass index, MMSE: Mini-Mental State Examination, HbA1c (%): glycosylated hemoglobin, IGF1; Insulin Like Growth Factor 1, z-Test: Two-Sample for Mean, Numbers represent Mean± Standard deviation, P value “highly” significant at < 0.001, a – comparing: control group– T2DM group, b – comparing: control group – AD group, c – comparing: T2DM group – AD group

**The Correlations of HbA1c with MMSE and IGF1:** There was a significant negative correlation between HbA1c and MMSE level in 3 studied groups. A significant inverse relation between HbA1c and IGF1 was in AD group and T2DM groups while no correlation in control group (Table 2).

**Table 2: The Correlations of HbA1c with MMSE and IGF1 in 3 studied groups**

Parameter	Control group	T2DM group	AD group
MMSE	-0.461*	-0.343*	-0.711**
HbA1c	1	1	1
IGF1	-0.191	-0.355*	-0.529*

\*P significant at 0.01, \*\* P is highly significant at 0.005

**The Correlations of MMSE with HbA1c and IGF1:** IGF1 score was found to be significant positive correlated with MMSE in AD and T2DM groups and no such correlation in control group (Table 3).

**Table 3: The Correlations of MMSE with HbA1c and IGF1 in 3 studied groups**

Parameter	Control group	T2D group	AD group
MMSE	1	1	1
HbA1c	-0.461*	-0.343*	-0.711**
IGF1	0.098	0.365*	0.517*

\*P significant at 0.01, \*\* P is highly significant at 0.005

**Discussion**

HbA1c% levels were significantly higher in T2DM than in control and AD groups. No significant difference in HbA1c% levels between control group and AD group. These results are in agreement with the previously studies by Harten *et al.* 2007<sup>10</sup>, Ragy and Kamal 2017<sup>11</sup> and Noreen *et al.* 2018<sup>12</sup> and in contrast of Razay *et al.* 2007<sup>13</sup>. This differences in results between studies due to life style or diet habits that effect on HbA1c% levels in blood.

Our findings was suggested that MMSE levels were significantly lower in AD comparing with control and T2DM groups. No significant difference in MMSE levels between control group and T2DM group. These results are same as studies by Ragy and Kamal 2017<sup>11</sup>, Razay *et al.* 2007<sup>13</sup> and Hazari *et al.* 2010<sup>14</sup>.

HbA1c% were negatively correlated with MMSE level in 3 studied groups. These findings are supported by the findings of Munshi *et al.* 2006<sup>14</sup> and Harten *et al.* 2007<sup>10</sup> studies and opposite of Huang *et al.* 2016<sup>15</sup>. Differences in results because of advanced age, education level and duration of T2DM.

It is well recognized that T2DM can influence the circulating levels and activity of IGF1. Our study results similar to findings of Watanabe *et al.* 2005<sup>16</sup>, Suda *et al.* 2016<sup>17</sup> and Álvarez *et al.* 2007<sup>18</sup> that found a decrease in IGF1 levels in serum of AD patients. Mutation of IGF1 and its receptor gene could be the reason for decreasing IGF1 level in AD group of our study. On other hand, Clauson *et al.* 1998<sup>19</sup> and Hertze *et al.* 2014<sup>20</sup> found that mean IGF1 levels did not differ. However, in the same study IGF1 was inversely correlated with HbA1c% in T2DM group. These differences could be due to variability in insulin levels because of different treatments and/or because of variability in insulin sensitivity encountered in T2DM patients. IGF1 score was found to be significant positive correlated with MMSE in AD and T2DM groups and no such correlation in control group. Our data are consistent with many studies such as Al-Delaimy *et al.* 2009<sup>21</sup>, Westwood *et al.* 2014<sup>22</sup> and Kimoto *et al.* 2016<sup>23</sup>. In contrast of our findings, Vardy *et al.* 2007<sup>24</sup> study were found no correlation between MMSE and IGF1 in the AD group.

### Conclusion

The demographic changes and social and economic developments in Saudi Arabia have to create new realities in an unprecedented growth of the elderly population. So more elderly population that means more AD and T2DM patients. As this study is the first to investigate the relationship between IGF1 in T2DM and AD in Saudi population. In conclusion for our study, blood serum levels of IGF1 decreased in patients with T2DM and AD and this may be the shared cellular and molecular connections between T2DM and AD in Saudi population. AD was associated with poor glycemic control, blood serum levels of IGF1. Further investigation into this area may unravel important clues

to the nature of these diseases.

**Limitations of the Study:** Small sample size, small number of subgroup subjects. Our subjects were Saudi elderly so these results may not be generalized to other populations of different nationalities or ages.

**Strength of the Study:** This is first one which investigated the relationship between IGF1 and AD and T2DM in a developing country especially Saudi Arabia.

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**Conflict of Interest:** Nil

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# Effect of Acupressure Pain and Fatigue among Patients with Multiple Sclerosis

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## Abstract

**Context:** Pain and fatigue are common symptoms that correlated with multiple sclerosis patients, which disrupts physical, cognitive, emotional, and social functioning. **Aim:** evaluate the effect of acupressure on pain and fatigue among patients with multiple sclerosis. **Design:** Non-equivalent interrupted quasi-experimental. **Sample:** 60 adult male and female patients were randomly selected and divided equally into study and controls groups study was conducted at Multiple Sclerosis Research Unit affiliated with one of the biggest teaching hospital in Cairo, Egypt. **Tools:** Semi-Structured Interview Questionnaire, Pain Quality Assessment Scale, and Fatigue Severity Scale. **Results:** There was statistical significant decrease of pain and fatigue mean scores among the study group who received acupressure when compared to control group who received routine hospital care. **Conclusion:** Applying acupressure could be effective in reducing severity of pain and fatigue among patients with multiple sclerosis. Therefore it is recommended to endorse acupressure as a nursing practice for patients with multiple sclerosis in the early course of the disease.

**Keywords:** Multiple sclerosis, Acupressure, pain and fatigue

## Introduction

Multiple sclerosis (MS) is a neuroinflammatory and neurodegenerative demyelinating disease of the central nervous system defined by a wide range of symptoms and signs that disrupt physical, cognitive, emotional, and social functioning<sup>1</sup>. Multiple sclerosis resulting from a complex interaction between genetic, lifestyle and environmental risk factors<sup>2</sup>. Approximately 2.5 million individuals are affected worldwide; females aged between 20- 40 years are mainly affected<sup>3</sup>. The prevalence of MS in Egypt was found to be 14.1/100,000<sup>4</sup>.

Multiple sclerosis patients suffer from various symptoms; among these symptoms pain and fatigue are the most significant symptoms<sup>5</sup>. Pain represents one of the most disabling symptoms of MS, in that it adversely affects most aspects of health-related QOL and not affecting only patients' lives but also their families, health care providers, and health care systems<sup>6</sup>. The overall prevalence of pain syndromes in MS patients is 63% with a higher risk associated with older age, longer disease duration, and greater disease severity<sup>7</sup>.

Fatigue is one of the most disabling MS symptoms, significantly impacting on patients' daily life activities and quality of life and affecting up to 80% of MS patients. The main characteristic of MS-related fatigue is enhanced perception of effort and limited endurance of sustained physical and mental activities and is described by patients as their worst symptom<sup>8</sup>.

The currently approved treatments for MS are pharmacological as disease-modifying agents and

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non-pharmacological as acupuncture, aromatherapy, reflexology, guided imagery, yoga and acupressure has become more popular. The use of these method not only reduces the overall side effects of drugs due to less consumption, but also prevents the conversion of acute pain to chronic pain<sup>9</sup>.

Acupressure therapy works on the principle of stimulating specific reflex points located along the lines of energy which run through the body, called meridians. There are 14 meridian lines, each of which corresponds to an individual organ of the body. When the vital energies are able to flow through the meridians in a balanced and even way, the result is good health. When you experience pain or illness, it is an indication that there is a block or leak in the bio magnetic energy or vital life force Energy or Chi energy flow within the body<sup>10</sup>.

Acupressure is a type of touch therapy by using fingers, palms, elbows, or special bands to apply pressure to exact points on the body that provides the energy circulation and balance in the body, applying pressure to these points creates a slightly painful muscle spasm. Acupressure therapy aims to maintain homeostasis by increasing the blood and oxygen flow in the affected body area, resulting in relief and suppression of various symptoms by reducing pain<sup>11</sup>.

**Significance of the Study:** Most of MS patients experienced pain and fatigue, which could affect their ability to perform activities of daily living. Patients are turning to complementary therapy due to dissatisfaction with conventional treatments<sup>12</sup> there is growing interest regarding using acupressure for such patients as it is safe, suitable for almost all people, no side effects, noninvasive treatment, reduce dependence on medications and self-administered. It is hoped that the findings of this study might provide health care providers and decision makers with evidence based data to be utilized in planning and providing treatment regimens for MS patients. As well, such data might have an impact on the provided care in a cost effective way and decrease the load upon personal and hospital resources.

## Method

**Aim of the Study:** The aim of this study was to evaluate the effect of acupressure on pain and fatigue among patients with MS.

### Research Hypotheses:

**H1:** The pain mean scores of patients with MS who subjected to acupressure will be significantly less than the pain mean scores of a control group who received routine hospital care.

**H2:** The fatigue mean scores of patients with MS who subjected to acupressure will be significantly less than the fatigue mean scores of a control group who received routine hospital care.

**Research Design:** Non-equivalent interrupted quasi-experimental (pre-post) control design was utilized in the current study.

**Setting:** This study was conducted at Multiple Sclerosis Research Unit affiliated with one of the biggest teaching hospital in Cairo, Egypt.

**Sample:** A convenient sample of 60 adult male and female patients over a period of six months consisted the study sample who were diagnosed as having RRMS, able to read and write, had no psychiatric disorder and had no history of addiction were recruited equally randomly divided into study and control groups.

### Tools for Data Collection:

- (a). **Demographic and medical related data sheet:** demographic data covering questions related to age, gender, level of education, occupation, marital status .....etc. Medical related data which includes questions related to duration of illness, duration of hospitalization.....etc.
- (b). **Pain Quality Assessment Scale (PQAS)** developed by<sup>13</sup>: used to assess quality of pain. The PQAS asks respondents to rate the severity of each of 20 pain descriptors by using 0 to 10 numeric rating scales, in which "0" means no pain while "10" is the worsening pain sensation imaginable. The reliability test of the scale is (Cronbach's  $\alpha = 0.859$ ).
- (c). **Fatigue Severity Scale (FSS)** developed by<sup>14</sup>: used to assess severity of fatigue; FSS is containing 9 statements with sub score ranged from (1) indicates strongly disagree to (7) indicates strongly agreement. Internal consistency of the FSS is excellent (Cronbach's  $\alpha = 0.89$ ).

**Procedure:** The study was conducted through four phases.

**Preparatory Phase:** Once official permission was granted, the subjects who met the inclusion criteria

were interviewed individually to explain the nature and purpose of the study, then written consent were obtained from them; every patient was asked to fill out the demographic and medical related data sheet, PQAS and FSS to assess pain and fatigue, then subjects were assigned to either control or study groups randomly as 1<sup>st</sup> patient included in the control group and the 2<sup>nd</sup> patient included in the study group and so on.

**Implementation Phase:** The researchers applied acupressure technique for the study group through three sessions/week for two weeks. Each patient was provided with a brochure that includes the sites of acupoints and step by step instruction on how to perform the acupressure technique and also contact with them by what’s app.

**Acupressure Technique:**

1. Acupressure was applied by pressing in circular movements on the acupoint with the thumb finger first in clock wise and then anti-clock wise direction. The finger must remain at the same point on the skin and be moved in small circles.
2. The patient was asked to perform breathing exercise during acupressure session
3. The duration of each session ranged between 30–45 min \ sessions, massage for each acupressure points it takes 3-5 min.
4. Nine acupoints were used in the current study which

were: He Gu (LI 4), Shen Men (HT 7), Nei Guan (PC6), Quze (PC3), Jian Jing (GB21), Feng Chi (GB20), Zusanli (St 36), Bigger Rushing (LV3) and Governor vessel (GV24.5).

**Evaluation Phase:** The researchers assessed pain using PQAS and fatigue using FSS for all patients either in study or control group by the end of the 1<sup>st</sup> and 2<sup>nd</sup> weeks of conducting the intervention.

**Statistical Analysis:** The collected data were scored, tabulated and analyzed by personal computer using statistical package for the social science (SPSS) program version 20. Level of significance was adopted at  $p \leq 0.05$ .

**Results**

Regarding age, 43.3%, 36.7% had age ranged between 18 to less than 30 years in the control and study groups respectively. In relation to gender, 80% and 83.3% respectively of both control and study group were females, regarding to marital status, 53.3% were married in both groups. In relation to educational level, 46.7%, 36.7% had secondary education in both control and study groups respectively. With reference to occupation, 76.6% and 80% were house wife in both control and study groups respectively. There were no statistically significant differences between the two groups regarding demographic variables.

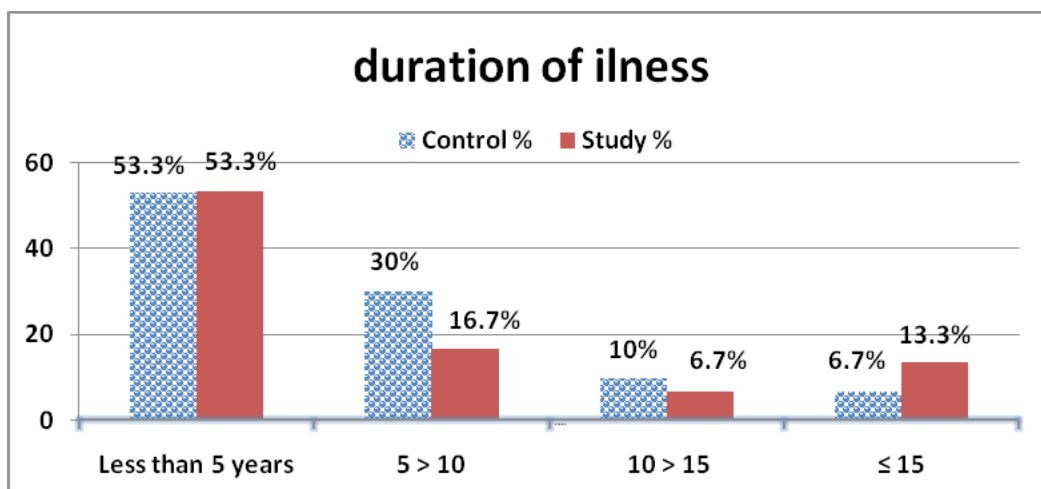


Figure (1): Percentage distribution of duration of illness among the studied sample (N=60).

Figure (1) in relation to duration of illness, 53.3% of both control and study groups had MS for less than five years additionally there was no statistically significant difference between the two groups regarding medical background variables.

**Table 1: Comparison of pain total mean scores between control and study groups along the study period (N= 60).**

Study periods	Mean ± SD	t-test	p-value
Pre intervention Control Study	96.7 ± 42.3 85.9 ± 45	0.955	0.344
After one week Control Study	99.5 ± 42.3 66.1 ± 36.8	3.268*	0.002
After two week Control Study	103.3 ± 42.6 57.1 ± 34.1	4.643*	0.000

It was significant at \*p ≤ 0.05

Table (1) shows that there was no statistically significant difference between control and study groups (t = 0.955, p = 0.344) regarding the total mean scores of pain at the pre intervention reading. While there was statistically significant difference between control and study groups after one and two weeks from acupuncture application (t = 3.268, p = 0.002), (t = 4.643, p = 0.000) respectively.

**Table 2: Comparison of fatigue total mean scores between control and study groups along study period (N = 60).**

Study periods	Mean ± SD	t-test	p-value
Pre intervention Control Study	41 ± 12.8 37.9 ± 13.8	0.927	0.358
After one week Control Study	43.2 ± 12.6 27.4 ± 11.9	5.014*	0.000
After two week Control Study	45.6 ± 11.9 21.9 ± 9.3	8.598*	0.000

It was significant at \*p ≤ 0.05

Table (2) shows that there was no statistically significant difference between control and study groups (t = 0.927, p = 0.358) regarding the mean fatigue scores in pre intervention reading. While there was statistically significant difference between control and study groups by the end of 1<sup>st</sup> and 2<sup>nd</sup> weeks of interventions (t = 5.014, p = 0.000) and (t = 8.598, p = 0.000) respectively.

### Discussion

The Mean ±SD age of the studied sample was 32.7 ± 8.6, 3. This result is linked with a study<sup>15</sup> who mentioned that the mean age among the sample was 33.9 ± 10.8. While it opposed with study<sup>16</sup> who reported that the X ± SD age is 56 ± 11.2.

The majority of study sample was female, this goes in accordance with study done by <sup>15</sup> and <sup>16</sup> who founded that more than three fourth of the sample were females in addition, the current study results revealed that half of the sample were married and had either secondary or higher education, while the majority of the sample were housewives. The results were congruent with a study<sup>17</sup> found that approximately three fourth of the

study sample were married, approximately three fourth had higher and secondary education and more than half housewives.

In relation to duration of illness more than half had MS for less than five years this result matched with<sup>18</sup> showed that mean duration of disease were 5.9 ± 4 years and the result opposed with<sup>19</sup> who reported that the mean ±SD of duration of illness since onset of MS symptoms was 8.3 ± 6.7 years;

The current study result shows that there was statistical significant decrease in pain mean scores of the study group after application of acupuncture when compared to control group by the end of the 1<sup>st</sup> and 2<sup>nd</sup> weeks, indicating that application of acupuncture may contribute in decreasing severity of pain. The result is consistent with study<sup>20</sup> who reported that the level of pain before the acupuncture application decreased significantly following the last acupuncture application on the 3<sup>rd</sup> day (P < 0.001).

The current study result shows that there was statistical significant decrease in fatigue mean scores of the study

group after application of acupressure when compared to control group by the end of the 1<sup>st</sup> and 2<sup>nd</sup> weeks, indicating that application of acupressure may contribute in decreasing severity of fatigue. The result is consistent with study done by<sup>21</sup>who reported significantly decrease of the mean scores of fatigue in both acupressure and sham acupressure groups. However, the decrease in the acupressure group was significantly greater than in the sham acupressure group.

### Conclusion

**Implications:** It can be concluded that applying acupressure could be effective in reducing severity of pain and fatigue among patients with multiple sclerosis.

#### Recommendations:

1. Endorse acupressure as a nursing practice for patients with multiple sclerosis in the early course of the disease.
2. Replication of the study on a larger probability sample selected from different geographical areas in Egypt to obtain more generalized results.

**Ethical Clearance:** An approval was obtained from the Research and Ethical committee at Faculty of Nursing-Cairo University and official permission was obtained from the administrators at study setting. Written informed consent was obtained from each patient.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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# Effect of Hydrotherapy Warm Red Ginger to Reduce Blood Pressure on Elderly at Panti Werdha Budi Luhur, Jambi

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## Abstract

**Context:** The process that every human being in the world will experience is aging. In this process, a person will undergo changes and decreased the function of the body's organs, one of which is the cardiovascular system. Disorders of the cardiovascular system can be hypertension. Hypertension can cause several types of complications, such as stroke, kidney failure, and heart disease. Pharmacological and non-pharmacological ways can overcome hypertension. Management of non-pharmacological hypertension can be with complementary therapy, one of which is foot hydrotherapy (soaking warm feet). This study conducted hydrotherapy warm red ginger on the feet of hypertensive sufferers. The purpose of this study was to see a picture of blood pressure before and after hydrotherapy therapy of warm red ginger and its effect on reducing blood pressure — research method with pre-post test one group design. The intervention was carried out six times for two weeks. The data analysis with univariate analysis resulted in average systole before the intervention was 153.1 mmHg, and after was 138.85 mmHg. Besides, the average diastole before the intervention was 86.8 mmHg and after was 83.0 mmHg. Bivariate analysis with pre-post systole resulted in a p-value of 0,000 and pre-post diastole with a p-value of 0.041, which means p-value <0.05. There was an effect of hydrotherapy in warm red ginger with a decrease in blood pressure at the elderly with hypertension. It could be an alternative treatment in patients with hypertension in health services.

**Keywords:** *Hypertension, hydroxyurea red ginger, blood pressure, old age*

## Introduction

Every human being in the world will experience aging. In this process, a person will change and decreased the organs' function. Its reduced function of one organ most often experienced by the elderly. Diseases that mostly affect them include hypertension<sup>1</sup>. WHO data in 2012 reported that as many as 74 million people in the world experienced hypertension, which resulted in around 51% of elderly deaths due to stroke and 45% of coroner heart diseases. In 2025, it is about 29% of the world population will be affected by hypertension, and the biggest sufferers will be the elderly<sup>2</sup>. The elderly often affected by hypertension caused by stiffness in arteries, so that blood pressure tends to increase. In 2015, hypertension was in the third rank, 13.89%<sup>3</sup>. The results of Riskesdas, the prevalence of hypertension rationally reached 8.4%

of the measurement of blood pressure at the age of 18 years and over, the incidence of hypertension in Jambi Province ranked 23rd with a case of 5.1% of people<sup>1</sup>.

Hypertension can cause several types of complications, such as stroke, kidney failure, and heart disease<sup>4</sup>. WHO data in 2012 reported that as many as 74 million people in the world experienced hypertension, which resulted in around 51% of elderly deaths due to stroke and 45% of coronary heart disease. Management of hypertension can be in the form of taking antihypertensive drugs, managing diet, exercising, reducing stress, avoiding alcohol, and smoking<sup>5</sup>. Another method of treatment can use a holistic nursing approach that is complementary therapy<sup>6</sup>.

Complementary therapies are massage, herbal, aromatherapy, and foot hydrotherapy<sup>7</sup>. One of the complementary therapies used for independent and natural intervention is foot hydrotherapy (soaking warm feet)<sup>8</sup>. Foot Hydrotherapy that soaks the foot in warm water will provide a local response to heat through this stimulation will send impulses from the periphery to the hypothalamus<sup>9</sup>. Other herbal ingredients, one of which is ginger, are better added in soaking foot<sup>10</sup>. Ginger that widely used for medicine is red because red ginger has a higher essential oil content compared to other ginger<sup>11</sup>. The warmth and spicy aroma of ginger because of its content of essential oils (volatile) and oleoresin compounds (gingerol). Warm feeling in ginger can widen blood vessels, so that blood flow is smooth<sup>12</sup>.

Research by Nurahmandani, A.R, et al. (2016) on the effectiveness of giving warm ginger foot bath therapy to the decrease in blood pressure in the elderly with hypertension in Semarang Ivory Semarang Werdha, it was found that there was an effect of giving warm ginger foot soak therapy to a decrease in blood pressure in elderly with hypertension at Pucang Gading Nursing Home in Semarang<sup>13</sup>

Nursing Home is a social welfare institution established to improve the quality of life and welfare of the elderly<sup>14</sup>. TresnaWerda Social Institution Budi Luhur Jambi City has 67 older people with more than 40% suffering from hypertension, and some are dependent on the use of pharmacological drugs.

The specific purpose of the study was to determine the effect of hydrotherapy, by Soaking feet in Ginger Warm Water against the Decrease in Blood Pressure in the Elderly at Budi Luhur PSTW Jambi The incidence of hypertension continues to increase every year with the increasing number of older adults due to increased life expectancy. The elderly with hypertension continues to depend on pharmacological drugs to overcome the disease. The problem in this study is if hypertension is not immediately above, then it will continue to cause complications such as heart problems, blood vessel disorders to death. Therefore, it is necessary to prevent complications of the elderly with hypertension using hydrangeas red ginger.

## Methodology

This research method uses pre-post-test one group design. The analysis was carried out in the form of

univariate analysis, which was to see a picture of blood pressure before and after the treatment of warm red ginger foot soak. As well as bivariate analysis to see the effect of hydrangea red, warm ginger on blood pressure reduction in the elderly with paired test with pre-post sistole results with p-value 0,000 and pre-post diastole with p-value 0.041, which means p-value <0, 05.

**Material and Tool:** Materials and equipment used in this study include hot water with temperatures ranging from 39-42°C, hot water flask, red ginger, basin, water thermometer, towels, cold water, digital tension. And research instruments in the form of observation sheets.

**A. Research Procedure:** The research procedure was out several stages, first carried out a pretest (a measurement of respondent's blood pressure), then the process of soaking the feet with warm ginger water, including:

- a. Give the patient a sitting position with dependent feet.
- b. Fill the bucket with cold water and hot water until it is half full then measure the temperature of the water (39-42°C) with a thermometer.
- c. If the feet look dirty, wash first.
- d. Dip and soak feet for 10-15 cm above the ankles then leave for 15 minutes.
- e. Take a temperature measurement every 5 minutes, if the temperature drops, spill hot water (feet lifted from the bucket) again, and measure the temperature of the thermometer again.
- f. Cover the bucket with a towel to maintain the temperature.
- g. When finished (15 minutes), lift the leg and dry it with a towel.
- h. **Tidy up the Tool:** After retaking action, the measurement of blood pressure (post-test) and recorded in the observation sheet. The pre-test is done every time before giving an intervention and after that post-test. The response was carried out for two weeks, with six interventions for each respondent.

## Research Result

### Responden Characteristic:

1. **Age:**



**Table 1: Frequency distribution based on age at Tresna Werdha Budi Luhur Social Home in Jambi City in 2019**

No	Age	f	(%)
1.	Elderly (60-74 years old)	14	70
2.	Old (75-90 years old)	6	30
	Total	20	100

Based on the table above, the distribution of respondents based on age 70% (14) respondents were elderly (60-74 years). Patients aged over 60 years have a risk of suffering from hypertension. Triyanti (2014) conveyed that the age factor is very influential on the incidence of hypertension because with increasing age, the higher the risk of hypertension.

**2. Sex:**

**Table 2: Frequency distribution of respondents by sex at Tresna Werdha Budi Luhur Social Home Jambi City in 2019**

No	Sex	f	(%)
1.	Male	14	70
2.	Female	6	30
	Total	20	100

Based on the table above, the distribution of respondents based on gender 70% (14) respondents were male. Gender is very carefully related to the occurrence of hypertension in young people, and middle age is higher suffering from hypertension in men<sup>15</sup>.

**Effects of Warm Red Ginger Hydrotherapy on Reducing Blood Pressure in the Elderly at Pstw Budi Luhur, Jambi City in 2019**

Variable	Mean	SD	df	P-Value	n
Sistole Pre -Sistole Post	153.10 138.85	14.581	19	.000	20
Diastole Pre - Diastole Post	86.80 83.00	7.750	19	.041	20

Based on the results of the bivariate analysis above, it showed that the pre-post test systole with a p-value of 0,000, while the pre-post diastole with a p-value of 0.041, which means p-value <0.05. It means that there was an effect of hydrotherapy with warm red ginger with a decrease in blood pressure in the elderly with hypertension at PSTW Budi Luhur Kota Jambi.

**Bood Pressure before and after Hydrotherapy Warm Red Ginger in the Elderly with Hypertension:**

**Table 3: Frequency Distribution of Respondents Based on Blood Pressure Before and After Hydrotherapy Warm Red Ginger in the Elderly with Hypertension**

Variable	Mean	SD	SE	n
Sistole Pre	153.10	13.780	3.081	20
Sistole Post	138.85	13.417	3.000	20
Diastole Pre	86.80	9.105	2.036	20
Diastole Post	83.00	10.443	2.335	20

Based on the table above shows that the average systole before the intervention was 153.1 mmHg, while the average systole after the intervention was 138.85 mmHg with a standard deviation before 153.1 and after 138.85. Meanwhile, the average diastole before being given response was 86.8 mmHg and after being given 83.0 mmHg with a standard deviation before 9.105 and after 10.44.

Respondents in this study are all elderly who suffer from essential hypertension. Hypertension often occurs in the elderly due to changes in the cardiovascular system. For example, an elasticity decreased in the aortic wall, heart valves thickened and stiff, the ability to pump blood decreased as much as 1% every year, loss of elasticity in blood vessels, and its increase in blood pressure because of its resistance from peripheral blood vessels<sup>16</sup>.

**Discussion**

**Effects of Warm Red Ginger Hydrotherapy on Reducing Blood Pressure in the Elderly at Pstw Budi Luhur, Jambi City in 2019**

Based on the results of the study showed that the average decrease in systolic blood pressure before and after 14.25 mmHg, and the average decrease in blood

pressure of 3.8 mmHg. These results indicate that there was a decrease in blood pressure, both systole, and diastole, after administration of the red ginger hydrotherapy intervention. However, the results of blood pressure measurements found only one respondent (5%) who experienced stable blood pressure and one person (5%) respondents who experienced an increase in blood pressure after being given hydrotherapy red ginger. It because respondents are in a state of anxiety and emotion. Stress conditions experienced by respondents can affect the blood pressure of respondents. According to the literature explained that terms of anxiety, fear, pain, and emotional stress could result in sympathetic stimulation, which can increase the frequency of heart rate, cardiac output, and vascular resistance. It was also evidenced by Sasmalinda research through multiple linear regression tests showing that age and stress factors affect the increase in blood pressure in patients at the Malalo Batipuh Selatan health center. Women's research results (2019) indicates that there is a relationship between stress (p-value = 0.003) and physical activity (p-value = 0.018) with a blood pressure of patients with essential hypertension.

Several national and international research findings on the benefits of red ginger for hypertension show different results. The results of the study by Nurahmandani et al. (2016) showed that there was an effect between giving foot bath therapy with warm ginger water on decreasing blood pressure in the elderly with hypertension in panning Semarang with p-value systole = 0,0001 and p-value diastole = 0,0001. Soak the warm feet of ginger water to provide therapy that relaxes the muscles. Sanghal's research results (2012) showed that red ginger is effective in preventing hypertension. The results of the study showed a statistically significant difference in the study group after consuming ginger for one month, whereas the control group did not<sup>17</sup>.

The results of this study and previous research studies strongly recommend ginger as an herbal therapy program to support conservative therapy for chronic diseases, especially hypertension. For this reason<sup>15</sup>, the Puskesmas should recommend providing ginger hydrotherapy for herbal-based nursing interventions for families with hypertension.

### **Conclusion**

The conclusion in this study was the average blood pressure after hydrolyzing warm red ginger has

decreased, and there is a hydrotherapy effect of warm red ginger on reducing blood pressure in the elderly with hypertension.

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**Conflict of Interest:** The authors confirms that this article contains no conflict of interest.

**Ethical Approval:** This study was approved by the Health Research Ethics Committee (KEPK) University Andalas University, Padang. All participants were provided with a participant information sheet written in Bahasa Indonesia, and they signed the consent form prior to participating in the study

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# Consistency of Condom Use Associated with HIV among Transgender in Indonesia: Secondary Data Analysis of IBBS 2015

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## Abstract

**Backgrounds:** Transgender has been identified as engaging in receptive anal sex with men. Unprotected anal sex is undoubtedly an important risk factor, therefore consistency of condom use is a fundamental measure to prevent HIV transmission. This study was aimed to investigate association between condom use consistency and HIV among transgender in several provinces in Indonesia.

**Method:** This study was done as secondary data analysis from a national cross-sectional study, namely the Integrated Biological and Behavioral Surveillance (IBBS) 2015, done by the Ministry of Health of Republic of Indonesia. In this IBBS survey, multistage cluster sampling was used. Condom use and sexual behaviors was assessed through guided interview, while HIV infection was determined by series of rapid serologic test. Association, between consistency of condom use and HIV, using PR (prevalent ratio), was analyzed using chi-square test and cox regression model.

**Result:** Transgender who did not consistently use condom when having commercial sex transaction were 1.7 times (PR=1.7; 95% CI:0.4-6.3) after adjustable several confounders. Transgender who did not consistently use condom use when having casual sex were 1.2 times (95% CI 0.1 -13.3) more likely to be infected with HIV than transgender who consistently use condom after adjusted by several confounders. Transgender who did not consistently use condom in both commercial and casual sex intercourses was 2.1 times (95% CI: 0.6 - 7.1) more likely to have HIV infection than transgender who consistently used condom after adjusted by several confounders.

**Conclusions:** There were increased risks of not consistently using condom in each type of sexual intercourse, commercial or casual, among transgenders. Condom inconsistency showed its higher effect when related to both commercial and casual sexual intercourses.

**Keywords:** HIV, Condom, Consistency, Transgender, Indonesia

## Introduction

Transgender whose gender identity does not conform to gender norms are known to be at high risk for HIV

infection.<sup>(1,9)</sup> Among 11,066 transgenders worldwide the HIV prevalence was 19.1% (95% CI 17.4–20.7). A global systematic review from 15 countries in 2013 found that the odds ratio of being infected with HIV among transgender as compared to all adults of reproductive age was 48.8 (95% CI 21.2–76.3).<sup>(1)</sup>

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The most important risk factor as a primary driver of HIV infection in transgender population is the unprotected receptive anal intercourse since transgender had been

consistently identified as engaging in receptive anal sex with men.<sup>(1,2,3,6)</sup> Indonesian Integrated Biological Behavior Survey (IBBS) in 2007 showed that HIV prevalence among transgender population was 24.4%.<sup>(12)</sup> Study about HIV risk behaviors among transgender in San Francisco showed that HIV-positive participants were 3.8 (95% CI 1.1 - 12.4) times more likely to have recently engaged in unprotected receptive anal sex with casual partners than HIV-negative participants, after controlling for other variables.<sup>(8)</sup>

Results from the few studies conducted on condom use among transgender in Southeast Asia were consistent with the global findings. HIV study among transgender in Cambodia showed that respondents inconsistently used condom during last anal sex had 3.84 times odds of HIV infection (adjusted OR = 3.84; 95%CI 1.58 - 9.33).<sup>(16)</sup> Having a higher perceived risk of HIV was also associated with inconsistent condom use among transgender in Thailand (OR= 1.8; 95%CI 1.1 -2.9).<sup>(11)</sup> HIV occurrence among 748 transgenders in three cities in Indonesia in 2007, was associated with inconsistent condom use during anal sex with clients last month (OR =1.38; 95% CI 0.95–2.00).<sup>(12)</sup> The above studies, however, did not differentiate factors based on type of sexual partners (commercial vs. casual vs. combination). Partnership characteristics have been found to be important predictors of unprotected intercourse.<sup>(10)</sup> This study was aimed to explore associations between 3 types of inconsistent condom use among transgender sex partner (commercial, casual and its combinations) and the HIV occurrence.

## Method

This was a study done by analyzing secondary data from the previous national wide survey in Indonesia namely The Integrated Biological and Behavioral Surveillance (IBBS) in 2015. Status of HIV infection was determined by 3 series of serological rapid test. Knowledge and behavioral aspects of condom use was obtained through a comprehensive interview by trained interviewers using a standardized structured questionnaire. In the IBBS survey, as many as 1003 eligible transgenders were selected randomly from 5 big cities (i.e. Jakarta, Bandung, Semarang, Surabaya and Malang), through a multistage cluster sampling with PPS (probability proportional to size) approach. The inclusion criteria of the transgender for this study (of secondary data analysis) were transgender (biologically male but psychologically female individual) aged  $\geq 15$

years old, never been tested with HIV test and have lived in the selected city for at least one month. There were totally 113 transgenders meeting the criteria for this particular study (of secondary data analysis).

Data analysis was done using statistical software, elaborating descriptive estimates and applying inferential statistical tests, such as chi-square test in bivariate and stratification analysis and also Cox regression in multivariate analysis to determine the most valid causal regression model after controlling the potential confounders. The strength of associations between condom consistency and the HIV status were measured using prevalence ratio (PR) and adjusted prevalence ratio (a-PR) after controlling the potential confounders. The precision of association was assessed using the 95% confidence interval of adjusted PR and the corresponding p-value (which significance were determined at level of 0.05).

## Results

The HIV prevalence rate among transgender was 17.7%. The prevalence rates of Syphilis among transgender was 13.3%, while the prevalence rate of Gonorrhea and Chlamydia was 25% (data not shown). Majority of transgender were below 30 years of age (59%). About 66% of the transgender had moderate education level. Majority of transgender (88.5%) were single. About 18% of transgender sold sex as their main occupation. About 45% of transgenders were living alone. About one third (30%) of transgender had no perception of HIV susceptibility. Almost half (49%) of transgender had low knowledge about HIV and its transmission. About 25% of them reported rupture of the condom. Most of respondents (78%) used lubricant when they had anal-sex. No one of transgenders had ever used drugs injection since one year ago (data not shown).

Within the last past month, the proportions of HIV infected transgenders who were not consistent in using condom with commercial sex partner, casual sex partner and the combination (of the two types of sex partner), were 30.4%, 20%, 31.82% respectively (Table 1).

The estimates of strength of associations (i.e. the PRs) between HIV infection and consistency of condom use with sex partner, casual sex partner and the combination of the two types of sex partner were 1.52 (95% CI 0.6-4.1); 1.27 (95% CI 0.3-6.4); 1.5 (95% CI 0.8 - 2.9) respectively (Table 1).

**Table 1: Crude Association Between Three Types of Condom Use Consistency and HIV Infection.**

Variable	HIV				Total	PR	95% CI	P-value
	Positive		Negative		n (%)			
	n	(%)	n	(%)				
<b>Consistency of condom use in commercial sex</b>								
No	7	(30.4)	16	(69.6)	23 (48)	1.5	0.6 - 4.1	0.4
Yes	5	(20)	20	(80)	25 (52)	1.0		
<b>Consistency of condom use in casual sex</b>								
No	2	(20)	8	(80)	10 (34)	1.3	0.3 - 6.4	0.7
Yes	3	(15.8)	16	(84.2)	19 (66)	1.0		
<b>Consistency of condom use in both, the two types of sex (casual and commercial)</b>								
Inconsistent	7	(31.82)	15	(68.18)	22 (37)	1.5	0.8 - 2.9	0.2
Sometimes/ Always Consistent	7	(18.92)	30	(81.08)	37 (63)	1.0		

Stratification by age showed that there were no sharp differences of strength of associations (i.e. the PRs) between age strata in all types of sexual intercourses except in commercial sexual intercourse (2,3 in age group <30 years, versus 1,1 in age group ≥30 years). However, all differences of PRs between strata were not significant (Table 2).

Similarly, the stratification by main occupation showed that there were no sharp differences of strength of associations (i.e. the PRs) between occupation strata in all types of sexual intercourses except in commercial sexual intercourse (2,5 in group of “selling sex”, versus 0,8 in group of “others”) were opposite associations appeared. However, all differences of PRs between strata were not significant either.

**Table 2: Stratification Analysis of Associations between Each Type of Condom Use Consistency and HIV Infection According to Strata of Age and Main Occupation.**

Stratification By		Condom use consistency in commercial sex	Condom use consistency in casual sex	Condom use consistency in the two types of sex	
Age	PR Strata (95%CI)	<30 years	2.3 (0.5 - 10.7)	1.6 (0.1 - 21.3)	1.6 (0.7 - 3.6)
		≥30 years	1.1 (0.3 - 4.3)	1.2 (0.2 - 8.5)	1.3 (0.3 - 5.9)
	Adjusted PR (95%CI)		1.6 (0.6 - 4.5)	1.3 (0.3 - 6.5)	1.5 (0.7 - 3.1)
	PR Crude (95%CI)		1.5 (0.6 - 4.1)	1.3 (0.3 - 6.4)	1.5 (0.8 - 2.9)
	P-value Homogeneity Test		0.5	0.8	0.8
	ΔPR (%)		5	7.4	1.3
Main Occupation	PR Strata (95%CI)	Selling Sex	2.5 (1.2 - 5.3)	1.1 (0.5 - 2.5)	1.6 (0.7 - 3.9)
		Others	0.8 (0.1 - 5.8)	1.7 (0.6 - 4.4)	1.4 (0.51 - 4.2)
	Adjusted PR (95%CI)		1.4 (0.4 - 4.1)	1.3 (0.7 - 2.4)	1.6 (0.8 - 3.1)
	PR Crude (95%CI)		1.2 (0.4 - 4.0)	1.31 (0.7 - 2.4)	1.5 (0.7 - 2.9)
	P-value Homogeneity Test		0.09	0.5	0.8
	ΔPR (%)		1.1	2.2	3.8

The three different models of multivariate analysis adjusting for relevant potential confounders showed consistent positive associations between condom use consistency in all types of sexual intercourses and the occurrence of HIV infection. The adjusted PRs of the three models of associations for the corresponding three types of sexual intercourse were 1.7 (95% CI: 0.4 - 6.3), 1.2 (95% CI: 0.1 - 13.3) and 2.1 (95% CI: 0.6 - 7.1) respectively

**Table 3: The Adjusted Associations Between Each Type of Condom Use Consistency and the HIV Infection Using Cox Regression Model**

	<b>Model 1: The Cox model of association between condom use consistency in commercial sex and the HIV infection<sup>a</sup></b>	<b>Model 2: The Cox model of association between condom use consistency in casual sex and the HIV infection<sup>b</sup></b>	<b>Model 3: Cox model of association between condom use consistency in both commercial and casual sex and the HIV infection<sup>c</sup></b>
Adjusted PR (95%CI)	1.7 (0.4 - 6.3)	1.2 (0.1 -13.3)	2.1 (0.6 - 7.1)
P Value	0.7	0.1	0.6

a. Model 1 was adjusted for current living with, received printed material about HIV prevention and transmission, condom rupture.

b. Model 2 was adjusted for age, main occupation, current living with, received printed material (booklets, brochures, calendars, leaflets) about HIV prevention and transmission, syphilis infection, chlamydia, gonorrhea infection.

c. Model 3 was adjusted for education, received printed material about HIV prevention and transmission, current living with, syphilis infection.

## Discussion

In this study, the proportion of HIV infected transgenders who were not consistent in using condom when having intercourses with commercial sex partner, casual sex partner and both (two) types of sex partners in 5 cities in Indonesia (2015) last past month were 30.4%, 20%, 31.82% respectively. In previous study by Prabawanti, 2011, prevalence of HIV among transgenders who inconsistently used condom during anal sex with clients last months in three cities in Indonesia (2007) were 28.4%.<sup>(12)</sup> Chhim S, 2017 found that prevalence of HIV among transgender who inconsistently used condom within past three months with casual sexual partner in Cambodia (2016) were 7.2%.<sup>(4)</sup> Study of Murliani E., 2014 based on IBBS 2011 found that the prevalence of HIV among transgenders who were not consistent in using condom when having intercourses with all types of sex partner in Indonesia were 20.6%.<sup>(15)</sup> These variations may indicate that some transgenders were better able to negotiate condom use with sex partner. In commercial sexual transaction, condom use consistency might be more difficult to achieve than the casual sex intercourse, because the clients in commercial sexual transaction might more powerful to dictate the conditions related to the intercourse. Transgenders living in different location of sexual transaction might have different attitude towards condom use.<sup>(5,14,16)</sup>

Our finding, inconsistency of condom use with commercial sex partner and HIV was 1.7 times (95% CI 0.4 - 6.3) more likely to be infected with HIV after adjusted by several confounders. This finding was supported by previous study showing that inconsistent condom use during anal sex with clients last month

increased the risk of HIV infection by 1.38 times (95% CI 0.95–2.00).<sup>(12)</sup> Our study also found that transgenders who were inconsistent using condom with casual sex partner was 1.2 times (95% CI 0.1 -13.3) more likely to get HIV infection as compared to transgender who consistently used condom. Study in Thailand showed that inconsistent condom use during intercourse with male casual partner (past 3 months) was 1.67 times (95% CI 0.80–3.45) more likely to be infected with HIV.<sup>(7)</sup> According to Reis RK et.al, 2019, who analyzed the predictors of inconsistent condom use among male HIV-positive individuals in Cambodia, having multiple partnership were independently associated with inconsistent condom use (5.0; 95% CI 1.3 - 19.6).<sup>(13)</sup> The effect of inconsistency of condom use in both commercial sex and casual sex activities, on the occurrence of HIV infection, was stronger (2.1; 95% CI 0.6 - 7.1) than condom use inconsistency in only one type of sexual activities.

The data analyzed in this study was limited for only 113 transgenders since transgenders who had taken HIV test before the survey of IBBS 2015 were excluded. This exclusion was done to minimize selection bias due to behavioral changes of condom use after they have known their HIV status and thus to assure the temporal sequence between the behaviors as the risk factors and the HIV status as the outcome. Limited number of participants might have also affected the precision of study associations. The result of the study may not sufficiently be generalized to all population of transgender national wide since transgenders participating the study were recruited in only 5 cities.

## Conclusions

We found evidence of associations between HIV status and inconsistencies of condom use with various types of sexual activities (or with different types of sexual partners) among transgender population. Effect of inconsistency of condom use in both commercial sex and casual sex activities, on the occurrence of HIV infection was stronger than condom use inconsistency in only one type of sexual activities. Based on this finding, we suggest to encourage transgender population to persistently be always consistent in using condom in any type of sexual activities being involved.

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**Competing Interests:** None declared

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# Depression and Generativity of the Middle Aged: Mediating Effect of Social Support

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## Abstract

**Purpose:** This study aims to examine the mediated effect of social support in the relationship between the depression and the generativity of the middle aged.

**Method:** The data was collected from a total of 128 middleaged in 40 to 59 years old. The data were analyzed using descriptive statistics, Pearson's correlation coefficient, and stepwise multiple regression using the SPSS 22.0 program.

**Results:** The generativity was shown a negative correlation with depression( $r=-.40$ ,  $p<.001$ ) and a positive correlation with social support( $r=.68$ ,  $p<.001$ ). In the relation between depression and generativity, social support was the significant mediating variable.

**Conclusion:** The mediated effect of social support on the relationship between depression and generativity in middle aged were verified and based on it, it will be used as basic data for developing integrated nursing intervention programs to help establish a sense of generativity, a task of middle age development.

**Keywords:** Middle aged, Depression, Social support, Generativity

## Introduction

Erikson<sup>1</sup>, who looked at human development from a full-life perspective before, expressed the middle aged as generativity versus stagnation, and said that the crisis at each stage is a task to solve at each stage of development and it can be a new turning point when overcoming the crisis at each stage.

The generativity begins to develop from the early adulthood, but the realization and achievement of it increases greatly in the middle age. The generativity is the degree of individual internal development that is important for having identity as a middle-aged adult, and it means the maturity of psychosocial adaptation in the middle aged.<sup>2</sup>

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Middle age is a kind of transition period from adulthood to old age, it is an important and meaningful step in the life cycle that ruminate the whole life and thinks about the future life with the decrease of physical function, change of family life cycle, loss of social role. Also, as a result of social and economic activities, people in this period will have a desire for a high-quality life, and resources to realize it.<sup>3</sup> The most common emotional change experienced in middle age is depression, which is caused not only by the effects of hormones, but also by the interaction of such as worries about the future, emotional crisis and anxiety, and a change in presence in family relationships.

Depression is associated with when people reach the middle of life, a question about what life means and who they really are, and along with one's own life goals and achievements level amid emotional turmoil and wandering, such as the futility of life, emptiness, despair, stagnation, and lethargy.<sup>4</sup>In particular, if the generativity is not acquired in middle age, it may fall one's into

depression and self-righteousness, and sometimes it caused experience psychological difficulties such as shrinking relationships with couples and others, anxiety, depression, and low self-esteem.<sup>5</sup> Therefore, it can be confirmed that the generativity in middle aged is closely related to negative emotions such as depression.

On the other hand, the generativity is a key factor in making people feel positive about themselves and evaluate their lives as meaningful and valuable. And it makes them emphasize positive aspects with optimistic attitudes toward the changes that occur to them.<sup>6</sup> Also, the generativity is a concept that exists within an individual, but it is formed as a result of continuous interaction between the social environment and the individual,<sup>7</sup> and the individual can enhance psychological well-being and enhance by perceiving the support of the social support system or resources, and it can enhance the generativity.<sup>8</sup>

Therefore, based on the preceding study<sup>7</sup> that social support increases psychological well-being, quality of life, and psychological well-being and quality of life are related to the generativity of middle-aged, social support in relation to depression and the generativity are judging as it will act as a mediating variable between these two variables. Hence, in this study aims to provide basic data for developing nursing intervention programs that can improve the generativity in the middle aged by confirming the mediating effect of social support in the relationship between depression and generativity in the middle aged.

## Method

**Subjects:** The subjects of this study were convenience sampling the middle-aged men and women aged 40 to 59 who live in four cities in including Seoul, Gyeonggi-do, Gangwon-do, and Chungcheongnam-do. The minimum number of samples in this study was calculated to be 119 when the medium level of effect size .15, significance level .05, and predictors were set to 3 to secure a statistical power of 95%, which is for correlation and regression analysis using G\*Power 3.12 program. Hence, in this study, a questionnaire was distributed to 140 people, and 128 questionnaires were included in the final analysis.

### Instruments:

**Depression:** The Korean version of Center for Epidemiologic Studies Depression Scale-Revised, (K-CESD-R), which is verified the validity and

reliability by Lee et al.<sup>9</sup> was used. The tool consists of the five-point scale from 0 to 4 of 20 items, and it means the higher the score, the higher the degree of depression. The Cronbach's alpha value in this study was .97.

**Social Support:** The Korean version measurement tool<sup>10</sup> of the Multipledimensional Scale of Perceived Social Support(MSPSS), which is developed by Zimet et al.<sup>11</sup> was used. The tool consists of the five-point scale of 12 items, and it means the higher the score, the higher the degree of social support. The Cronbach's alpha value in this study was .94.

**Generativity:** The middle-aged generativity scale developed by Lee & Lee<sup>7</sup>, was used. The tool consists of the five-point scale of 27 items, and it means the higher the score, the higher the degree of social support. The Cronbach's alpha value in this study was .93.

**Data Collection:** The data collection was implemented from the period of November 2019 to December 2019. The data collection was conducted on middle-aged men and women who visited once or twice the community social gatherings, sports centers, and shopping centers by this researcher. Also, the purpose and intent of the research were explained and then let them voluntarily participated in the research and wrote a written consent form.

**Ethical Consideration:** The selected subjects were assured anonymity and confidentiality after explaining the purpose and intent of the study and explained in advance that the subjects do not have to respond if they were reluctant to expose personal information. Also, they got explained that they could suspend or withdrawn if they do not wish to participate in the research at any time. Collected data will be stored in a locked private locker for three years after the study is completed, and will be discarded.

**Data Analysis:** The collected data were processed by computerized statistics using SPSS/WIN 22.0 program. The general characteristics of the subject, the depression in middle age, the generativity and the degree of social support were obtained by frequency and percentage, average and standard deviation, and the correlation between the variables was analyzed by the Pearson's correlation coefficients. Also, to understand the mediating effect of social support in the relationship between depression and the generativity in middle age, regression analysis was conducted following the method suggested by Baron and Kenny<sup>12</sup>, and the significance of mediating effect was confirmed by Sobel test.

**Results**

**General Characteristics of Subjects:** The general characteristics of the subjects in this study are as follows (Table 1). The distributions of the gender were 59 men (46.1%), 69 women (53.9%), and the age was 76 women between 40 and 49 (59.4%) and 52 people between 50 and 59 (40.6%). The education level was the highest in 104 students (81.2%) with college or higher. And the subject who had spouses was 98(76.6%). In terms of marital satisfaction was the highest in 48 (37.5%) with who answered as ‘satisfied’. And 66 (51.6%) answered as ‘yes’ on whether they have religion, and 105 (82.0%) had a job. In economic status, 85 (66.4%) answered ‘middle’ and in health status, 53 (41.4%) of subjects answered as ‘hHealthy’ (Table 1).

**Table 1: General characteristics of subjects(N=128)**

Characteristics	Categories	n(%)
Gender	Male	59(46.1)
	Female	69(53.9)
Age(years)	40~49	76(59.4)
	50~59	52(40.6)
Education	≤High school	24(18.8)
	≥College	104(81.2)
Spouse	Yes	98(76.6)
	No	30(23.4)
Marital satisfaction	Very Satisfied	14(10.9)
	Satisfied	48(37.5)
	Common	22(17.2)
	Dissatisfied	8(6.3)
	Very dissatisfied	6(4.7)
Religion	Yes	66(51.6)
	No	62(48.4)
Occupation	Yes	105(82.0)
	No	23(18.0)
Economic status	High	3(2.3)
	Middle	85(66.4)
	Low	40(31.3)
Healthstatus	Very healthy	2(1.6)
	Healthy	53(41.4)
	Common	39(30.5)
	Unhealthy	29(22.7)
	Very unhealthy	5(3.9)

**The Degree of Depression, Social Support and Generativity in Subjects:** The subjects’ average score of depression was .66(±.82), social support was 3.38(±.75), and generativity was 3.21(±.54).

**Table 2: The degree of depression, social support and generativity in subjects**

Variables	M±SD	Min	Max
Depression	.66±.82	.00	3.60
Social support	3.38±.75	1.00	5.00
Generativity	3.21±.54	1.48	4.30

**Correlations between depression, social support and generativity in subjects:**The generativity was shown that it has a significant negative correlation with depression( $r=-.40, p<.001$ ) and a positive correlation with social support( $r=.68, p<.001$ ). In other words, it showed that the lower the score of depression, and the higher the level of social support, the higher the generativity (Table 3).

**Table 3: Correlations between depression, social support and generativity in subjects**

Variables	Depression r(p)	Social support r(p)	Generativity r(p)
Depression	1		
Social support	-.32(<.001)	1	
Generativity	-.40 (<.001)	.68 (<.001)	1

**The mediating effect of social support in the relations between depression and generativity in subjects:** As a result of testing assumptions of the regression model for diagnosing whether the data in this study are suitable for regression analysis before testing the mediated effect, the Durbin-Watson index for self-correlation was 1.898, that it satisfied the independence test. For the multicollinearity among independent variables, there was no multicollinearity, as the variance inflation factors (VIF) was between 1,000~1.116. Therefore, all the assumptions for regression analysis were met. Firstly, the results of Baron and Kenny’s three-step mediated effect verification to test the mediated effect of social support in the relationship between depression and the generativity in middle age are as follows (Table 4).

Step one, the independent variable depression had a statistically significant effect on the mediating variable social support ( $\beta=-.323, p<.001$ ), and the explanation power of social support was 9.7%. Step two, the independent variable depression had a significant effect on the dependent variable generativity ( $\beta=-.400, p<.001$ ), and the explanation power of the generativity was 15.3%. Step three, in order to understand the effect

of the social support which is the independent variable on the generativity which is the dependent variable, the result of regression analysis by set the depression and social support as a predictor and the generativity as the dependent variable, depression ( $\beta=-.203, p=.003$ ) and social support( $\beta=.609, p<.001$ ) was shown as a significant predictor of generativity. In step three, when the social support mediated variable, depression was shown as significant for the generativity, and the non-standardized regression coefficient was reduced from the absolute

value .264 of Step two to the absolute value .134 of Step three that it shown the social support was partially mediated. The explanation power of these variables explaining the generativity was shown as 48%. In order to significance test of the scale of the mediating effect of social support conducted the Sobel test, and the result showed that social support is a significant mediating variable in the relationship between depression and generativity ( $Z=-3.522, p<.001$ ).

**Table 4: Mediating Effect of Social support in the Relations between Depression and Generativity in subjects**

Step	Variables	B	$\beta$	t	p	R <sup>2</sup>	Adj. R <sup>2</sup>	F	p
Step 1	Depression → Social support	-.298	-.323	-3.829	<.001	.104	.097	14.661	<.001
Step 2	Depression → Generativity	-.264	-.400	-4.892	<.001	.160	.153	23.931	<.001
Step 3	Depression, Social support→Generativity					.492	.484	60.533	<.001
	1) Depression	-.134	-.203	-3.012	.003				
	2) Social support	.437	.609	9.044	<.001				
Sobel test : $Z=-3.522, p<.001$									

### Discussion

The cut point for this depression tool was 13 points, and the depression level of subjects for this study was an average score of .66 points (average of 13.2 points). The optimal cut point of CESD-R tool in foreign countries is 16 points, which is higher than this tool. This may be a result of reflecting the sociocultural background of Korea, so it is emphasized that the management of middle-aged depression is necessary even if the score of this tool is relatively low.<sup>13</sup> The level of social support average score of 3.38 points, which was lower than 3.75 points in a result of a study of middle aged people using the same tools.<sup>14</sup> However, the social support in the middle age when the support system from family members and social networks was reduced, was shown to buffer the depression.<sup>14</sup>The average score of the generativity was 3.21, and the study of Ji<sup>15</sup> was higher with 3.59 than this study. These results are considered it is because the subjects of the study of Ji<sup>15</sup> are older than this study’s subjects. And this is consistent with the results of Oh<sup>16</sup>, which reported that the generativity of middle-aged is higher than young people and lower than old age.

In the correlation between depression, social

support, and the generativity, the generativity was a significant negative correlation with depression, and a positive correlation with social support. These results are consistent with the study that reported that middle-aged women’s depression is correlated with social support<sup>14</sup> and that depression has a negative correlation.<sup>7</sup> Thus, it supports this study as social support can be inferred that it is related to the generativity.

Social support has been shown to have a partial mediating effect in the relationship between depression and generativity. In other words, middle-aged depression directly affects the generativity, and it can positively affect the generativity by social support that has mediated effect. In the study of Kim and An<sup>17</sup> also shown that the key factors related to the generativity of old age were family relations, and it is emphasized that the development task of life should be completed through social activities until middle age. Therefore, it supports the results of this study that the generativity improves through social support, and social support acts as an important mediating effect.

Hence, in this study, it is necessary to seek a physically and psychologically integrated nursing intervention strategy to establish the generativity

of middle aged by proving that social support has a mediating effect in the relationship between depression and generativity of middle aged.

### Conclusions

In this study, social support has been identified as a mediating variable that significantly affects the generativity, which is a dependent variable, in the relationship between depression and generativity in middle aged. As a result, the quality of life after middle age can be determined by how successful they are adapting to changes and losses caused by physical aging. Therefore, the re-examination is needed to establish the generativity, a development task in middle age, by enhancing the ability to manage depression through social support. In addition, since this study was conducted on middle aged men and women in some parts of the country, it is difficult to generalize the results of the study. Therefore, it is suggested that further studies on the generativity that added various subjects and other new mediating variables to be conducted.

**Ethical Clearance:** Not required

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**Conflict of Interest:** Nil

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# Quality of Life Evaluation in Titanium/Peek Andtitanium/Co-Crdouble Crown Systemin Implant-Retained Mandibular Overdenture (Randomized Controlled Trial)

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## Abstract

**Background and Objective:** This study was designed to evaluate the impact of double crown system with either titanium/PEEKor titanium/Co-Cr combination on oral and general health related quality of life (OHRQoL) in patients with completely edentulous mandible.

**Materials and Method:** Participating patients received new complete dentures and then received two mandibular interforaminal implants. Patients were randomly dividedinto two equal groups. For patients of group (A) the secondary crowns of the telescopic overdenture were made of PEEK material, while those of group (B) the secondary were made of Co-Cr material. Questionnaires were used to assess OHRQoL (OHIP-EDENT).

**Results:** The study was conducted on 18 healthy completely edentulous patients. Patients were recalled two weeks after final dentures insertion, 3m, 6m, 9m and 12m. The results showed that both materials have improved the oral health related quality of life, however there was a non-significant difference between the two groups.

**Conclusion:** Double crown systems, with either titanium/Peek combination or titanium/Co-Cr combination, have the same impact on oral and general health related quality of life when used for treating patients with completely edentulous mandibles.

**Keywords:** Double crown, telescopic overdenture, PEEK

## Introduction

The standard treatment for completely edentulous patients is a complete maxillary denture opposed by mandibular overdenture on two implants. Various attachment systems have been introduced for retaining implant supported overdentures. One of the most popular attachments is the double crown system or the telescopic attachment.<sup>(1,2)</sup>

For proper functioning of telescopic retained overdentures, proper retentive force must exist. This is particularly important because of the direct relation between retention of the prosthesis and patient's satisfaction. For the success of double-crown systems it is very important to reach an optimum retentive force, which necessitates technical skills and experience.<sup>(3)</sup>The double crown retention is associated with the problem of the frictional wear during their functional period.<sup>(4)</sup> In addition,as reported by **Ohkawa et al**, it is hard to predict the long-term denture retention. Retentive force can decline, remain unchanged, or even increase.<sup>(5)</sup> The material used for double crown system fabrication is one of the parameters in its retention.<sup>(6)</sup> Metal alloys, precious and non-precious, are the most commonly

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approved materials in prosthodontics owing to their excellent physical and mechanical properties. Double crown systems are presented in different material combinations. Those different materials have different retention forces and different long-term retention behavior.<sup>(7)</sup>

Gold either casted or electroplated, has been the standard material in double crown system for years. However, gold has many disadvantages being expensive, heavy, and its electroplating technique requires highly skilled technicians.<sup>(8)</sup> Base metals alloys and titanium are also used for double crown system fabrication. Some of these metals reported allergic reaction, discrepancies due their casting procedure, as well as galvanic current between the primary and secondary copings. All that previously mentioned, evokes the need of new material combination of double crown system being non-metallic, of low cost, and with satisfactory retention values.

New metal free materials have been introduced to substitute metals. One of them is a thermoplastic composite polymer known as PolyEtherEtherKetone or PEEK which is already used in telescopic crown manufacturing and other prosthetic treatment modalities. Studies that are available about the suitability of PEEK as double crown material are scarce and only in vitro.

Those materials are claimed to have many clinical advantages and reported to have high retention values.<sup>(9)</sup> They have mechanical properties that are definitely different from that of metal and reported to have a highly successful result. Therefore, when used in double crown system, enough evidence must exist to ensure that their properties will cope with the fundamentals and prosthetic advantages of double crown system in completely edentulous mandible taking into account the value and stability of their retentive force, prosthetic technical complications, and patient perception.

The patients' expectation in terms of function, esthetic, psychological, and social aspects is very important factor.<sup>(10)</sup> The Oral Health Impact Profile for Edentulous OHIP-DENT is short questionnaire and relevant to prosthodontics treatments outcome. It is a 19-question survey and was suggested to be the most appropriate for edentulous patients, as it includes a set of specific questions relevant to edentulous patients. This tool evaluates the impact of oral health on the quality of life of patients with complete dentures before and after prosthodontics intervention.<sup>(11)</sup>

The aim of the study was to evaluate the impact of double crown system with titanium/Peek combination versus double crown system with titanium/co-cr combination on the Oral Health-Related Quality of Life in patients with completely edentulous mandible,

## Materials and Method

**Study Groups:** Patients were randomly divided into two equal groups: the intervention group (group A) in which the secondary crowns of the telescopic overdenture were made of PEEK thermoplastic material, and the study group (group B) in which the secondary crowns of the telescopic overdenture were made of Co-Cr material. Simple randomization procedure was used. Allocation of the patients in either intervention group or control group was performed with computerized random allocation program. Computer-generated list of random numbers was obtained for both groups.

**Study Population:** Eighteen Completely edentulous patients were selected from the outpatient clinic of prosthodontic department, faculty of Dentistry Cairo University, in an age range of 45 - 65 years. Patients were given a detailed description of the planned procedures and provided written informed consent prior to participation. The study protocol was approved by the local ethics committee. All patients had to fulfill the following inclusion criteria: Patients are completely edentulous from 3 months at least, inter-arch distance is 15mm or more, anterior lower ridge with buccolingual width of 6mm or more, as measured from CBCT, patients have Angle's class I relation and without TMJ disorders, patients are free from any systemic disease that may interfere with proper osseointegration of implants. Heavy smokers and uncontrolled diabetic patients whose glycosylated hemoglobin (HbA1c) is more than 8% were excluded from the study.

All patients were provided with conventional maxillary and mandibular complete denture followed by the insertion of two (NeoBiotech, Neo CMI implant IS-II active), 10mm length and 3.5mm diameter, implants in the interforaminal region. Following implant placement and a healing period of 3 months, the implants were uncovered and healing abutments were inserted and impression were made followed by milling of the prefabricated titanium shapeable abutments in 2-degree taper angle. The milled abutments were scanned using scanning machine and scanning software to design a coping with 0.6mm thickness. The design was exported



as STL file to a milling machine in order to mill the coping in wax. For group A, the secondary coping was fabricated in PEEK material (*BioHPPGranulat for 2 press system, Bredent, Germany*) which is processed in the for-2-press vacuum press device. For the second group, the secondary coping was casted in Cobalt Chrome material using the conventional lost wax technique. After secondary copings fabrication, metal framework was constructed for both groups (*fig.1*), followed by mandibular overdenture construction. The final mandibular overdenture was inserted intraorally, while the abutments were screwed in their position and secondary copings were well seated upon them followed by intraoral pick up of the secondary copings into the metal framework using DTK-adhesive material(*fig.2, fig.3*).



**Fig. (1) Metal framework and PEEK copings**



**Fig. (2) The secondary copings picked up**



**Fig. (3) The final prosthesis**

**Outcome Measures:** Two weeks after denture insertion, the patients were recalled for assessment, and after 3m, 6m, 9m and 12m. Patients were monitored in terms of Oral Health-Related Quality of Life via the use of OHIP-EDENT questionnaire. Patients were asked 19-questions in Arabic language by one examiner only. Patients answered the questions expressing their satisfaction concerning the prosthesis in five choices; never, hardly ever, occasionally, fairly often, very often. Each choice was given score. lower scores indicated better oral health-related quality of life.

Data were statistically described in terms of mean  $\pm$  standard deviation ( $\pm$  SD), median and range when appropriate. Comparison between the study groups was done using Mann Whitney *U*test for independent samples. Within group comparison was done using Wilcoxon signed rank test for paired (matched) samples in comparing 2 groups and Freidman's test in comparing more than 2 groups. *p* values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 22 for Microsoft Windows.

## Results

Eighteen patients were included in this study; Male to female ratio was 3.5(4 females and 14 males) in an age range of 45 - 65 yearswith average age group of 55.

Throughout the entire time intervals of the study, PEEK group showed lower scores than the Co-Cr group in term of the seven domains of the OHIP-EDENT questionnaire. At baseline only, Co-Cr group showed lower scores than that of the PEEK group in terms of two domains; psychological discomfort (*p* value= 0.049) and psychological disability (*p* value= 0.591). However, in general and as total scores, there is statistically insignificant difference between the two groups.

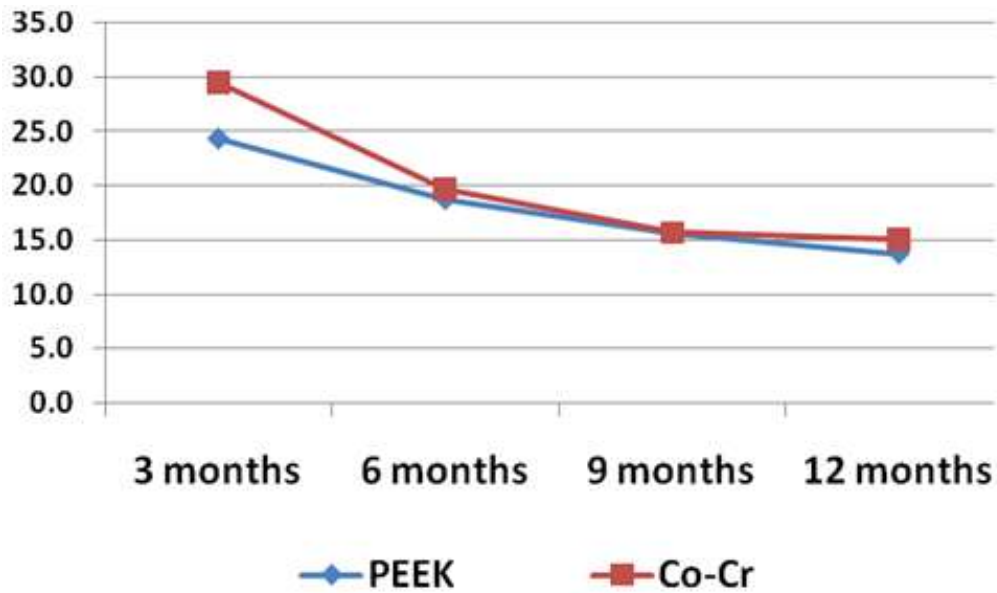


Fig .(4): Mean total score between the study groups

Based on Wilcoxon signed rank test, for the PEEK group, there is statistically significant difference in the OHIP-EDENT Scores between the baseline and after 12 months follow up as illustrated in table (1). While for the Co-Cr group, there is statistically significant difference in the OHIP-EDENT Scores between the baseline and after 12 months follow up as illustrated in table (1).

**Table 1: The difference in the OHIP-EDENT Scores for group A (PEEK) and group B (Co-Cr) between the baseline and 12m:**

Test Statistics(b,c)								
	Functional limitation-12m - Functional limitation-Baseline	Physical pain-12m - Physical pain-Baseline	Psychological discomfort-12m - Psychological discomfort-Baseline	Physical disability-12m - Physical disability-Baseline	Psychological disability-12m - Psychological disability-Baseline	Social disability-12m - Social disability-Baseline	Handicap-12m - Handicap-Baseline	Total-12m - Total-Baseline
Z	-2.401(a)	-2.456(a)	-2.271(a)	-2.264(a)	-2.232(a)	-2.264(a)	-2.410(a)	-2.375(a)
p value	0.016	0.014	0.023	0.024	0.026	0.024	0.016	0.018
a. Based on positive ranks.								
b. Wilcoxon Signed Ranks Test								
c. Group = PEEK								
Significance level at $p \leq 0.05$ .								

Test Statistics(b,c)								
	Functional limitation-12m - Functional limitation-Baseline	Physical pain-12m - Physical pain-Baseline	Psychological discomfort-12m - Psychological discomfort-Baseline	Physical disability-12m - Physical disability-Baseline	Psychological disability-12m - Psychological disability-Baseline	Social disability-12m - Social disability-Baseline	Handicap-12m - Handicap-Baseline	Total-12m - Total-Baseline
Z	-2.588(a)	-2.565(a)	-2.588(a)	-2.539(a)	-2.032(a)	-2.539(a)	-1.826(a)	-2.524(a)
pvalue	0.010	0.010	0.010	0.011	0.042	0.011	0.068	0.012
a. Based on positive ranks.								
b. Wilcoxon Signed Ranks Test								
c. Group = Co-Cr								
Significance level at $p \leq 0.05$ .								

## Discussion

In the presented study, mandibular implant retained overdenture using double crown systems, with either titanium /PEEK combination or titanium /Co-Cr combination was evaluated regarding Oral Health-Related Quality of Life and it was showed that both have the same impact on oral and general health related quality of life when used for treating patients with completely edentulous mandibles. There are few clinical studies which evaluated the impact of various material combinations of double crown system on the oral and health related quality of life (OHRQoL). The available studies showed general improvement in (OHRQoL) by the use of double crown system as an attachment for mandibular implant overdenture as compared to conventional dentures.<sup>(12,13)</sup>

The results of the presented study showed a general improvement in the seven domains of(OHIP-DENT) questionnaire in both groups throughout the study period. Although statistically insignificant difference was found between both groups regarding the (OHRQoL), PEEK as a secondary crown material, had a positive impact on the oral and health related quality of life.

In Co-Cr group, overdentures insertion and removal were much more easier than that of the PEEK ones. That might explain the lower scores of the Co-Cr group at the baseline in terms of psychological discomfort and psychological disability. Although it is agreed that retention of overdentures is mostly mechanical when using double crown systems, it is also augmented by the physical factors of retention and the neuromuscular adaptation of the patient.<sup>(14)</sup>

At denture insertion appointment and for short period later, patients with PEEK secondary copings reported difficulty in insertion and removal of their overdentures due to the high retention of the PEEK copings. By time, patients of the PEEK group became more familiar with their over dentures and patients of Co-Cr group got more adapted to their overdentures, and in return more satisfaction took place in both groups.

It has been suggested by several studies that the time effect plays an important role in terms of quality of life and patients satisfaction. The initial assessment of a new removable prosthesis is not a significant predictor of patients' perception later on.<sup>(15)</sup>This can be due to the changes that occur in the oral cavity due to the neuromuscular adaptation of the patient

with the prosthesis.<sup>(16)</sup>This is supported by another two studies which suggested that patient satisfaction with mandibular complete dentures is determined more by the denture-wearing experience itself<sup>(17)</sup>, and the age of the mandibular prosthesis as well.<sup>(18)</sup>

## Conclusion

**Funding:** The study was self-funded

**Competing Interests:** No conflict of interest

**Ethical Approval:** Taken from the Ethics and research committee, Faculty of Dentistry, Cairo University and patients' consent was obtained.

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# The Correlation Between Nesfatin-1 Level and Insulin Resistance in Gestational Diabetes Verses Control

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## Abstract

**Objective:** The examination of nesfatin-1 level in females with gestational diabetes versus controls and its relation with the markers of insulin resistance.

**Method:** The study was accomplished for eighty eight pregnant females at 24<sup>th</sup> -28<sup>th</sup> week of gestation which were involved 44 females diagnosed with gestational diabetes and 44 females without. Age and bone mass index were matched in two groups. Nesfatin-1 and insulin concentrations were measured by using enzyme linked immunosorbent assay. Insulin level and (homeostasis model assessment index- insulin resistance) were measured in two groups. The manufacture instructions were performed accurately. The comparison between previous parameters was performed.

**Results:** The level of nesfatin-1 wasn't differed significantly between two groups. While insulin, homeostasis model assessment index-insulin resistance and fasting blood glucose were significantly increased in gestational diabetes than control groups.

**Conclusion:** The mean of nesfatin-1 levels showed no significant difference between two groups. While fasting blood glucose, insulin, and homeostasis model assessment index-insulin resistance were significantly higher in GDM. Advance age, higher bone mass index were associated of gestational diabetes.

**Keywords:** Gestational diabetes; nesfatin-1, insulin resistance.

## Introduction

Gestational diabetes “is defined as diabetes first diagnosed in the second or third trimester of pregnancy that is not clearly either preexisting type 1 or type 2 diabetes<sup>(1)</sup>. Placental production of anti-insulin hormones like: cortisol, progesterone, a human placenta lactogen, oestrogen that are lead to evolve insulin resistance after mid pregnancy<sup>(2)</sup>.

The risk characteristics for development of gestational diabetes: reduced sensitivity of insulin and raised resistance of insulin in women before pregnancy, production of insulin is inadequate after conception, and cell functional weakness<sup>(3)</sup>.

Nesfatin-1 is polypeptide which is consist of 82 amino acid (aa) that is obtained from DNA binding protein (NUCB2 (and calcium. NUCB2 (nonesterified fatty acid/ nucleobinding 2) is present in the plasma membrane and neuroplasma and peripheral organ<sup>(4)</sup>. The PC3/1 and PC2 that are changing the NUCB2 to nesfatin-1, 2 and 3<sup>(5)</sup>. The one of the marked roles of nesfatin-1 is regulation of hunger, control of food ingestion and appetite which is leading to satiety feelings<sup>(6)</sup>.

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Nesfatin-1 role is supporting insulin release via Ca<sup>2+</sup> influx through L-Type Ca<sup>2+</sup> canals without depending on protein kinase A (PKA) and phospholipase A<sub>2</sub>, impairment in the regulation of nesfatin-1 might be involved in metabolic upset like type (II) D.M.<sup>(7,8)</sup>.

Insulin action in skeletal muscle, adipose tissue and liver are very essential in the homeostasis of total body fuel. Insulin exerts anabolic effects by stimulation uptake and storage of carbohydrate, amino acids and fat and prevented catabolism of those fuel stores<sup>(9)</sup>.

The facilitative glucose transporter (GLUT2) is taking up blood glucose that is present on the  $\beta$ -cells surface. Inside the cell, generating adenosine triphosphate (ATP) by glycolysis of glucose results in the raising ATP/ADP ratio. This alteration in the ratio lead up to close ATP-sensitive K<sup>+</sup>-channels (KATP-channels). In non-energizing status, the canals remain opening to keep the resting potential via transfer potassium ions (K<sup>+</sup>) down their concentration gradient out of the cell. Upon closing, the following drop in "the magnitude of the outwardly directed K<sup>+</sup>-current elicits the depolarization of the membrane, followed by the opening of voltage-dependent Ca<sup>+</sup>-channels (VDCCs) "<sup>(10)</sup>.

The aim of this study that is examination of nesfatin-1 level in females with gestational diabetes versus controls and find the relationship between nesfatin-1 and markers of insulin resistance.

### Subjects and Method

This case control study was involved 88 pregnant females at 24<sup>th</sup>-28<sup>th</sup> weeks of gestation that was categorized in to two groups forty four females diagnosed without gestational diabetes and 44 females without (control). Their age and BMI are matched. Previous acceptance was obtained from all females. This study is accomplished in Baghdad and AL Yarmouk Teaching Hospital and National center for Diabetes research and Treatment / Mustansiriya University from November 2018 to May 2019 . Females with pre-existing DM, liver, renal and inflammatory disease, fetal and placental abnormality, hypertension, anti-inflammatory drugs, glucocorticoid of any dose in the last 3 months before sampling were excluded.

The diagnosis of GDM depend on the International Association of the Diabetes and Pregnancy and study groups (IADPSG)<sup>(1)</sup>, Fasting blood sugar  $\geq 126$ mg/

dlor random blood sugar (200mg/dl) that minimum value for diabetes diagnosis otherwise GDM in females with moderate or high-risk factors were diagnosed by performing OGTT one or more of the venous plasma concentration must be met or exceeded for a positive diagnosis FBS  $\geq 92$  after 1hours 180 mg/dl at 2 hours 153mg/dl. Females were categorized as controls under this threshold<sup>(1)</sup>.

### Method

Five milliliter of blood was drawn from pregnant females when they were fasted not less than 8 hour then centrifuged and stored at  $-80^{\circ}\text{C}$  until use. Nesfatin-1 and insulin levels were analyzed by enzyme linked immunosorbent assay kits which were manufactured in ((CUSABIO\ China) (HUMAN / Germany) company. Serum glucose was analyzed by an enzymatic colorimetric method which performed by Human kits . The relationship between nesfatin-1 and insulin concentration were estimated in two groups .The homeostasis model assessment insulin resistance index (HOMA-IR) was performed for all participants<sup>(11)</sup>. All statistical analysis, SPSS software 22.0 was used. The Anderson darling test was used for normal distributions. Mean and standard deviation were used when followed normal distribution. Median and interquartile range were used when not follow normal distribution .The differences in means between two groups were analyzed by t test when two sample follow normal distribution with no significant outlier). The differences in median of two groups were analyzed by Mann Whitney U test when they do not follow normal distribution). Linear regression analysis used to assess the association between different variables. Binary logistic regression analysis performed to calculate the odd ratio (OR) and their 95% confidence intervals, when the outcome can be categorized into 2 binary levels, and Wald used to assess which parameters had more strong effect (Wald basically is  $t^2$  which is Chi-Square distributed with  $df=1$ ). P value considered when appropriate to be significant if less than 0.05.

### Results

The mean of nesfatin-1 levels were similar in both groups .While FBS, fasting insulin, and HOMA-IR were significantly higher in GDM compared to control, also insulin resistance percentage (determined as with HOMA-IR  $\geq 2.5$ ) was higher in women with GDM, as illustrated in table 1.

**Table 1: Assessment of Various Biomarkers for GDM**

Variables	Control	GDM	p-value
Number	44	44	-
Nesfatin-1(pg/mL), mean ± SD	38.1±7.4	38.8±7.9	0.676 <sup>1</sup>
FBS (mg/dL), mean ± SD	79.1±8.2	107.7±20.6	<0.001 [S] <sup>1</sup>
Insulin(μIU/mL), median (IQR)	4.6 (3.6-5.5)	11.7 (5.2-25.3)	<0.001 [S] <sup>2</sup>
HOMA-IR (%), median (IQR)	0.9 (0.7-1.1)	2.7 (1.3-6.6)	<0.001 [S] <sup>2</sup>
Insulin resistance, n (%)	4 (9.1%)	22 (50.0%)	<0.001 [S] <sup>3</sup>
SD: standard deviation, IQR: interquartile range, S: significant <sup>1</sup> Independent t-test <sup>2</sup> Mann – Whitney U test <sup>3</sup> Chi square test			

HOMA-IR: homeostasis model assessment index, FBS: fasting blood sugar.

**Table 2: Nesfatin-1 relation to women with GDM**

	Nesfatin-1	
	R	p-value
Age	-0.076	0.624
GA	-0.144	0.352
BMI	-0.153	0.321
FBS	-0.107	0.490
Insulin	0.152	0.324
HOMA	0.074	0.631
r: correlation coefficient		

HOMA-IR offered good ability, insulin offered fair ability and Nesfatin-1 had ability to diagnose GDM, as illustrated in table 3

**Table 3: ROC analysis of various markers for GDM**

	AUC	95%CI AUC	p-value	-LH	+LH
HOMA-IR	0.830	0.735 – 0.902	<0.001	0.15	3.55
Insulin	0.759	0.656 – 0.844	<0.001	0.34	2.75
Nesfatin-1	0.514	0.405 – 0.622	0.822	0.82	1.55
ROC: receiver operator characteristics, AUC: area under the curve, CI: confidence interval, LH: likelihood ratio					

In terms of specificity nesfatin-1 offered comparable value to that of HOMA-IR and insulin for diagnosis GDM with cut off value less or equal to 36.2 diagnosis GDM, however its sensitivity was very low than that of HOMA-IR and insulin. As illustrated in table 4

**Table 4: validity analysis of various markers for GDM**

	Cut-off	SN	SP	AC	PPV	NPV
HOMA-IR	>1.1	88.6	75.0	81.8	78.0	86.8
Insulin	>5.2	75	72.7	73.9	73.3	74.4
Nesfatin-1	≤36.2	38.6	75	56.8	60.7	55
SN: sensitivity, SP: specificity, AC: accuracy, PPV: positive predictive value, NPV: negative predictive value						

Advance age, higher BMI, elevated fasting insulin, and elevated value of HOMA-IR, were predictors of GDM. Nesfatin-1 was not, as illustrated in table 5

**Table 5: logistic regression analysis of the predictors of GDM**

	Wald	OR (95%CI)	p-value
Age	5.891	1.098(1.018-1.183)	0.015 [S]
BMI	10.251	1.174(1.064-1.296)	0.001 [S]
Nesfatin-1	0.179	1.012 (0.958-1.070)	0.673
Insulin	10.146	1.106(1.039-1.176)	0.001 [S]
HOMA-IR	10.878	1.752 (1.255-2.445)	0.001 [S]

OR: odd ratio, CI: confidence interval, Hx: history

### Discussion

This study shows that there were no significant differences in mean nesfatin-1 concentration between females with GDM versus control. Our study is in agreement with Aslan et al. who noticed that nesfatin-1 concentrations in cord blood were similar in both groups and the correlation between maternal nesfatin levels and their special cord blood were positive<sup>(12)</sup>. This study is in agreement with Zhai et al. 2017, which include 7 a meta-analysis studies, But subgroups in this studies, newly diagnosis women with type 2 diabetes had been significantly higher nesfatin-1 concentration and those who taking antidiabetic drugs had been significantly lower nesfatin-1 concentration so this supports a relation between nesfatin-1 levels and type 2 diabetes<sup>(13)</sup>.

Nesfatin-1 levels are decreased in patients with type 2 diabetes who are taking antidiabetic drugs, these drugs :decreasing of blood glucose, raising sensitivity of insulin and diminished food ingestion. This result clarified also by J. Dong, H. et al. 2013 observed that nesfatin-1 can catalyzed the metabolism of lipid and showed anti-inflammatory effects.<sup>(14)</sup>

The different observation have been shown by groups of Zhang et al. 2017 as they explained that nesfatin-1 concentrations in maternal serum and cord blood in females with GDM were higher compared to controls as nesfatin-1 is neatly linked to insulin resistance and obesity in pregnancy<sup>(15)</sup>.

But disagreement with (Radziśław Mierzynski et al, 2019, Ademoglu et al 2017, Kucukler et al 2016) observed that, nesfatin-1 serum concentrations was significantly lower in females with GDM than controls<sup>(16,17,18)</sup>.

The study of Algul et al. 2016. showed that fasting

nesfatin-1 concentration decreased in patients with type 2 DM and metabolic syndrome, compared to controls and patients with T1DM. This outcomes are clarified by: GDM and T2DM, and (IGT) share many common pathophysiological mechanisms such as insulin resistance and hyperinsulinemia, and all of these conditions are more often observed in overweight and obese individuals that study suggested a possible role of nesfatin-1 in GDM, and nesfatin-1 level may be predictor for GDM development and act as antidiabetic therapy<sup>(19)</sup>.

The contradiction between the outcomes showed by many studies might be clarified by the difference in study protocols, method of patient selection, the gestational age when samples were collected (2th, 3rd trimester), gestational age in the GDM diagnosis (in the 1<sup>st</sup> trimester (might be IGT before pregnancy) or 2<sup>nd</sup> trimester (“model” gestational diabetes.) and the type of treatment for GDM: with diet or with metformin or insulin, that might be suggestive the degree of metabolic disorders,

(Hana M. Gashlan 2017, Kucukler et al. 2016, Saisho et al 2013) all observed that fasting blood glucose and C-peptide concentration are significantly higher in females with GDM than controls due to imbalance between insulin resistance and insulin secretion. The elevated insulin resistance was obvious in females with GDM that proved by increasing biomarker of insulin resistance. They suggested that increased insulin resistance associated to beta cell dysfunction is related with the degree of glucose intolerance and dosage of insulin that need for females with GDM<sup>(20,18,21)</sup>

This study observed that there was no correlation between nesfatin-1 levels and maternal age, BMI and



gestational age, in both groups in agreement with Aslan and cols. et al<sup>(12)</sup>. While study done by (Radzislaw et al. 2019, Ying Zhang 2017, Anwar et al. 2014, Ramanjaneya et al. 2010) all noticed that nesfatin-1 level was positively correlated with gestational age and (BMI) in both groups<sup>(16,15,22,23)</sup>. But negative correlation was observed by Kucukler et al (2016)<sup>(18)</sup>.

This study failed to find correlation between nesfatin-1 levels and, fasting insulin, and HOMA-IR and fasting glucose in both groups in agreement with (Aslan et al 2012., Algul et al 2015<sup>(12,19)</sup> and disagree with (Zhang 2017, Ramanjaneya et al 2010) who detected a positive significant correlation<sup>(15,23)</sup>, while a negative correlation was observed by Kucukler et al 2016<sup>(18)</sup>.

This study concludes the mean of nesfatin-1 levels showed no significant difference between women with gestational diabetes and control. While fasting blood glucose, insulin, and homeostasis model assessment index-insulin resistance) were significantly higher in GDM compared to control.

## Conclusions

**Ethical Clearance:** Approval to conduct the study was obtained from the dean of college of medicine, Mustansiriyah University

**Source of Funding:** Self

**Conflict of Interest Statement:** We declare that we have no conflict of interest.

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# Construct Validity Indonesian Version of Barthel Index for Post Stroke

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## Abstract

**Background & Aims:** Stroke is a significant health problem with high prevalence and mortality worldwide. In Indonesia, it is the first leading cause of death after ischemic heart disease in 2017. As Barthel Index has been regarded as the best outcome measure used in rehabilitation of people with stroke, this study sought to determine the construct validity of the Indonesian version of the tool. Specifically, the study looked into the inter-rater reliability of the tool, the problems encountered by participants with the English version and the corresponding modifications to be incorporated in the Indonesian version.

**Method:** Utilizing an exploratory sequential mixed method design and involving five different groups of participants with a total of 391, the study began with the forward and backward translation of the English Barthel Index followed by the validation, reliability and validity testing of the Indonesian version.

**Result:** Results showed that inter-rater reliability is satisfactory. Some terms in the English version were modified to suit the linguistic and cultural context of Indonesia. In terms of content validity, the Indonesian version of Barthel Index is acceptable. The construct validity test revealed two major factors, namely, functional performance and physiological function.

**Conclusion:** it thereby provides a baseline data to advance knowledge on the use standardized tool like BI, to further improve nursing practice in the stroke room, and to enhance the nursing education curriculum.

**Keywords:** *Construct Validity, Barthel index, Post Stroke*

## Introduction

Indonesia has strategic potential in the development and economic growth. However, it does not always have a positive impact; development and economic growth also have a negative impact on people's living behavior. Common changes are high consumption of junk food and fast food, high calorie food consumption, consumption

of fatty foods, consumption of cigarettes and alcohol, and low consumption of fiber, fruit and vegetables, and physical activity. The behavior is visible on Riskesdas 2007 data that the prevalence of obesity is 28.1%.<sup>1</sup> The high prevalence of obesity is one of the risk factors of heart disease and stroke.

Measuring outcomes using standardized assessments provides information related to client progression while establishing the value and effectiveness of treatment.<sup>2</sup> Measuring outcomes enables nurse and other health care to identify a patient's current functional status and using this information subsequently direct therapy.<sup>3</sup> Selecting an appropriate standardized assessment can be time consuming as no standardized assessment will measure all the domains for every client group or environmental

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setting and the advantages and disadvantages of each assessment must be considered.<sup>4,5</sup> Therefore, it is vital that nurses and health worker select an appropriate standardized assessment to assess function that has demonstrated validity and reliability with older adults and stroke patients.<sup>4-6</sup>

The use of Barthel Index measurement tools must be tested in terms of its adaptation, validity and reliability test to be able to provide accurate data about the status of stroke patient condition, specifically if the measuring instrument has not gone through adaptation test, validity and reliability in other language.<sup>7</sup>

In Indonesia, the assessment of functional status of daily activity has used the Barthel index instrument in elderly patients, patients with limited mobility, rheumatoid arthritis and patients after stroke. The Barthel Index has been tested in terms of its reliability and validity to assess the activity of daily living status of elderly and has been recommended that Barthel Index can be used on elderly. However, in this study, the researcher assessed the construct validity of the Indonesian version of the Barthel index for stroke patient as utilized by Indonesian nurses and health professionals. It has been commonly observed that after stroke, the patients suffer hemiplegia and limitations of daily living activity.

## Method

The study utilized an exploratory sequential mixed method research design. As an exploratory design, qualitative data was first collected and analyzed, and themes were used to drive the development of a quantitative instrument to further explore the research problem. As a result of this design, two stages of analyses were conducted.

In this study the researcher have taken 308 nurses participants have experience minimal 2 year to care post stroke from the seven hospitals in Sulawesi Island and considering 47 people with stroke were selected at random from the stroke ward. For nurses have observed one patient, thus in this study 47 patients were involved in the conduct of this study. The method used for randomization was to draw list when the patients entered the pre-discharge planning stage throughout the data collection period. 25 (53%) were male and 22 (47%) were female. All of them were diagnosed with first stroke as confirmed by a CT scan. Their mean age was 68 years (SD=7.6)

The study has utilized the original Barthel Index (BI) of Activities of Daily Living (ADL), first developed in 1965 by Mahoney. Firstly, the researcher asked permission for translation, adaptation and validation from The Maryland State medical Society who holds the copyright of the original Barthel Index. Given permission.<sup>8</sup>

Data collection commenced after duty hours of the participants. The BI was provided only after the informed consent had been signed. Each participant read the informed consent in the presence of the researcher and was encouraged to ask questions about their participation in the study. As soon as the participants agreed to get involved in the study, they were asked to respond to each of the items of the Barthel Index. The items were filled up on a 5-point scale with options ranging from none to all the time.

**Data Analysis:** Particularly content analysis has been done for the synthesis from the expert committee review and the pre-testing for the semantic equivalence, idiomatic equivalence, experiential equivalence and conceptual equivalence of the questionnaires. The expert panel were then asked to evaluate each item of the instrument for content equivalence. The guideline offered was that the ACP should be .90- not .80 as the standard criterion for acceptability for the S-CVI. 3 Kappa coefficient agreement has used to evaluate the rater's agreement. This was used to determine the inter-rater reliability of the developed Indonesian version Barthel Index. 4. Exploratory factor analysis was utilized for the construct validity of the Indonesian version Barthel Index.

## Results

Inter -rater Reliability: The average agreement which was calculated using weighted kappa in Groups I to VI. (Table 1) The results demonstrated that the group fourth and sixth had a moderate level of agreement. This is possibly due to the overestimated patient's functional ability and they were not familiar with the use of Indonesian version of the Barthel index. And the nurses were working in the small city (Toraja and Kendari) so that the possibility that they have not attended any training, seminar and workshop about the assessment of the ADLs of stroke patients. Training improves consistency in application of stroke assessment scales.<sup>9, 10</sup>

While, mean Kappa coefficient is 0.670, which



**Table 3: Principal Component Analysis (PCA) Total variance explained: Indonesian version Barthel Index**

Total	% Of variance	Cum.%	Total	% Of variance	Cum%
5.023	50.232	50.232	5.023	50.232	50.232
1.090	10.895	61.128	1.090	10.895	61.128
1.000	10.005	71.132	1.000	10.005	71.132
.758	7.582	78.715			
.645	6.449	85.164			
.466	4.661	89.825			
.404	4.037	93.862			
.372	3.717	97.578			
.148	1.478	99.056			
.094	.944	100.000			

**Table 4: PCA; Rotated component Matrix of Indonesian Version Barthel Index.**

No		Comp 1	Comp 2
1	Feeding (if food needs to be cut up = help)	.606	-
2	Moving from wheelchair to bed and return (includes sitting up in bed)	.659	-
3	Personal toilet (wash face, comb hair, shave, clean teeth)	.774	-
4	Getting on and off toilet (handling clothes, wipe, flush)	.748	-
5	Bathing self	.751	-
6	Walking on level surface	.856	-
7	Ascend and descend stairs	.770	-
8	Dressing (includes tying shoes, fastening fasteners)	.778	-
9	Controlling bowels	-	.742
10	Controlling bladder	.616	-

**Discussion**

**Development of the Translated Indonesia Barthel Index:** The necessary item modifications that were introduced in the proposed translated Indonesian Barthel Index. It can be noted that items 2, 6, and 8 required no change, as they were clearly understood by the participants. For item 1, to be more appropriate in the Indonesian context ‘feeding (if food needs to be cut up = help’ is changed to ‘Feeding (bring food and liquid with a spoon to mouth’. (Table 2) It has been noted that manipulating a spoon was more culturally familiar than using knife and fork for picking up food to the mouth. The physical demands to obtain independence rating on

the feeding item would require higher hand dexterity and upper limb coordination from Indonesian subject compared to western counterpart (holding a fork). This could explain why the rank order of items was previously found to differ across different cultural groups.<sup>6, 13</sup> Items 5, 7, 9, and 10 were considered to be more of a technical term. The expert review of this study observed some content ambiguity; hence, they suggested the use of a more culturally appropriate language. This is evident in item 3 (from personal toilet to doing personal hygiene), item 4 (from toilet to water closet), and item 7 (from ascending and descending to going up and down).

Component analysis factoring of Indonesian version BI this shows the result of Explanatory Factor Analysis. The eigenvalue represents the total variance explained by each factor. (Table 3) The result showed that there were three extraction factors from Initial factor Eigenvalue with value > 1.0<sup>14</sup> sum of squared loading also showed that there are three factors as revealed for the Principal Component Factoring. The implement that tree factors can be extracted from the Indonesian Barthel Index. That the Eigenvalue support the Indonesian Barthel Index’s variable belongs to two components.

PCA of the Indonesian version of the BartheL Index. The result of the Explanatory Factor Analysis (EFA) the Eigenvalue represents the total variance explained by each factor. The result showed that there were three extraction factors (5.023, 1.090, and 1.000) from Initial factor Eigenvalue with value > 1.0<sup>14</sup>, the sum of Squared loading also showed that there are three factors as revealed for the Principal Component Factoring. This implies that three factors can be extracted from the Indonesian version Barthel Index. The Eigenvalue supports that the Indonesian Barthel Index’s variable belongs to three components. But after component Matrix of Indonesian BI there are nine items that belong to one component, items 1,2,3,4,5,6,7,8 and 10 because all of these items have component values above .60. While the in groups component two has only item 9, namely bowel controls. (Table 4) However, the researcher decided that item 10 be into integrated component 2 because, based on the table 5 item 9 have Eigenvalue of 99.0 and item 10 have Eigenvalue 100.0. This shows that both of the item has a very close the Eigen values, then the bladder control and bowel control are both physiological functions of the body and while component 1 functional performances<sup>15</sup><sup>16</sup> These findings were found to be consistent with two others studies. Tenant et al. discussed that among the items the authors identified the ‘bladder control’ item<sup>17</sup>,

which had a deviated value score; Kucukdeveci et al. and Leung et al. who discussed items found to misfit the single dimension model revealed similar results for Modified BI particularly for item 9 and 10 the 'bladder control' and 'bowel control'.<sup>10, 13</sup>

### Conclusion

The Indonesian version of the BI has good validity and reliability that it can be used with the stroke population. The findings indicate that there are culture-specific contents requiring to be incorporated into the original items when adapting the MBI for use in assessing the patients.

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**Conflict of Interest:** The authors declare that they have no competing interests

**Ethical Approval:** This study received a certificate of ethical clearance from ethical commission of STIK Stella Maris Makassar

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# Input Evaluation (HR, Funds, Method, Facilities and Infrastructure, and Targets) on the Implementation of Biscuits as Complementary Foods for Pregnant Women in Parepare City

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## Abstract

**Context:** This study aimed to assess the Inputs (HR, Funds, Method, Facilities and Infrastructure, and Targets) on the implementation of biscuits as complementary foods for Pregnant Women in Parepare City. This study used a descriptive qualitative method to assess the management of the implementation of the Complementary foods distribution for the Pregnant Women Program in the Parepare City based on Input aspects. Input consists of Human Resources, Funds, Method, Infrastructure and Targets. The results of the study showed officers who carry out complementary foods distribution for pregnant women were TPG (Nutrition officer) and MCH officers (Midwives). If the Nutrition officer is on duty in the field, the MCH officer will replace the role of the TPG in the distribution of Biscuits for complementary foods. Funds are adjusted to the distribution and target, funds are distributed from the Central Government, the Provincial Government, the City Health Office, the community health center (TPG/Midwife), to the Village (Cadre). The distribution of biscuits for pregnant women was not in accordance with the initial plan and existing regulations. Biscuit distribution method for pregnant women based on technical instructions is 150 pieces/month and carried out for 3 months, with a dose of 5 pieces/day. There were no available facilities and infrastructure that meet 9 warehouse standards according to technical instructions

**Keyword:** *Input, Biscuit as complementary foods, Pregnant Women, Nutrition Officer and Midwife*

## Introduction

Complementary foods distribution Program for pregnant women who suffer chronic energy deficiency has been implemented in all Regencies/Cities in Indonesia

every year by the Health Office. Complementary foods products provided in the form of Biscuits that contain Macro and Multi Micro Nutrients. However, there are still a number of obstacles in the program, including procurement of goods that only occur in certain periods, the report format from the Ministry of Health is limited to the implementation of complementary food distribution, targets cannot be monitored regularly, and report formats are not uniform among each community health center<sup>1</sup>.

The effectiveness of a program implementation is also influenced by good management. The implementation of biscuits as complementary foods begins with the

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stages of Input, Process, Output and Outcome. So that management really needs to be considered so that it can be applied in various fields including health to solve public health problems<sup>2</sup>. Management is urgently needed to support a coordinated and integrated system in the fields of health, sustainable human resources, infrastructure development, and effective data management systems to overcome current challenges<sup>3</sup>.

Input is a collection of parts or elements contained in the system and is needed for the system to function<sup>1</sup>. Administrative tools include personnel, funds, facilities and method, also known as sources, procedures and capabilities. Input elements can be categorized in 6M, namely man, money, materials, method, markets and machinery<sup>4</sup>.

This study aimed to assess the Input (man, money, materials, method, markets and machinery) on the implementation of biscuits as complementary foods for Pregnant Women in the Parepare City.

## Method

This study used descriptive qualitative method to assess the management of the implementation of the Complementary foods distribution Program for Pregnant Women in Pare pare City based on Input aspects. Input consists of man, money, materials, method, markets and machinery. Data collection through in-depth interviews with informants and direct observation to the location.

In qualitative research the number of informants is usually small, so in order to maintain the validity of the data, several method are needed. The validity test used in qualitative research was called triangulation. To establish the validity in this study so: 1) Key Informants (Head of nutrition section of the City Health Office); 2) Triangulation of Resources (Community Health Center Nutrition Workers, Village Midwives, Cadres); 3) Triangulation of Method (Interview, Observation, Document)

## Results

**Human Resources:** Based on the data it can be known that officers who carry out complementary foods distribution programs for pregnant women are carried out by Nutrition Workers (TPG) and MCH officers (Midwives). If the Nutrition Officer works in the field, the MCH officer will replace the TPG role in providing Biscuits as complementary foods for pregnant women.

The number of Nutrition Workers (TPG) involved in the Pare pare City Health Office was 2 people, and the number of nutrition workers involved in all community health centers was 14 people.

*“The number of human resources in Parepare consisted of 2 nutrition workers at the city health office, 2 at the Lakassa community health center, 4 at Madising community health center, 4 at Lapadde community health center, 2 at Cempae community health center, 3 at Lumpue community health center. people to carry out complementary foods distribution programs, (EN, 38 years old)*

*“The village midwife who came only once ... there were also those who were given nutrition consultations ...”. (AJ, 22 years old)*

The number of MCH officers (Midwives) involved in all community health centers was 63 people. If the nutrition officer is absent, then it is replaced by another officer, namely the midwife.

*“In the Lakessi Community Health Center, there were around 6 people who usually carry out complementary foods distribution programs” (AY, 27 years old)*

**Funds/Money:** Funds are distributed from the central government, the provincial government, the City Health Office, the community health center (TPG/ Midwife), to the village (cadre).

**Budget on Biscuit:** Based on the results of research in the field, the distribution of biscuits for pregnant women is only at the central government level until it ends at the community health center, and not through cadres. The main reason is because there is no special fund for cadres.

**Cost:** Transportation and warehouse storage costs should be allocated. Funds are considered insufficient to cover the costs of building warehouses, transportation and accommodation as well as staff salaries from the central level to cadres. These funds also need to be clearly regulated in the technical guidelines and recording still needs to be improved in terms of neatness and accuracy, and further checks need to be made to find out the exact nominal of the budget.

**Distribution Method:** In general, the distribution

time is only when pregnant women do ANC to community health centers so that it is not suitable for the needs of pregnant women, especially those who do not routinely do ANC. Some pregnant women with chronic energy deficiency are not visited after the biscuits run out because they are from other Community Health Center areas but always visit other Community Health Centers as well. Time, energy, and cost limitations to carry out complementary foods distribution for pregnant women with chronic energy deficiency to the home

**Dosage:** In general, the specified dose is not met properly because the distribution time is only when pregnant women do ANC to the public health center. So that many are not in accordance with the needs of pregnant women, especially those who do not routinely do ANC. Pregnant women do not routinely take biscuits because they do not understand well the dose to be consumed and do not understand well the benefits of biscuits for pregnant women with chronic energy deficiency. Time, energy, and cost limitations to complete complementary foods distribution in pregnant women with chronic energy deficiency. This is the main reason the biscuits are not distributed directly through the cadres but rather waiting for pregnant women to come to the community health center.

**Facilities/Materials:** There are still many community health centers that do not carry out standard storage. Although there are already quite qualified because 7 of the 9 required standards have been provided such as the Lapadde community health center. Storage in many households is not according to standard. The results of interviews conducted with several informants found the fact that the storage of biscuits as complementary foods does not comply with the standards listed in the technical instructions, some are just put on the cupboard or in the refrigerator.

Pregnant women do not know the standard of biscuit storage at home because it is not specifically socialized. Storage is not prepared a special place. Pregnant women only pick up the packaging shortly after the biscuits are eaten. There are also those who store it in jars and invite any guest who wants to consume because of cultural factors.

## Discussion

**Human Resources:** Based on the results of an interview with one of the Coordinating Midwives (Bikor), it is known that officers who carry out

complementary food distribution in pregnant women are carried out by TPG (Nutrition Officer) and MCH officers (Midwife). If the Nutrition officer works in the field, the MCH officer will replace the TPG role in providing Biscuits as complementary foods for pregnant women. A collaborative approach between midwives and nutrition workers in the service of pregnant women can be an effective method in overcoming the nutritional problems of pregnant women<sup>5</sup>.

The success of the public health center in carrying out the program is determined by a balanced human resource between medical staff on the one hand and promotive and preventive staff on the other. The main problem in the management of health workers is the unequal distribution of human resources<sup>6</sup>. In addition there are Over-staffing for non-professional staff (non-technical) and under-staffing for professional staff (technical staff)<sup>7</sup> A similar study took place in the Taburia distribution program with an input element in the form of managing the nutritional status of stunting toddlers in the work area of the Sirampog community health center which was considered ineffective, because the health worker coordinator who was midwife not the Nutrition officer. It was considered incompatible with competence<sup>8</sup>. Midwives should have a management approach, especially Nutrition management, so that they can organize all elements involved in their services properly in order to reduce maternal and child mortality<sup>9</sup>

**Funds:** The funds are adjusted to the distribution and target, the funds are distributed accordingly starting from the Central Government, the Provincial Government, the City Health Office, the community health center (TPG/Midwife), to the Village (Cadre). The cost depends on the number of target recipients of the program<sup>10</sup>.

The results of the research in the field showed that the distribution of biscuits for pregnant women was not in accordance with the initial plan and existing regulations. The distribution flow in Parepare city started from the central government to the community health center, which should still distribute through the TPG, Midwives, and Villages/Cadres. From interviews with officers, the main reason was no special funds intended for cadres. While the technical instructions are not regulated in detail about the use of the complementary foods distribution budget. So that the application of the program in the field is uneven.

### **Complementary Foods Distribution Method:**

Complementary Foods Distribution Method for pregnant women through annual planning and according to the prescribed dosage. The demand for biscuits is adjusted to the amount of chronic energy deficiency proposed from the public health center and the City Health Office in the previous year, so the number of biscuits available may not be able to cover pregnant women with chronic energy deficiency this year because it is not necessarily the same amount as the previous year. In general, the specified dose is not met properly because the time of distribution is only when pregnant women do ANC to the public health center. So, it is not in accordance with the needs of pregnant women, especially those who do not routinely do ANC.

Pregnant women do not routinely take biscuits because they do not understand well the dose to be consumed and do not understand well the benefits of biscuits for pregnant women with chronic energy deficiency. The limited time, energy, and cost to complete complementary foods distribution in pregnant women with chronic energy deficiency is the main reason that biscuits are not distributed directly through cadres but rather waiting for pregnant women to come to community health center<sup>11</sup>.

**Facilities/Materials:** Facilities and infrastructure are important factors that support the implementation of complementary foods distribution in pregnant women, including the availability of adequate health services such as community health centers and the existence of complementary food storage for pregnant women. Storage of biscuits as complementary foods should not be mixed with dangerous goods and are not suitable for consumption, storage in warehouses according to standards (pay attention to the taxonomy of inputs for transportation and storage). Each community health center has its own warehouse to facilitate distribution of pregnant women. There are still many community health centers that do not carry out standard storage. Inappropriate food storage can cause damage and affect the nutritional value of the food<sup>12</sup>.

**Target:** The target of biscuit distribution is pregnant women with chronic energy deficiency. There were 49 pregnant women getting biscuits as complementary foods (all pregnant women with chronic energy deficiency got biscuits as complementary foods). Some pregnant women who were stated to have chronic energy deficiency did not understand well the schedule

for giving biscuits for complementary foods. Pregnant women were not enthusiastic about visiting health services, they stated that they got biscuits while doing ANC, they were also got biscuits even though they were late or sometimes asked for availability.

In addition to chronic energy deficiency, Gakin (Poor Family) is also a concern for the improvement of Nutrition in Parepare, data on pregnant women obtained from village midwives or cadres about pregnant women who are below the poverty line are also given biscuits, although the foods they consume often fall into the category of less nutritious and unbalanced is certainly a big hope that the child can still live healthy with the help of nutrition from these complementary foods.

Chronic energy deficiency as well as Gakin are the main priority of the biscuits distribution as complementary foods. This is the first and foremost goal that must be realized immediately so that it can be distributed quickly and accurately. Pregnant women with chronic energy deficiency with a low economy will find it difficult to meet their nutritional needs through other foods, because of their economic difficulties<sup>13</sup>. Chronic energy deficiency conditions that are not handled properly will cause fatal for pregnant women<sup>14</sup>.

### **Conclusion**

The human resources that carry out the complementary food distribution program for pregnant women are TPG (Nutrition officer) and MCH officers (Midwives). Funds are distributed from the Central, Provincial, City Governments. However, funds were deemed insufficient to cover warehouse rentals, transportation to public health centers, and procurement of technical manuals. Biscuit distribution method for pregnant women based on technical instructions is 150 pieces/month and carried out for 3 months, with a dose of 5 pieces/day. There were no available facilities and infrastructure that meet 9 warehouse standards according to technical instructions.

**Ethical Clearance:** Taken from Faculty of Public Health, Universitas Hasanuddin Committee.

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**Conflict of Interest:** None

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# The Relationship Between Lifestyle and Breast Cancer among 25-64 Year Old Women on Urban Areas of Indonesia in 2016

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## Abstract

**Background:** Breast cancer was the cancer with the second highest prevalence in Indonesia in 2013 after cervical cancer, at 5 cases per 10,000 population. Modifying one's lifestyle can prevent the disease. Lifestyle factors that can be modified relate to obesity, smoking, alcohol consumption, following a diet of vegetables and fruits, physical activity, hormone therapy after menopause, diabetes mellitus and stress.

**Method:** The study uses a cross-sectional study design, using data from the 2016 Non-Communicable Disease Research of the Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. A research sample of 38,749 women aged 25-64 who had undergone a clinical examination was collected from 34 provinces, consisting of 76 districts and cities in Indonesia. The breast cancer group comprised all respondents who were diagnosed with breast cancer at a clinical breast examination (SADANIS), following a biopsy and confirmed by breast mammography/ultrasound examination and anatomic pathology (PA) examination. Odds ratios (ORs) and 95% confidence intervals (CIs) in a multivariate logistic regression analysis were used to observe the relationship between lifestyle and breast cancer.

**Results:** The results show that the prevalence of breast cancer in women aged 25-64 in urban areas of Indonesia was 0.2%. Multivariate logistic regression analysis showed a significant relationship between women who consumed alcohol and incidence of the disease, the rate being 3.87 (95% CI: 1.76-8.49) higher than for those who did not consume alcohol, after controlling for age, education and occupational covariate variables.

**Conclusions:** Lifestyle has a relationship with breast cancer among 25-64 year old women in urban areas of Indonesia. It is very important to prevent the disease because it greatly affects the mortality and morbidity of women. Improving education can significantly change the lifestyle of women, thereby reducing the risk of breast cancer.

**Keyword:** *Relationship, Breast Cancer, Lifestyle, Indonesia.*

## Introduction

Cancer is the second leading cause of death in the world. In 2018, the number of cancer deaths was

around 9.6 million, consisting of lung cancer (18.4%), colorectal cancer (9.2%), stomach cancer (8.2%), liver cancer (8.2%), breast cancer (6.6%), esophageal cancer (5.3%), pancreatic cancer (4.5%), prostate cancer (3.8%) and other cancers (35.8%)<sup>1</sup>.

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According to the Indonesian Ministry of Health, state expenditure on cancer is the second highest type after hemodialysis. In 2012 this amounted to 144.7 billion rupiahs and increased to 905 billion rupiahs in 2014<sup>2</sup>. Based on basic health research data from

2013, the prevalence of cancer in all ages in Indonesia was 14 cases per 10,000 population (around 347,792 people), with the highest rate in the Special Region of Yogyakarta province, at 41 per 10,000 (around 14,596 people). Breast cancer was the cancer with the second highest prevalence in Indonesia in 2013 after cervical cancer, at 5 cases per 10,000 population. The highest prevalence of breast cancer in Indonesia was also in the Special Region of Yogyakarta, at 24 per 10,000<sup>3</sup>.

Every gene has a function in the body, one of the main ones being to divide cells. If a gene mutation occurs, the cells will divide without control. They will not function normally, so turn into cancer cells. Gene mutations can be caused by aging, the influence of radiation on the environment on radiation, chemicals, hormones and other factors such as smoking and alcohol. Cells can usually divide and turn into cancer over a long period of time, which explains why older people have a higher risk of breast cancer<sup>4</sup>.

Various risk factors of breast cancer have been identified, such as age, genetic factors (carrying of mutated genes *BRCA1* and *BRCA2*), hormonal factors, lifestyle factors, personal history of breast cancer and environmental factors. Lifestyle factors include high fat diets, lack of exercise, deficiency of certain vitamins or fibre, adult weight gain, alcohol intake and smoking, together with the lack of moderate physical activity or vegetable intake<sup>5</sup>.

Based on epidemiological studies, it is known that lifestyle factors play a very important role in the development of breast cancer. Modifying one's lifestyle can prevent the disease. Lifestyle factors that can be modified relate to obesity, smoking, alcohol consumption, diet of vegetables and fruits, physical activity, hormone therapy after menopause, diabetes mellitus and stress<sup>6</sup>.

The results of scientific research have found that consumption of fibre in fruit and vegetables, especially green vegetables, can reduce the risk of breast cancer, while alcohol consumption can increase the risk. Women who consume alcohol can increase their hormone estradiol, which is a risk factor in breast cancer. Several studies have shown that girls who exercise regularly will experience menarche delays and reduce the risk of breast cancer, as will women aged below 40 who do high physical activity, especially those who have not reached menopause and have a BMI of < 25 kg/m<sup>2</sup>. Women's

breast tissue is very sensitive to carcinogens, so they should avoid smoking<sup>7</sup>.

Breast cancer screening is an examination to find abnormal breast conditions that can become breast cancer. It can be in the form of breast self-examination (BSE), clinical breast examination or mammography screening. Diagnosis can be made by consideration of medical history and physical examination, laboratory examination, imaging examination, breast ultrasound, MRI (magnetic resonance imaging) and CT-SCAN<sup>8</sup>.

Research conducted at the Makasar City Hospital in 2016 showed that smoking had a significant relationship with the incidence of breast cancer (OR = 2.00; 95% CI: 1.02-3.93)<sup>9</sup>. A prospective cohort study of the relationship between alcohol consumption and breast cancer in 105,986 women concluded that 5.0-9.9 grams alcohol intake per day or 3-6 times per week increased the incidence of breast cancer (RR = 1.15; 95% CI: 1.06-1.24)<sup>10</sup>. A systematic review and meta-analysis reported that increased physical activity can reduce the risk of breast cancer (OR = 0.73; 95% CI: 0.63-0.85)<sup>11</sup>. The results of a study by Yulianti L, Setyawan H, and Sutningsih D showed that there was a relationship between physical activity and the incidence of breast cancer (OR = 1.22; 95% CI: 0.51-2.94). Women with low physical activity had a greater risk of developing breast cancer compared to those with frequent exercise habits or high physical activity<sup>12</sup>.

Breast cancer is the most common cancer and the second cause of female deaths from the disease. The ability of existing screening tests and knowledge of the risk factors that cause breast cancer is an interesting disease to study that is useful in prevention breast cancer. Breast cancer can be prevented by changing one's lifestyle. Several lifestyle factors that can be changed are known to be very effective in preventing the disease<sup>13</sup>. This study assesses women's lifestyles (smoking, alcohol consumption, physical activity, protein consumption and fiber consumption) in relation to the incidence of breast cancer in those aged 25-64 in urban areas of Indonesia (NCD Research in 2016).

## Method

The study employed a cross-sectional design using NCD (non-communicable disease) research data from the Indonesian Ministry of Health's Health Research and Development Agency. It was conducted in August-September 2016 in 34 provinces in Indonesia, consisting

of 76 regencies and cities, and centred on urban areas.

The 2016 NCD research sample was designed for presentation at the national level. The number of samples determined was 70,000 respondents spread across 1,400 census blocks and 76 selected districts in 34 provinces throughout Indonesia. A total of 43,948 respondents were successfully visited and interviewed. A total of 39,188 respondents were willing to undergo clinical examinations, although 439 of these had incomplete data. The total number of respondents who completed the study was therefore 38,749.

Breast cancer was discovered from the results of diagnosis of breast cancer in clinical breast examinations and biopsy, and confirmed by breast mammography/ultrasound examination and anatomic pathology (PA) examination conducted by the Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia. Lifestyle factors measured were smoking, alcohol consumption, physical activity, protein intake and fibre intake. Smoking status was divided into smokers and non-smokers, including those who smoked every day and those who had sometimes in the past month (when the research was conducted). Alcohol consumption was the habit of drinking alcohol in the past month (when the research was conducted). Physical activity was divided into high and low physical activity; high activity referred to at least 3 days a

week (1500 MET-minutes / week). Protein intake was the weekly habit of consuming animal and vegetable protein, divided into high (daily) and low (<5 days a week). Fibre intake was the weekly habit of consuming fruit and vegetables, also divided into high (daily) and low (<5 days a week).

Bivariate analysis was used to observe the relationship between lifestyle factors (smoking, alcohol consumption, physical activity, protein and fibre intake) and the incidence of breast cancer. Odds ratios (ORs) and 95% confidence intervals in multivariate analysis with logistic regression were used to examine the relationship between lifestyle and breast cancer after controlling for covariate variables (age, education and occupation).

## Results

**Table 1: Prevalence of Breast Cancer in Women Aged 25-64 in Urban Areas of Indonesia in 2016**

Variable	Frequency	Percentage (%)
Breast Cancer		
Yes	68	0.2
No	38,681	99.8

The univariate analysis results in Table 1 show that the proportion of women aged 25-64 suffering from breast cancer was 0.2%, while for those who were not suffering from the disease it was 99.8%.

**Table 2: Characteristics of the Study Sample**

Variable	Breast Cancer		No Breast Cancer		P-value
	n= 68	%	n=38,681	%	
<b>Age</b>					
≥ 40 Years	46	0.2	23,637	99.8	0.327
< 40 Years	22	0.1	15,044	99.9	
<b>Education</b>					
Low	58	0.2	36,261	99.8	0.010
High	10	0.4	2,420	99.6	
<b>Work status</b>					
Unemployed	43	0.2	24,566	99.8	0.963
Working	25	0.2	14,115	99.8	
<b>Smoking</b>					
Smoker	6	0.3	2,381	99.7	0.313
Non- Smoker	62	0.2	36,300	99.8	
<b>Alcohol Consumption</b>					
Yes	7	0.6	1,098	99.4	0.003
No	61	0.2	37,583	99.8	

Variable	Breast Cancer		No Breast Cancer		P-value
	n= 68	%	n=38,681	%	
Physical Activity					
Low	65	0.2	36,114	99.8	0.627
High	3	0.1	2,567	99.9	
Protein Intake					
Low	48	0.2	25.963	99,8	0.632
High	20	0.2	12.718	99,8	
Fibre Intake					
Low	48	0.2	27.019	99,8	0.894
High	20	0.2	11.662	99,8	

Based on the bivariate analysis in Table 2, it can be seen that the proportion of breast cancer in those aged  $\geq 40$  years was 0.2%; for those with low education 0.2%; the unemployed 0.2%; smokers 0.3%; for those who consumed alcohol 0.6%; those with low physical activity 0.2%; those with low protein intake 0.2%, and low fibre intake 0.2%. There is a significant relationship between education (P: 0.010) and alcohol consumption (P: 0.003) with the incidence of breast cancer.

**Table 3: Relationship between Lifestyle and the Incidence of Breast Cancer in Women Aged 25-64 in Urban Areas of Indonesia**

Variable	Crude Analysis		Adjusted Analysis*	
	OR	95% CI	OR	95% CI
Smoking	1.47	0.64-3.41	1.49	0.64-3.45
Alcohol Consumption	3.93	1.79-8.61	3.87	1.76-8.49
Physical Activity	1.54	0.48-4.90	1.43	0.45-4.56
Protein Intake	1.18	0.70-1.98	1.20	0.71-2.02
Fibre Intake	1.04	0.61-1.75	1.10	0.65-1.85

\*Controlled by covariate variables (age, education and work status)

Table 3 shows the relationship between lifestyle and the incidence of breast cancer in women aged 25-64 years in urban areas of Indonesia. From the results of the bivariate analysis of this relationship it can be seen that women aged 25-64 who smoked (OR: 1.47; 95% CI: 0.64-3.41); who consumed alcohol (OR: 3.93; 95% CI: 1.79-8.61); who had low physical activity (OR: 1.54; 95% CI: 0.48-4.90); and who had low protein consumption (OR: 1, 18; 95% CI: 0.70-1.98) and low fibre consumption (OR: 1.04; 95% CI: 0.61-1.75) increased their risk of developing breast cancer. Women aged 25-64 who smoked had a greater risk of developing breast cancer than those who did not smoke, after being controlled for covariate variables of age, education and work status (OR: 1.49; 95% CI: 0.64-3.45). The results of the multivariate logistic regression analysis show that there was a significant relationship between alcohol consumption and the incidence of breast cancer, 3.87

(95% CI: 1.76-8.49) times higher than for those who did not consume alcohol, after controlling for age, education and work status. Women who had low physical activity had a greater risk of developing breast cancer than those with high physical activity, again after being controlled by the covariate variables of age, education and work status (OR: 1.43; 95% CI: 0.45-4.56). Those who had low protein consumption (OR: 1.20; 95% CI: 0.71-2.02) and low fibre consumption (OR: 1.10; 95% CI: 0.65-1.85) also had a greater risk of developing breast cancer after the controls described above.

### Discussion

The results of the analysis show that there is a relationship between lifestyle and the incidence of breast cancer in women aged 25-64 in the urban areas of Indonesia. A poor lifestyle will increase the risk, but changing it can prevent the disease. However, providing



information on breast cancer risk factors and ways of prevention is not enough. Increasing the education provided can significantly change the lifestyle of women, so reducing risk.

This study found that the prevalence of breast cancer in the women studied is 0.2% and that there is a relationship between the level of education and the incidence of breast cancer in ( $p: 0.010$ ). The proportion of breast cancer in women with a low education is 0.2%. The study employed a cross-sectional design; it can be seen in Table 2 that there are small amount of cells in several research variables, such as smoking, alcohol consumption and physical activity. The multivariate logistic regression analysis shows that the prevalence of breast cancer in women who consume alcohol is 3.87 (95% CI: 1.76-8.49) times higher than for those who do not Consuming alcohol, lack of physical activity and smoking are risk factors in breast cancer. Many other studies have shown association relationships between women who consume alcohol and breast cancer, including a cohort study<sup>3</sup>.

Many risk factors affect the occurrence of breast cancer, including lifestyle. Changing one's lifestyle is important in the effort to reduce breast cancer; moreover, screening testing can also make early diagnosis and allow for early prevention efforts. Some studies have reported that the risk of breast cancer can be reduced by increasing physical activity and exercising regularly. In addition, exercise can also reduce other risks of breast cancer such as obesity. Physical activity has also been proven to increase patients' chances of survival after being diagnosed with the disease. However, the majority of women do not do this<sup>13</sup>.

Smoking is a carcinogenic lifestyle contributing to breast cancer and other cancers. The carcinogenic effect is caused by the aromatic hydrocarbon contained in tobacco. This substance, with the genetic polymorphism in N-AcetylTransFerase-2, can affect the development of breast cancer; tobacco consumption causes 21% of cancer deaths world wide<sup>8</sup>.

Modifying one's lifestyle can reduce the risk of breast cancer. Therefore, education programmes discussing lifestyle changes are very important. These should be offered from childhood and contain information about the importance of a healthy lifestyle by avoiding obesity in adulthood, smoking, alcohol consumption and the benefits of increased physical activity<sup>8</sup>.

## Conclusion

Lifestyle has been shown to have a relationship with breast cancer. A poor lifestyle is a risk factor in breast cancer in women aged 25-64 in the urban areas of Indonesia. It is important to prevent the disease, because it has an important effect on the mortality and morbidity of women. Increasing education can significantly change the lifestyle of women, thus reducing the risk of breast cancer.

**Ethical Considerations:** Ethical testing was conducted by the Health Research Ethics Commission of the Indonesian Ministry of Health's Research and Development Agency No: LB 02.01 / 5.2 / KE / 154/2016.

**Competing Interests:** The authors declare that no competing interests exist.

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# Coronary Artery Disease in the Military Setting: Lower Gensini Score in High-Rank Personnel Compared to Low-Rank and Civilian

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## Abstract

**Background:** Studies had reported an increasing trend of coronary artery disease (CAD) cases in the military population. However, the severity of the CAD among different military rank is yet to be studied. The Gensini scoring system as a popular and developed objective method to quantify the CAD severity through the coronary an giographic findings.

**Material and Method:** In this retrospective cross-sectional study, researchers consecutively enrol a consecutive total of 171 patients referred to the Indonesian Navy Hospital of Dr Ramelan, who underwent elective coronary angiography from January to June 2019. Researchers divided the study population into three groups of low-rank military personnel, high-rank military personnel, and the civilian. Anthropometric, laboratory finding, and Gensini score were obtained from medical records.

**Results:** This research found that Post-hoc LSD test analysis showed the average score of Gensini Score of high-rank military personnel ( $18.39 \pm 32.71$ ) is significantly lower than both low-rank ( $32.76 \pm 41.84$ ;  $p=0.031$ ) and civilian ( $36.08 \pm 43.41$ ;  $p=0.005$ ).

**Conclusions:** High-rank military personnel was found to have lower Gensini score compared to low-rank and civilian.

**Keywords:** *Gensini Score, Military Rank*

## Introduction

Coronary artery disease (CAD) is the principal causes of death and disability in the world, causing nearly half

of the 36 million deaths as a noncommunicable disease. CAD had become a very problematic condition both in developed and developing countries and its incidence has reached 422 million cases and 17 million deaths globally in 2015.<sup>1</sup> In Europe, CAD causes almost 2 million deaths in the European Union (EU) and nearly 4 million deaths.<sup>2</sup> The rate of CAD incidence in developing countries is twice more than in developed countries. In India, around more than 30% of all deaths were due to CAD.<sup>3-6</sup> Indonesia as the most populated nation in South-East Asia, and home to 260 million people with over 10% of the population is living in abject poverty, CAD is accountable for 37% of all deaths.<sup>7,8</sup> Similar to

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the civilian population, the increased cardiovascular risk factors prevalence also affect the military population. Recent studies reported an increasing trend CAD prevalence in the military population.<sup>9</sup> Investigations revealed that most of the time, both low and high-rank military personnel are under high-pressure duty-related stress condition followed by physical and psychological issues, which may contribute as a risk factor for CAD development.<sup>9-11</sup> Hypertension, as other CAD risk factors, is also highly prevalent in the military personnel. In Indonesian Navy Hospital of Dr Ramelan, secondary hypertension incidence ranked at third and primary hypertension in the seventh of the top 10 out-patient clinic visitation, with 13,130 and 6,061 patients respectively.<sup>12</sup> The military system has a very rigid ranking hierarchy; thus, unpredictable changes in the rank structure are almost impossible<sup>13</sup>, suggesting that each military rank may have distinct disease characteristics. However, the comparison of CAD severity between different military rank is yet to be investigated.

The Gensini scoring system is a popular and developed objective method to quantify the CAD severity through the coronary angiographic findings.<sup>14</sup> Many studies have confirmed its efficacy to identify CAD severity of the patient who underwent PCI.<sup>15</sup> Hence, in this research, we evaluate the severity of the CAD between different military rank and civilian by comparing their average Gensini score.

## Material and Method

**Study Population and Grouping:** In this retrospective cross-sectional study, we randomly enrol a consecutive total of 171 elective coronary angiography patients from the Indonesian Navy Hospital of Dr Ramelan from January to June 2019. Included patients aged between 25 to 80 years old with complete medical record history. Patients with congenital heart disease, cardiomyopathy, heart valve disease, renal failure, active chronic inflammation, carcinoma, system dysfunction of immunology and haematology, or been medicated with immunosuppressive agents are excluded. Clinical and demographic characteristics of the patients (age, gender, military status, military rank, body mass index, coagulation test, diabetes mellitus, complete blood count, blood pressure, hypertension, hyperlipidemia, peripheral arterial disease, chronic kidney disease, left ventricle ejection fraction, treadmill stress test) were analysed by retrospective chart review.

**Data Collection and Ethical Clearance:** All data were collected from patients medical history. Researchers determined hypertension as  $\geq 140/90$  mmHg blood pressure or antihypertensive medication usage<sup>16</sup>, hyperlipidemia as  $>130$  mg/dL fasting low-density lipoprotein concentration or antihyperlipidemic medication usage<sup>17</sup>, diabetes mellitus as  $\geq 126$  mg/dL fasting plasma glucose concentration or antidiabetic medication usage<sup>18</sup>. We divided patients into three groups, high-rank military personnel, low-rank military personnel, and civilian. High-rank military personnel consist of Ensign, Lieutenant Junior Grade, Lieutenant, Lieutenant Commander, Commander and Captain; while low-rank military personnel consist of Second Seaman, First Seaman, Able Seaman, Second Corporal, First Corporal, Chief Corporal, Petty Officer Second Class, Petty Officer First Class, Senior Chief Petty Officer and Master Chief Petty Officer.

**Assessment of Coronary Angiography by Using Gensini score:** Coronary angiography was evaluated by qualified nonpartisan cardiologists who were blinded to the patient's clinical features. Significant CAD was determined as  $\geq 50\%$  stenosis of lumen diameter in any of the major epicardial coronary arteries including the left main coronary artery, left circumflex artery, left anterior descending artery, right coronary artery, or one of their major branches. Researchers classified the distribution of the CAD as a one-vessel disease (1-VD) whose disease in one vessel only, two-vessel disease (2-VD) whose disease in two vessels or only in left main trunk without being accompanied by right coronary artery stenosis, and three-vessel disease (3-VD) whose disease in three vessels or in left main trunk accompanied by right coronary artery stenosis. We determine a significant left main disease as  $\geq 50\%$  stenosis of the left main trunk, with or without accompanying lesions in other arteries.<sup>19</sup>

We calculated The Gensini score by giving a severity score to every coronary artery narrowing for as much as 1 point for  $\leq 25\%$  stenosis, 2 points for 26-50% stenosis, 4 points for 51-75% stenosis, 8 points for 76-90% stenosis, 16 points for 91-99% stenosis, and 32 points for 100% stenosis. Afterwards, we multiply every severity score of the coronary artery stenosis by the accountable importance value of the coronary circulation lesion's position. The lesion position's importance values are gradual as follows: 1.0 for right coronary artery, posterolateral artery, distal segment of left anterior descending coronary artery, and obtuse marginal artery; 1.5 for mid-segment of left anterior

descending coronary artery; 2.5 for proximal segment of circumflex artery; 2.5 for proximal segment of left anterior descending coronary artery; 5 for left main coronary artery; and least of all, 0.5 for other segments. Eventually, we assessed the Gensini score by summing up every coronary artery stenosis severity scores.<sup>20</sup>

**Statistical Analysis:** Categorical variables were presented as frequencies and percentages while the continuous variables presented as mean ± standard deviation. One way ANOVA and LSD Post-Hoc test was used to compare the difference between groups. All statistical analyses were done using SPSS statistical software ver. 25.0.

**Findings:**

**Study Population Characteristics:** The average age of patients was 53.04±10.56 years. The number of patients classified as 1-VD, 2-VD, and 3-VD was 33 (19.3%), 28 (16.4%), and 47 (27.5%), respectively. We found that not only Gensini score to be significantly different between study population groups (p=0.015), but also the age (p=0.000), height (p=0.003), weight (p=0.017), random blood glucose (p=0.005) and blood urea nitrogen (p=0.016). Meanwhile, the rest of the study variable did not show a significant difference in between study population groups, as illustrated in Table 1, alongside with the summarized clinical characteristics of the whole study population.

**Table 1. Characteristic of patients who underwent coronary angiography**

Variable	Total	Civilian	Low-Rank	High-Rank	P
Gensini Score	32.30 ± 40.29	36.08 ± 43.41 <sup>c</sup>	32.76 ± 41.84 <sup>c</sup>	18.39 ± 32.71 <sup>a, b</sup>	0.015*
Age (years)	53.03 ± 10.56	57.62 ± 9.74 <sup>b, c</sup>	48.07 ± 8.84 <sup>a</sup>	49.42 ± 10.10 <sup>a</sup>	0.000*
Height (cm)	165.49 ± 6.66	163.82 ± 7.53 <sup>c</sup>	165.71 ± 5.90	168.15 ± 4.57 <sup>a</sup>	0.003*
Weight (kg)	70.25 ± 10.51	68.06 ± 10.77 <sup>b</sup>	72.66 ± 10.18 <sup>a</sup>	71.94 ± 9.78	0.017*
BMI (kg/m <sup>2</sup> )	25.62 ± 3.28	37.71 ± 1.09 <sup>b</sup>	33.14 ± 9.15 <sup>a, c</sup>	34.22 ± 9.31 <sup>b</sup>	0.050
SBP (mmHg)	127.50 ± 23.94	127.15 ± 25.02	130.95 ± 23.75	125.14 ± 22.31	0.787
DBP (mmHg)	75.67 ± 11.49	75.98 ± 13.02	75.71 ± 11.38	75.10 ± 8.63	0.812
RBG (mg/dL)	118.96 ± 45.27	129.47 ± 50.00 <sup>c</sup>	117.20 ± 52.74	102.65 ± 24.22 <sup>a</sup>	0.005*
BUN (mg/dL)	14.81 ± 7.47	16.60 ± 9.17 <sup>b, c</sup>	12.63 ± 3.58 <sup>a</sup>	13.63 ± 5.90 <sup>a</sup>	0.016*
Cr (mg/dL)	1.13 ± 0.28	1.12 ± 0.33	1.15 ± 0.19	1.15 ± 0.27	0.081
WBC (x10 <sup>3</sup> /uL)	7.25 ± 1.90	7.17 ± 1.84	7.18 ± 1.92	7.62 ± 2.04	0.468
Hgb (g/dL)	14.13 ± 2.19	13.46 ± 1.60	14.78 ± 3.96	14.66 ± 1.19	0.519
Hct (%)	42.17 ± 4.04	40.53 ± 4.95	43.17 ± 3.98	43.83 ± 3.30	0.536
Plt (x10 <sup>3</sup> /uL)	264.38 ± 55.36	262.44 ± 61.91	269.59 ± 73.95	26.29 ± 49.64	0.500
LMD	7 (4.1)	4 (2.34)	2 (1.17)	1 (0.58)	
1-vessel CAD	18 (10.53)	8 (4.68)	6 (3.51)	4 (2.34)	
2-vessel CAD	12 (7.02)	9 (5.26)	1 (0.58)	2 (1.17)	
3-vessel CAD	14 (8.19)	6 (3.51)	3 (1.75)	5 (2.92)	

Values are presented as mean ± standard deviation or n (%)

a: significant difference compared to the civilian (p<0.05)

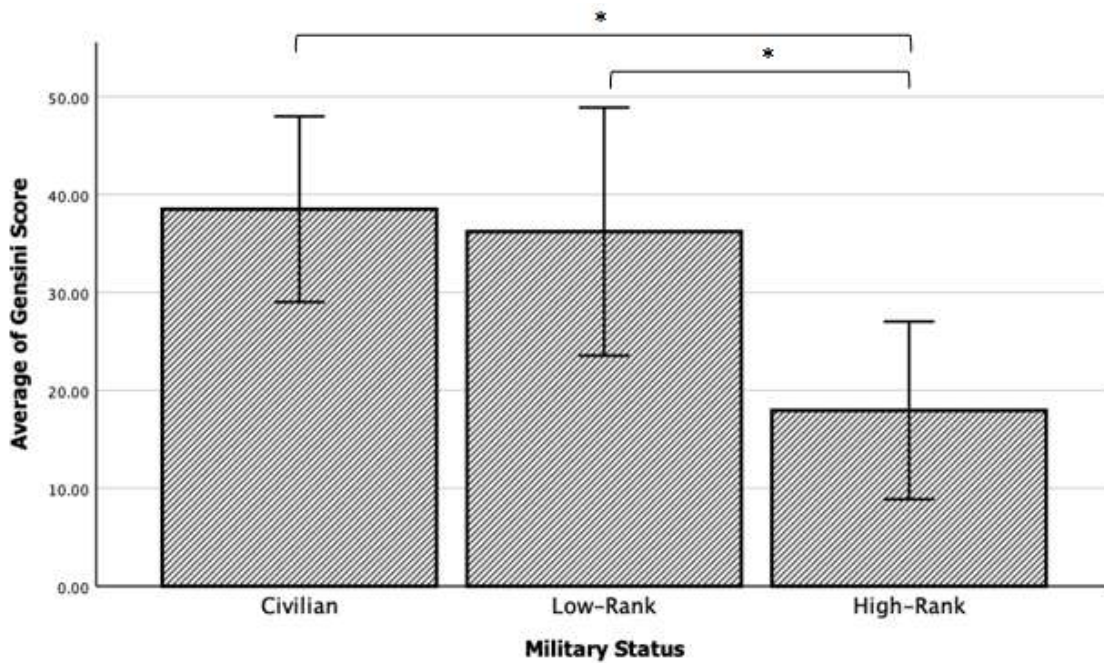
b: significant difference compared to the low-rank military personnel

c: significant difference compared to the high-rank military personnel

\*: ANOVA test showed a significant difference at <0.05.

BMI: Body Mass Index. SBP: Systolic Blood Pressure. DBP: Diastolic Blood Pressure. RBG: Random Blood Glucose. BUN: Blood Urea Nitrogen. Cr: Creatinine. WBC: White Blood Cell. Hgb: Hemoglobin. Hct: Hematocrit. Plt: Platelet. LMD: Left Main Disease. CAD: Coronary Artery Disease.

**Association between Gensini Score and Military Status:** Post-hoc LSD test showed the average score of Gensini Score of high-rank military personnel (18.39 ± 32.71) is significantly lower than both low-rank (32.76 ± 41.84; p=0.031) and civilian (36.08 ± 43.41; p=0.005), as shown in Graph 1. However, no significant difference was found on the average Gensini Score of low-rank military personnel compared to civilian (p=0.761).



Error Bars: 95% CI

\*: ANOVA Test showed significant difference at <0.05

**Figure 1: Comparison of the average of Gensini score grouped by military status level**

### Discussion

Coronary artery disease (CAD) event happens differently among the patient population in the military setting.<sup>11</sup> In this study; researchers found that high-rank military personnel was proven to have lower Gensini Score compared to the civilian ( $p=0.005$ ). This finding might be explained on the National Defence Medical Centre of Canadian Armed Forces research which showed that military personnel has a lower risk of CAD compared to civilian due to higher physical activity, lower-level state of anxiety and better psychosocial adjustment to illness.<sup>11,21</sup> Hence, lower CAD severity in the high-rank military personnel may be due to CAD risk reduction through higher physical activities, fewer anxieties, and better adaptation capability.

However, not all military personnel have reduced CAD severity. This research found that low-rank military personnel has more severe CAD marked by higher Gensini score compared to high-rank personnel ( $p=0.031$ ). No significant difference was found between low-rank military personnel and civilian ( $p=0.761$ ). This finding suggested that lower CAD severity may only occur on the high-rank military personnel. This phenomenon might be explained from the previous report, which showed that the low-rank military

personnel tends to have difficulties in overcoming the harmful effects of a traumatic combat life. Meanwhile, those from more privileged backgrounds and acting as a leader in the high-rank military personnel, possess a distinct soft skill of psychological and a sense of control to buffer against combat life stress, while also less negatively or even positively affected by combat.<sup>22,23</sup> Previously, it also has been reviewed that distress might increase the risk of CAD development through the activation of sympathetic nervous function.<sup>13</sup> Autopsy result showed that significant CAD was found on 70% of young military personnel who were dead in Korea and Vietnam war.<sup>24</sup> These findings suggest that the distress in the low-rank military personnel might increase the risk of atherosclerosis development, causing more severe CAD. High-rank military personnel has also been reported to have less physical exhaustion compared to low-rank since low-rank military personnel tends to work as a standing guard or other physically exhausting jobs daily.<sup>21</sup> Hence, it is concluded that only high-rank military personnel have lower CAD severity.

This research data was limited from only a single centre. Hence, our findings are yet to be directly generalized for the Indonesian National Defence Forces population. Additionally, very little prior research on the

health status of the military personnel based on their rank. Hence, we found difficulties in comparing our findings with previous results. In the future, multicenter research should be conducted to obtain a more generalized result. Comparison of the distress level and other CAD risk factors between different military rank should be further investigated to determine their involvement in CAD severity.

### Conclusion

High-rank military personnel have lower Gensini score compared to low-rank and civilian in the military setting who underwent elective coronary angiography.

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**Ethical Clearance:** The Ethics Committee has approved this research of the Indonesian Navy Hospital (No 06/EC/KERS/2019). This study and research were carried out under the principles of the Declaration of Helsinki, and all participating patients have provided written informed consent.

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# Social Support on Parents of Children with Intellectual Disability

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## Abstract

**Context:** Intellectual disability is one of the disabilities that occurs in children with Intelligence Quotient (IQ) characteristics <70. The limitations possessed by intellectually disabled children can be stressors and burdens that can cause psychological problems for parent, therefore, social support is needed for parents. The purpose of this study was to identify social support obtained by parents who have intellectually disabled children. This quantitative descriptive study was conducted at schools for special needs children in Bandung, with a sample of 81 parents of intellectual disabled children who met the research criteria. Social support was measured by the Social Support Questionnaire that was modified and developed using The Sarafino theory. Data were analyzed by univariate. The results showed that 70.4% of parents have received social support in the higher category, while 29.6% had low social support. The results of the study showed that the highest social support received by parents was instrumental support, while the lowest domain was recognition support. Nurses need to collaborate with parents, teachers and other health providers to strengthen the supportive program for parents with intellectually disabled children.

**Keywords:** Children, intellectual disability, parents, social support.

## Introduction

Disability in children is a condition that includes physical, mental, intellectual, or sensory limitations over a long period of time, which will cause delays in children's participation in society<sup>1</sup>. At present, the prevalence of disability in children is increasing. Indonesia is the 8<sup>th</sup> largest country that has children with disabilities<sup>2</sup>. Intellectual disability in children is ranked second from overall disability that occurs in children in Indonesia for about 30,460 number of cases<sup>3</sup>. West Java Province is in the highest position with intellectual disabilities children, which has 13,173 children and

Bandung is the town that has 1,077 children with intellectual disability<sup>4</sup>, almost reaches 10% of the total population of intellectual disabilities children in West Java.

Children with intellectual disabilities had impaired cognitive and adaptive skills (limited communication, self-help, speaking, self-directed) that occurs before entering the age of 18<sup>5,67</sup>. In addition, the way of thinking of children with intellectual disabilities that is too simple, the ability to catch and memory are weak, and the understanding of language and numeracy is weak too. This will make it difficult for children to attend regular schools<sup>8</sup>.

Another problem, which can be found in children with intellectual disability is a problem related to independence<sup>9</sup>. Children with an intellectual disability tend to be difficult to communicate and adapt so that this results in the dependence of children's intellectual disabilities on their parents or the surrounding environment to be very high.

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Poor independence and a high sense of dependence from intellectual disabilities children are the cause of the child’s future still in uncertainty. The future uncertainty can cause a negative impact on parents, namely to become stressors and psychological problems. Psychological problems that arise for parents include worrying about stress, and anxiety in parents<sup>10</sup>.

Parents who have intellectual disabilities children have more significant risks to the physical and psychological well-being of parents. Some challenges that could be faced by parents are increased financial burden to care for intellectual disabilities children; regulate life with the behavior of children who have problems or have limitations, and stigmatize the community towards children with intellectual disability themselves<sup>11</sup>. This will make stressors for parents of intellectual disabilities children.

Sarafino said that the individual’s reaction to stressors is different, and the role of social support is needed to deal with these stressors<sup>12</sup>. When viewed from the theory of stress adaptation models belonging to Stuart, one of the factors that can be related to parent’s psychological problems (anxiety or stress) is social support<sup>6</sup>. Social support is one source of coping that is owned by individuals when getting a stressor and can help individuals to integrate these stressors<sup>12</sup>.

Social support can come from several sources, including partners, family, friends, health workers, or organizations and communities. Individuals who have social support believe that they are loved, valued, and part of their environment, which can help individuals when they need it. It can be said that social support is an action carried out by others to individuals or support received by individuals from other people. Social support also refers to the individual’s perception that comfort, caring, and help are available when individuals need it, it can be said to be perceived support<sup>12</sup>.

Lack of support for parents with intellectual disabilities children can be a negative experience for parents and children with intellectual disabilities. Parents with limited support tend to have negative effects, such as emotional and behavioral problems as an anxious response in providing care for children with intellectual disability<sup>13</sup>. Mothers who received low social support were more likely to experience high stress<sup>14</sup>. It is important for nurses to explore how social support is obtained by parents. Sarason revealed that social

support has been linked to many benefits for health, both physically and mentally<sup>15</sup>.

## Material and Method

This study used a descriptive approach with a cross-sectional approach. This study aimed to identify and explore social support in parents with intellectual disabilities children in Bandung. The samples studied were 81 parents as a primary caregiver and lived with intellectual disabilities children, taken by purposive sampling. Social support was measured using a Social Support Questionnaire that had been modified and developed using Sarafino theory with alpha Cronbach values of 0.728. The questionnaire includes the domain of emotional support, instrumental support, informational support, and award/assessment support. Each statement item was measured on a 1-4 scale. The method of categorizing uses the cut-off point, with a low support category if the total score was  $\leq 50$ , and high category if the total score between 51-80. Data collection was carried out for 2 months (May-July 2019). The collected data was then analyzed using univariate analysis.

## Results

**Characteristics of Respondents:** Based on the characteristics of respondents, it was found that the age of parents who have children with intellectual disabilities was dominated by 36-45 years old (44.4%), 95.1% were married, mostly was a mother (75.3%) and were not working (housewife) (76.5%). Most family income was below the minimum wage (70.4%), and the last education taken was high school (67.9%).

The age of children mostly was in the teenage years (13-16 years) (38.3%) the child status were biological children (97.5%), more than half of children were male (53.1%), and the intellectual disability categories were mild (55.6%).

**Table 1: The Characteristics of Respondents**

Characteristics	Frequency (f)	Percentage (%)
<b>Age of Parents</b>		
26-35	8	9.9
36-45	36	44.4
46-55	29	35.8
56-65	8	9.9
<b>Gender of Parents</b>		
Men	20	24.7
Women	61	75.3

Characteristics	Frequency (f)	Percentage (%)
<b>Job Status</b>		
Working	19	23.5
Not Working	62	76.5
<b>Family Income</b>		
Below the minimum wage	57	70.4
Above or equal to the minimum wage	24	29.6
<b>Marital Status</b>		
Married	77	95.1
Not Married or divorced	4	4.9
<b>Parent's Last Education</b>		
Junior High School	12	14.8
Senior High School	55	67.9
College	14	17.3
<b>Age of Children</b>		
5-12	29	35.8
13-16	31	38.3
17-25	21	25.9
<b>Children Status</b>		
Biological	79	97.5
Not Biological	2	2.5
<b>Gender of Children</b>		
Male	43	53.1
Female	38	46.9
<b>Level of Intellectual disability of Children</b>		
Mild	45	55.6
Moderate	32	39.5
Severe	2	2.5
Profound	2	2.5

**Table 2: Parent's Social Support Sources**

Source of Social Support	Frequency (f)	Percentage (%)
Spouse		
Yes	76	93.8
No	5	6.2
Parents (Grandfather/ mother)		
Yes	58	71.6
No	23	28.4
Friends (fellow parents of intellectual disabilities children/peer group)		
Yes	55	67.9
No	26	32.1
Others: -Professional Staff	9	11.1
-Siblings (Family)	14	17.3
-Neighbour	2	2.5
-Community	4	4.9

Almost all respondents received support from a spouse (husband/ wife); 71.6% of respondents received support from parents (grandparents of intellectual disabilities children). Then 67.9% of parents get support from friends (fellow parents of children with intellectual disability). Parents also mentioned several other sources of support such as professionals, relatives, neighbors, social media and the community.

**Social Support:**

**Table 3: Social Supports Received by Parents**

Social Support	Frequency (f)	Percentage (%)
Low	24	29.6
High	57	70.4

Based on table 3, parents mostly have social support in high categories (70.4%), whereas parents who have low social support were 29.6%. Based on the social support domain, it was found that instrumental support was the highest domain (84%) and award/assessment support became the lowest domain (60.5%) that received by parents (table 4).

**Table 4: Social Support Domains Received by Parents of Children with Intellectual Disabilities**

Social Support Domain	Categories			
	Low		High	
	f	%	f	%
Emotional Support	25	30.9	56	69.1
Instrumental Support	13	16.0	68	84.0
Informational Support	31	38.3	50	61.7
Award/Assessment Support	32	39.5	49	60.5

**Discussion**

Social support is a condition that refers to the comfort, care, respect, or assistance available to someone from another individual or group. However, not all individuals get the social support they need. This relates to several factors, including the unavailability of the resources they need or the individual not assertive enough to ask for help from others<sup>12</sup>.

Social support is one thing that is needed for parents who have children with intellectual disabilities. There is support from the social and family environment, able to provide a positive influence on parents to avoid various psychological disorders or stresses<sup>17</sup>. In addition, social support for parents of intellectually disabled children is one form of effort made by individuals or other groups

in encouraging parents to accept the conditions of intellectually disabled children<sup>22</sup>. Duran states that when parents find out their child is intellectually disabled, parents tend to close down and stop communicating with those around them. This is done by parents because they feel they will get a negative reaction from the people around and will refer to a decrease in their mental health. Therefore, it is necessary to increase the support that comes from families and people around them<sup>19</sup>. One factor that can improve social support in parents is the willingness of partners to assist when caring for intellectual disabilities children. Based on the results of the study, 93.8% received support from their husbands or wives. Support from couples is expected to be able to overcome psychological problems for parents because the couple is the closest and most important person for parents.

The role of support for grandparents from children with an intellectual disability is also important. This is related to solving problems that are likely to be encountered by parents of intellectual disabilities children. Family members who are the closest to parents are expected to provide more support to parents. Their support tends to make parents accept the reality of their children<sup>17</sup>. Other than that, friends also become important people outside the family. Parents mentioned that they get support from friends. Parents having new friends when they take their children to school. So they can exchange stories and experiences with fellow parents. This is in line with research conducted by Cuzzocrea which states that support from friends is able to reduce stress levels for parents who have children with disabilities, one of which is intellectual disability<sup>18</sup>. Good motivation for parents from friends can also balance the support conditions felt by parents of intellectual disabilities children<sup>19</sup>.

However, the results of the study stated that only nine parents received support from professionals such as nurses and teachers in schools. In fact, the role of nurses and teachers is also important for the psychological well-being of parents of intellectual disabilities children. In addition, only two parents said that they had the support of their neighbors, even though neighbors or surrounding communities have a big role in providing support for parents.

The results of this study indicate that parents get social support in the high category. This is likely due to the role of the closest person to the parent. Parents in this study were members of the peer group. Parents

who have children with special needs will usually form peer groups and will support one another with other parents<sup>18</sup>. This will increase the social support that is obtained by parents. Parents who have high social support, especially in material and spiritual support, tend to have better attitudes toward intellectually disabled children<sup>19</sup>. In addition, parents with high social support will have a better quality of life than parents who do not have support<sup>20</sup>.

Based on the domain of social support, the highest support in this study is instrumental support, while the other three domains have almost the same percentage value. However, award support/assessment based on the results of this study is the domain with the lowest percentage value.

High instrumental support for parents of intellectual disabilities children may be related to the presence of direct assistance for parents. Buran states that the presence of other people (spouse, family, or friends) who can help parents in providing care or caring for intellectual disabilities children is proven to increase the score of social support for parents<sup>21</sup>. The function of the couple themselves in this domain is as the person closest to the parent, where parents can do the division of care for children with intellectual disability<sup>19</sup>.

Emotional support is the second of the highest support domains received by parents. In this study parents stated that their partners were willing to listen to stories, share joys and sorrows, exchange ideas, and listen to their hearts. The couple has a role as someone who can listen to or accompany parents at any time, so as to reduce the burden of thought and burden of care for mentally retarded children. In addition to partners, friends can also be some one to share stories, provide motivation, and solutions so that parents can avoid being ostracized. Parents who have low emotional support may be due to lack of willingness of partners and friends to listen to stories, share joys and sorrows, and do not accept the child's condition<sup>19</sup>. Informational support also needed by parents. In this study, parents get information, advice or direction regarding the development and parenting of children from peer groups and social media. The availability of easy and diverse information access becomes very beneficial for parents to get information, advice, and direction to solve problems.

Award or assessment support is the lowest domain obtained by parents. Parents state they rarely get praise

from people around them. Parents feel that the people closest to them rarely appreciate their parents, and sometimes do not consider what parents do important, even though praise and appreciation are very important because it can provide comfort and a sense of being loved by other individuals. Praise and appreciation may also be able to increase self-efficacy for parents in dealing with the stress of caregiving<sup>12</sup>. The sympathetic feelings of professionals (teachers, doctors, nurses) are able to make parents feel understood and valued<sup>21</sup>. Therefore, it is important for those closest people including health workers to always give praise and appreciate the things that have been done by parents. Praise given to parents may be able to increase the sense of comfort and confidence.

### Conclusion

Social support is very much needed by parents with intellectually disabled children. Spouses, family, friends, peer groups and other health workers are important sources for parents. Parents need support for access to health information, praise or appreciation from those around them and professionals. Appreciation support is very important to increase parental self-efficacy in parenting intellectually disabled children.

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# Health Promotion Action by Primary Health Care for Smoking Prevention

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## Abstract

**Context:** Tobacco use has been proven to be detrimental to health. Health promotion offered by Primary Health Care (PHC) for smoking prevention has not shown any satisfactory results. The issues of tobacco use were always identified every year. This study aimed to explore the health promotion (HP) actions for smoking prevention in PHC as a material to inform smoking prevention efforts in PHC.

Qualitative research was conducted on 35 participants from two PHCs in Surabaya. In-depth interviews were conducted on 25 PHC workers followed by observation and document tracking. Triangulation of sources obtained from stakeholders and patients.

Although, in practice, health promotion in a certain sense adopted the WHO strategy, PHC workers viewed the concept of health and health promotion traditionally. There were a number of efforts of smoking prevention which still required some improvements including the promotion and supervision of local regulations, raising awareness and the ability of people to live healthy, and creating a conducive environment.

PHC health promotion action for smoking prevention adapted the strategy of WHO even though it tended to develop personal skills. More effective and efficient smoking prevention efforts required professionals who understand health promotion and a combination of strategies. The government as a policy maker occupied a key and central position in supporting the efforts.

**Keywords:** *smoking prevention, The Ottawa Charter, health promotion*

## Introduction

Tobacco is the only legal product that kills many users. The current use of tobacco has an impact on premature deaths of around 8 million people worldwide each year. The total includes about 600,000 people who presumably died from the effects of being passive

smokers<sup>(1)</sup>. The deaths related to tobacco use frequently occur in lower middle income countries which become the targets of intensive marketing of the tobacco industry. The total economic cost of smoking is estimated at around 1.4 trillion USD per year, equal to 1.8% of the world's domestic products<sup>(2)</sup>.

Indonesia is the country with the highest number of smokers among other ASEAN countries, which is 65.19 million. This number is equal to 34% of the total population of Indonesia<sup>(3)</sup>. The number of smokers does not immediately decrease due to the efforts to stop smoking that has not been effective while a number of novice smokers like teenagers are constantly increasing. The proportion of the population aged  $\geq 15$  years who

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smoke and chew tobacco tends to increase<sup>(4)</sup>. The prevalence of smoking in the population aged 10-18 years also experienced an upward trend. The 2013 RKD was 7.2%, the 2016 National Health Indicator Survey was 8.8%, and the 2018 RKD was 9.1%<sup>(5)</sup>.

Surabaya is the second largest metropolitan city in Indonesia. Surabaya has become a strategic, potential, and prospective target for the cigarette industries to market their products. Disease trends attributed to smoking behavior which include chronic diseases such as hypertension, heart disease, stroke, asthma, COPD and lung cancer show an upward trend in the last three years<sup>(6)</sup>. Considering the increasing trend of the chronic diseases, the efforts to control the effects of tobacco require more serious concern. Meanwhile, the indicators of smoking in the house are still becoming the issues every year<sup>(7)</sup>.

HP has a fundamental role in realizing the overall Sustainability Development Goals agenda<sup>(8)</sup>. HP is an effort closely related to the principle and development of PHCs as a first-rate health service. Accessibility, follow-up and continuity of basic services and their presence in the community are the ideal contexts offered in an integrated and focused manner to concern on and implement HP activities<sup>(9)</sup>. The efforts of HP in PHC should be implemented so that people are able to promote clean and healthy life behavior (PHBS) as a form of solving the health problems they experience<sup>(10)</sup>.

The complexity of the problem of smoking requires a systematic and comprehensive strategy. The strategy or action of coaching of PHBS in PHC refers to The Ottawa Charter from the results of the First International HP Conference initiated by WHO<sup>(11),(12)</sup>. The strategies that can be used include advocate (advocacy), mediate (community development) and enable (empowerment) which are implemented through five actions.

Meanwhile, in practice, the integration of HP interventions in PHC presents a challenge or obstacle in the form of a heavy workload, time constraints, and professionals and patient belief in HP<sup>(13),(14)</sup>. The implementation of HP in Indonesia still faces some obstacles<sup>(15)</sup>. The purpose of this study is to explore the actions of HP for the smoking prevention in PHC. The researchers consider this indispensable knowledge to inform the prevention of smoking by PHC.

## Method

**Research Design:** This research is a qualitative research with a phenomenological approach. The phenomenological approach in this research is to understand and explore the reality experienced by professionals and the underlying aspects<sup>(16)</sup>.

**Informants/Research Subjects:** The determination of informant number is until the information variations are no longer found. The key informants in this study include 23 PHC workers which cover the Head of PHC, and PHC workers who have a role in carrying out the HP action to prevent smoking. There are additional informants outside the PHC as a PHC triangulation consisting of 6 patients and 5 stakeholders. One other informant is the Head of the Disease Prevention and Control Division to obtain information about the Surabaya City Government's policy regarding smoking prevention. All informants have stated their willingness to be interviewed by first signing an informed consent.

**Data Collection:** Data collection is done by conducting in-depth interviews, observation and analysis of documents. The instruments in this study are the main researcher as a master program student and two lecturers in Public Health Faculty of Airlangga University. Supporting equipment in gathering information includes in-depth interview guides, observation sheets, document study sheets, smartphones and stationery. A semi-structure topic guide contains questions about HP's action for smoking prevention.

**Research Location and Time:** The researchers choose two PHCs in Surabaya as the location of the research based on the value of the no-smoking indicator inside the house in 2016-2018. The two PHCs chosen are Tembok Dukuh PHC with a positive trend indicator value and Simomulyo PHC with a negative trend. The data collection is carried out in September to October 2019.

**Data Analysis and Validity:** Data as a result of field notes is transcribed, coded and analyzed using domain analysis. The analysis is carried out as soon as possible after each data collection in the field is completed. The researchers begin with an overall picture of the phenomena that have been collected. The entire data is read and marked with margin notes in the data that are considered important, then the data is coded. Findings in the form of statements experienced by informants are grouped. Irrelevant and repeated statements are

reduced. The findings of each statement are collected in units of meaning. The researchers develop an overall description of these findings to find the essence of the phenomenon<sup>(17)</sup>.

Data validation is done through source triangulation and method triangulation. Source triangulation is done by confirming data from the key informants to other informants, while method triangulation is done by confirming data from in-depth interviews with observations and document searches.

## Results

The informants who have participated in this study consisted of 23 PHC workers, 1 Head of Disease Control and Prevention, 5 stakeholders, and 6 patients. The majority of informants from PHC were women (n = 22/23). The average service life was 6.54 years. PHC workers consisted of 5 general practitioners, 2 dentists, 4 public health, 7 midwives, 3 nurses, and 2 psychologists. Other informants consisted of 5 stakeholders with undergraduate education, and 6 patients with high school and undergraduate education.

The findings from the analysis were divided into 4 main categories: HP workers' perceptions, HP's actions and the results for smoking prevention.

**PHC Workers' Perception:** The theme related to the perception of PHC workers in the HP of prevention smoking identified covered the healthy concept and HP. The healthy concept was identified from PHC workers' answers that healthy was interpreted as a physical and mental condition that was not sick so that individuals were able to do their activity.

"..it is considered healthy if someone does not hurt, both the body and ... the soul" (AM/31/Physician).

There are few of them who defined healthy holistically; including behavioral and environmental (physical, economic and social) aspects.

The PHC workers interpreted HP as a medium to inform, the efforts to inform healthy ways of life, prevention efforts, socialization, and counseling. HP has not been widely understood. The focus of the intervention is on the individual.

"inform the importance of health. We promote a message to the community to be able to maintain their health." (HS/56/Head of Community Health Center).

"...media used to provide information to the wider community" (IS/33/Health Promotor).

**Action and Results of HP for Smoking Prevention:** The HP actions to prevent smoking identified from the informants included building healthy policies, creating supportive environments, strengthening community actions, developing personal skills, and reorienting health services.

**Building Healthy Policy:** The Surabaya City Government has issued a regional regulation on non-smoking and smoking-restricted areas in Surabaya since 2008 and was revised in 2019 to be a non-smoking area (KTR). This regulation became the basis in regulating the rights of smokers and non-smokers in reducing health risks. PHC has socialized the new regulation to several institutions, especially health service facilities, schools, children's activity arenas, places of worship, public transportation, workplaces, etc. PHC advocated institutions in (KTR) to issue regulations or decrees on the formation of a development and supervision team.

"We already have ... regulations on KTR. That's number one, so we use it as a reference for any spots." (FS/35/Health Promotor).

**Creating Supportive Environments:** The activities to create an environment that strengthened smoking prevention efforts included installing banners, posters, stickers and establishing smoke free villages as a model. The efforts to modify the environment to support HP still needed to be increased.

"..I have already socialized about the Regional Regulation on KTR. I have distributed leaflets, banners, posters in terms of which areas are not allowed to smoke.." (FS/35/PJP).

**Strengthening Community Action:** PHC had an Integrated Service Post (posyandu) for youth, a youth-sourced activity. Teenagers could develop skills in providing education to their peers. This strategic activity has not been developed more optimally.

"There are around 30 cadres of adolescent or teenagers posyandu. We hold a roadshow. The posyandu cadres have provided counseling to youth groups (Karang Taruna) in the halls. Their skills also improve." (FN/32/Midwife).

**Developing Personal Skills:** PHC activities to increase knowledge, awareness, and ability to live



healthy lives away from smoking include socialization of regulations in schools, RT / RW meetings, counseling at Integrated Service Post (posyandu) and Integrated Development Post (posbindu).

“..the material of smoking prohibition has been given to elementary school.”(HS/56/Physician).

**Reorienting Health Services:** were PHC activities to develop health services from the health-illness continuum to be healthy through a preventive promotive approach. PHC has integrated service posts (Posyandu) as a form of service sourced from the community. Posyandu was a health service that can accommodate community participation which makes it a channel to bring community health centers (PHC/ Puskesmas) closer to the community. In dealing with the patients who were indicated smoking, individual health services such as doctors and midwives would give an information to control the smoking habits. PHC provided smoking cessation counseling services for novice smokers.

“If a baby has a cough and flu, I would ask, does anyone smoke at home?”(FN/32/PKPR).

## Discussion

PHC workers' understanding of the concept of health affected the orientation of the services they provided<sup>(18)</sup>. HP was a process of enabling people to improve their health control and determinants in order to improve their health<sup>(11)</sup>. In practice, health services in PHC prioritized curative, disease-centered and focus on problem solving<sup>(10)</sup>. Health professionals had the role of HP, so they were expected to have a holistic view towards the health. Health determinant was also a part of health that required intervention as a promotive and preventive effort. PHC workers needed to understand the concepts and principles of health promotion to be able to support the development of HP practices<sup>(19)</sup>. HP was more than just preventing disease and changing individual behavior. The attitude of PHC workers to HP depended on the concept of health interpreted which could affect the goals of the health services. The framework of the HP effort also depended on the determinants of health targeted<sup>(20)</sup>. The Ottawa Charter emphasized the need for a new understanding of HP. Its definition indicated an important change from the focus of modifying individual behavior factors to the determinants that maintained people's health<sup>(21)</sup>.

HP Interventions using a combination of HP

strategies and actions offered by WHO had proven to be effective and cost-effective in preventing and managing chronic diseases and related risk factors<sup>(22)</sup>. The implementation of health promotion for smoking prevention by PHC covered almost all WHO strategies and actions. The actions were carried out at the structural, social and personal level. However, every action still requires continuous optimization.

The efforts to control the impact of tobacco were strengthened by regulations. Policy was the key strategy. Policies and regulations required guidance, supervision and law enforcement. Cross-sectoral collaboration other than health actors was carried out to support the implementation of regulations. Government officials were expected to be able to be the role models for healthy living behavior. The pilot area, installation of banners and posters were the efforts of the Puskesmas to create a supportive environment. Creating a supportive environment was an essential strategy to ensure the effectiveness of other strategies. Socialization and education related to tobacco control efforts were carried out. Developing personal skills actions also needed to be combined with other actions, for instance, the government policy in controlling tobacco use could be done by limiting teenagers' access to tobacco products by restricting cigarette shops and raising cigarette taxes. Reorienting health service was a very important strategy to deal with the growing problem of chronic diseases.

## Conclusions

PHC health promotion action for smoking prevention has adapted the strategy of WHO even though it tends to develop personal skills. More effective and efficient smoking prevention efforts require professionals who understand health promotion and a combination of strategies. PHC workers need capacity building to achieve the main goals of PHC as a primary health care facility that promotes promotion and prevention. The government as the policy maker occupies a strategic position in supporting the efforts to prevent smoking.

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# The Influence of Posyandu Cadres' Training to ward the Predisposing Factors of Provider Initiated Testing and Counseling (PITC) of HIV Services for the Pregnant Women and Its Utilization on Samarinda Municipality, Indonesia

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## Abstract

**Introduction:** The infection of HIV from mother to child can be prevented through the prevention of transmission from mother to child's efforts based on the WHO recommendation in 2010. The cadres are considered to be capable of monitoring pregnant women in their area, so they are considered to be capable of moving pregnant woman's willingness to carry out an HIV test at the nearest Community Health Center or *Puskesmas*. The purpose of this study was to prove the influence of training given to cadres toward predisposing factors of PITC of HIV Services on Pregnant Women and influence of the training and PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

**Method:** This quasi experimental research conducted from March to May 2019. The population was *posyandu* cadres. Sampling was 42 cadres, divided into treatment and control group. Data assessed using a questionnaire on the pre-test and post-test.

**The Results:** A significant difference in knowledge showed after the training between treatment and control group  $p=0.000$ . On the contrary, no significant difference in self-efficacy shown before and after the training in the treatment and control group  $p = 0.178$  and  $0.216$ , consecutively. There was also no significant influence showed on the attitude of cadres before and after the training for the treatment and control group  $p=0.488$  and  $p=0.731$ , consecutively. There was a significant influence of training toward the PITC of HIV service utilization by the pregnant women  $p=0.004$ .

**Conclusion:** There was a significant influence between training toward knowledge of the *posyandu* cadres' knowledge on the PITC of HIV and the PITC of HIV service utilization by the pregnant women.

**Keywords:** *Cadre, training, provider initiated testing and counseling, HIV, pregnant women*

## Introduction

HIV infection is one of the main health problems

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in Indonesia. This infectious disease can affect maternal and child mortality. Indonesia is one of the countries with the estimated increase in *the incidence rate of infection with more than 25%*<sup>(1)</sup>. Prevalence and HIV transmission from mother to child is likely to be low, however the number of pregnant women infected with HIV are likely to be arise. The infection of HIV from mother to child can be prevented through the prevention of transmission from mother to child's efforts based on the WHO recommendation in 2010. It is essential that

all of the pregnant women are offered to perform a test for HIV. Offering HIV testing to pregnant women can be done when mothers come for antenatal care (ANC) visits<sup>(2)</sup>.

Indonesia is still remains to be the lowest coverage of pregnant women perform HIV test i.e. less than 1% compared with Thailand as the highest i.e. 94%, China 64%, Vietnam 52% and Cambodia 41%<sup>(3)</sup>.

In 2012 the incidence of HIV transmission from mother to child has been reached 2.6 % of the entire cases of HIV/AIDS in Indonesia (Ministry of Health Republic of Indonesia, 2012). While the coverage of HIV tested pregnant women in East Kalimantan only 2.58 % of the 17,552 targeted pregnant women in 2012<sup>(4)</sup> In the East Kalimantan province, the Samarinda municipality has the highest number of HIV/AIDS cases compare with other districts/municipality in the province. The cumulative of HIV/AIDS cases till the month of May 2013 in the Samarinda municipality was 3,146 cases.

According to data from the Health Office of Samarinda municipality, on 2016 out of 5,556 pregnant women in Samarinda City only 34% or 1,867 people or who want to come to a health facility and want to do an HIV test and want to receive the results of the test<sup>(5)</sup>.

As an extension in delivering primary health service to the community in Indonesia, the *posyandu* is established in every village. The *posyandu* runs by several health volunteers or cadres, accompanied by health professionals. One of the cadres' tasks is delivering PITC of HIV services to pregnant women in their community.

To increase the coverage of the pregnant women's willingness to get an HIV test, the cadres' empowerment is needed. The cadres are considered to be capable of monitoring pregnant women in their area, so they are considered to be capable of moving pregnant women's willingness to carry out an HIV test at the nearest Community Health Center or *Puskesmas*.

Based on the previous cross-sectional study conducted in the Samarinda municipality from September to November 2019, known that the predisposing factors influenced the cadres' empowerment in delivering PITC of HIV services were knowledge, attitude and self-efficacy. These predisposing factors can be increased by training.

Hence, the purpose of this study was to prove the influence of training given to cadres toward predisposing factors of PITC of HIV Service on Pregnant Women and influence of the training and PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

## Materials and Method

This *Quasi Experimental* research was conducted from March to May 2019. The population of this research was *posyandu* cadres in Samarinda Municipality. The sample determined using simple random sampling method. The number of sampling was 42 cadres, which divided into treatment group and control group. The assessment of the research was carried out by giving questionnaires at the pre-test and post-test of the treated group. Besides being given training, cadres are given modules as materials to be studied. For the control group, only modules are given, as a guide for implementing the program. After the training, the observation continued with the follow up regarding the utilization of PITC of HIV services by the pregnant women.

The training was conducted in 2 days. Participants were given materials and practices to increase the role of cadres in conducting education, motivation, and assistance to pregnant women. The material provided were basic knowledge about HIV, self-efficacy, and attitude as a cadre. Training used a role play, brainstorming and exercises. This training then followed by observations between 1 – 3 months afterwards.

## Results

**1. Respondents Characteristics:** The characteristics of research respondents as can be seen in table 1.

**Table 1: Characteristics of Respondents**

Characteristics	n (%)
<b>Age</b>	
20-35	7 (15.9)
36-50	19 (43.2)
51-65	15 (34.1)
> 65	3 (6.8)
Mean	47.0
<b>Education Level</b>	
Elementary school	3 (6.8)
Junior High School	10 (22.7)
Senior High School	24 (54.5)
College	7 (15.9)

Occupation	
House Wife	35 (79.5)
Civil Servants/Teachers	2 (4.5)
Entrepreneurs/Traders	7 (15.9)

2. **Statistical Analysis Results: Mann Whitney Test** utilized to analyze the difference and significance of pre-test and post-test for both groups. The results as can be seen bellow.

**Table 2: Statistical Analysis Results (Mann Whitney Test)**

Observation result	Group	Mean	Standard Deviation	Asymp. Sig. (2-tailed)
Knowledge Pre	Treatment	37.3571	3.07485	0.130
	Control			
Post	Treatment	41.0476	4.79305	0.000
	Control			
Self-Efficacy Pre	Treatment	23.8095	3.43041	0.178
	Control			
Post	Treatment	24.9048	3.48383	0.216
	Control			
Attitude Pre	Treatment	44.3810	2.95764	0.488
	Control	44.9048	1.72930	0.489
Post	Treatment	45.2857	5.56006	0.731
	Control	44.8095	2.96005	0.731

3. **Utilization of the PITC of HIV by the pregnant women (Follow Up): 1 – 3 months after the training,** observation as the follow up of the training given was done. The result can be seen as bellow.

**Table 3: The Utilization of the PITC of HIV Services Analysis**

No.	Group	HIV Test				Total		p value
		Yes		No		n	%	
		n	%	n	%			
1.	Treatment	11	100	0	0	11	100	0.004
2.	Control	4	40	6	60	10	100	
	Total	15	71.4	6	28.6	21	100	

## Discussion

- 1. Respondents Characteristics:** Most of the respondents were at 36 – 50 (43.2%) and 36 – 50 (34.1%) year old range. The oldest respondent was 68 years old and the youngest was 23 years old. The respondents mainly (54.5%) were senior high school graduates and 79.5% were housewives.
- 2. Influence Of Training toward Predisposing Factors:**
  - a. Knowledge:** Result from MannWhitney test shown that there was no difference in knowledge before training between the treatment and control group ( $p = 0.130$ ). While a significant difference was found after the training ( $p = 0,000$ ) between the treatment

and the control group. This result is in line with the result of a research on interventions conducted in the Men Like Men (MSM) group, to promote health and stress management to groups in HIV-infected MSM conducted by Brown et al (2019)<sup>(6)</sup>.

Knowledge will underlie a person in doing behavior change so that the behavior shaped will be more lasting compare with the behavior that not constituted by knowledge<sup>(7)</sup>. Knowledge can be interpreted as know or understand after seeing (witnessed, experienced or taught). Cadres who have good knowledge are expected to be able to provide a good and qualified service *atposyandu*.

With increasing knowledge of the cadres as the results of the intervention cadres are expected to

provide a better service to the community.

Cadres' knowledge of HIV transmission is very important as a foundation to provide education and counseling to pregnant women so that can rise their willingness to have an HIV test. A woman who has a good knowledge about the transmission of HIV transmission from mother to child will try to protect themselves and want to treat themselves<sup>(8)</sup>.

- b. Self-efficacy:** Self-efficacy defines as one's feelings of adequacy, efficiency, and one's ability to cope with life<sup>(9)</sup>.

In this research, there was no significant difference found on self-efficacy before and after intervention in the treatment group and the control group with  $p = 0.178$  and  $p = 0.216$ , consecutively. Meaning that statistically the training was not influenced the cadres' self-efficacy. This condition happened because the cadres' self-efficacy before the training mostly was already in good self-efficacy category, only 4 respondents or 9.5% had poor self-efficacy category. However, in many research found that a training can increase a self-efficacy as proved by Oakley et al (2017) in a research of training of teenage at age 11 – 14 year old. It also said in this research that peer education proved to be comparable to adult education<sup>(10)</sup>.

Higher self-efficacy of the *posyandu* cadres will increase the cadres performance in delivering the PITC of HIV to the pregnant women. This research was in line with research by Sulaeman and Indarto (2018) that showed that pregnant women with high self-efficacy would be more likely to come to *posyandu* compare with pregnant women with low self-efficacy. This condition similar with the health cadres. Cadres that have high self-efficacy were expected to be more capable in motivate pregnant women to be willing to take an HIV test at the nearest community health center<sup>(11)</sup>.

According to Bandura (1997), women have a high self-efficacy in managing a role. Women who have a career as addition to her role as house wives will have higher self-efficacy when compared with men<sup>(12)</sup>. Self-efficacy and coping strategies also significantly has correlation<sup>(13)</sup>.

- c. Attitude:** The attitude referred to in this research is the attitude of *posyandu* cadres in supporting pregnant women to carry out HIV testing at the

*puskesmas*. The result of the attitude variable analysis with the *Independent Test T*, showed no significant difference in the attitude of the respondent before and after training with  $p = 0.488$  and  $p = 0.731$ , consecutively. It means that statistically the training was not influenced the cadres' attitude. This condition happened because the cadres' attitude before the training mostly was already in good attitude category, only 3 respondents or 7.1% had poor attitude category.

Factors that influence the formation of attitudes are personal experiences, culture, significant others, mass media, institutions or educational institutions and religious institutions as well as individual emotional factors<sup>(14)</sup>. Level education has been reported as another factor that influence the attitude by Widagdo and Husodo (2009). The higher level of education the easier to receive a new information and the contrary<sup>(15)</sup>.

In line with this research, a study conducted by Andira et al (2008) showed that cadres who have a positive attitude has better performance compared with cadres who have a negative attitude<sup>(16)</sup>. Hermanus et al. 2010 stated that there were differences in people's attitudes in a positive direction after an intervention was carried out, the attitude of the community was more open and more direct in a personal way<sup>(17)</sup>.

### 3. Influence Training toward the PITC of HIV Services Utilization by the Pregnant Women:

The result of *posyandu* cadres assistance in the follow up of the training after 1-3 months shown that the number of pregnant women who tested for HIV in the treatment group was 11 pregnant women (100%) and in the control group was 4 pregnant women (40%). The result of chi-square test analysis was  $p=0.004$  meaning that the training that had been conducted had influenced the PITC of HIV services utilized by the pregnant women in Samarinda municipality.

This result showed that the training conducted, indeed, had influenced toward the PITC of HIV service utilized by the pregnant women. PITC has been proven effective in identifying HIV cases in mothers and children<sup>(18)</sup>.

### Conclusion

The statistical analysis found that there was a

significant influence of training given to cadres toward cadres' knowledge of PITC of HIV Services for pregnant women. There was no significant influence of training toward cadres' self-efficacy and attitude showed. This condition happened because the self-efficacy and attitude of cadres before training mostly already good.

The training proved to be significantly influenced the PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

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# Nutritional Evaluation of Chayote Flour-Based Biscuits(*Sechium Edule*)

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## Abstract

**Background:** Product development using chayote and evaluation of nutrients is a way to extend the benefits of chayote.

**Objectives:** The objectives of this study was to evaluate the nutritional content in chayote flour-based biscuits so that it can be used as a healthy food product.

**Method:** Proximate evaluation for water content using the thermogravimetric method, the ash content of the dry ashing method and the fat content of the Soxhletation method. Analysis of proteins and vitamins using the UV-VIS spectrophotometry method, while minerals use the atomic absorption spectrophotometry method.

**Results:** The results showed that the proximate analysis obtained the highest to lowest levels of carbohydrate, fat, protein, water and ash, was calculated with the average value of each analysis ie carbohydrates (57.66 g / 100g), fat (19.39 g / 100g), protein (16.99 g / 100g), water (6.68 g / 100g) and ash (5.28 g / 100g). The highest vitamin C is 13.97%, then vitamin E (0.11%) and vitamin A (0.041%) and the mineral composition, namely potassium is the highest mineral in biscuits based on chayote flour(3,902 g / 100g), then sodium and calcium (861.0 g / 100g and 665.6 g / 100g).

**Conclusion:** Biscuits based on chayote flour contain high carbohydrate, vitamin C and potassium minerals. It is hoped that product based on chayote flour become healthy food for the prevention of diabetes mellitus and hypertension

**Keywords:** *Biscuits, chayote, flour, minerals, vitamins*

## Introduction

Biscuits are popular snacks among the people because they can be consumed at any time and have a relatively long shelf life. Various types of biscuits have been developed to produce biscuits that are not only tasty but also healthy. Biscuits are popular with many people because they are easily consumed in the form of baked foods with small pieces that have a dry and crispy texture. The antioxidant activity of biscuits makes it a very useful food in preventing degenerative diseases due to the deterrence effect of free radicals and oxidative stress<sup>1-4</sup>.

Food products in the form of biscuits are in great demand by children to adults, ranging from the lower to upper economic communities. This tendency is related to people's lifestyles and dietary patterns which have completely changed as a form of modernity in life, so that it requires various innovations and ease in getting food. In addition to staple foods and flour is still the main ingredient in making biscuits<sup>5, 6</sup>.

The raw material for biscuits is flour, but in the development of food technology, it can be processed from basic ingredients of flour other than flour, including

flour from chayote to the characteristics of the biscuits produced<sup>7</sup>. Chayote is processed into flour to maintain the shelf life and is widely used by the community in making bread, cakes, noodles, etc. The processing of chayote into flour has several advantages over its fresh fruit, namely as a raw material for advanced processing industry, long shelf life due to low water content and can be used as a functional<sup>8-10</sup>.

Chayote is a vegetable that is widely consumed by the public and the price is quite cheap so that it has always been the people's choice in fulfilling their food. The solution in extending the shelf life is the manufacture of chayote based products including the development of chayote yogurt to enrich the variety of yogurt with a broad market prospect<sup>11</sup>, Drying will increase the level of crude fiber of fresh squash (0.27 g/100 g) to 0.35 g/100 g and reduce the water content reduced from 93.27% to 63.58%<sup>10</sup>, processed into high-value nutritious pastries<sup>12</sup>, Jam<sup>13</sup> and chayote juice.<sup>14</sup>

Chayote is used mainly in processed form because of its nutritional content, which includes vitamins, minerals, fiber, water and amino acids (lysine, histidine, arginine, aspartic acid, glutamic acid, cysteine, valine, isoleucine, serine, alanine and tyrosine<sup>14</sup>. Chayote which shows diuretic, anti-inflammatory and hypertensive activities have business opportunities in producing nutritionally valuable food products and maintaining health<sup>15</sup>. Chayote flour significantly reduces blood glucose levels<sup>16</sup>

Conjoined flour-based biscuits have been produced into fast food, but information about its nutritional value has not been reported. Evaluation of nutrient content in chayote-based biscuits is very important to provide guarantees for processed products, so it can be made as a food product that has acceptability and in its development can be one of the food choices to overcome public health problems.

## Materials and Method

**The Research Setting:** The research was carried out in the chemical education laboratory for the manufacture of conjoined chayote biscuits, the Mathematics and Science Education Faculty research laboratory of Tadulako University for proximate and vitamin analysis, health laboratory of Central Sulawesi province for mineral analysis.

**Time and Location Research:** This research was conducted in the period of 3 months, September 2019 - November 2019. It was conducted in Palu City.

**Product Preparation:** Chayote used in this research was taken from smallholder plantations in Palolo District, Sigi Regency, Central Sulawesi Province, which is close to Palu City. The process of making chayote flour is: chayote is washed using running water, crushed into small sizes. It is dried using an oven, the drying is carried out for 2 x 24 hours (until dry), the dried chayote is then ground and sieved using an electromagnetic sieve shaker with a filter size of 80 mesh, obtained flour and is used for biscuit preparation.

**Making Biscuits Basedchayote Flour:** Chayote flour is mixed with baking soda and vanilla powder evenly mixed with sugar and eggs until fluffy, allowed to stand for 15-20 minutes, formed round or in accordance with the tastes of each place in the oven plate with a temperature of 160°C - 175°C for 30-35 minutes, lift and chill, chayote biscuits are ready for analysis.

**Proximate Analysis:** Proximate evaluation for water content using the thermogravimetric method, the ash content of the dry ashing method and the fat content of the Soxhletation method. Analysis of proteins using the UV-VIS spectrophotometry method. Measurement of total carbohydrate content in a sample is calculated based on calculations (in%): % carbohydrate = 100% - (% protein + fat + ash + water)

**Vitamin A Analysis (Spectrophotometric Method):** The sample was extracted with hexane solvent several times on a 250rpm agitation shake machine until all Vitamin A was extracted (the extract was no longer colored). The resulting Vitamin A extract is passed over anhydrous sodium sulfate to release bound water. Vitamin A extract is measured in volume. Vitamin A extract was analyzed by Vitamin A level using UV-VIS spectrophotometry at a wavelength of 450 nm.

**Vitamin E Analysis (Spectrophotometric Method):** The sample was extracted with hexane solvent several times on a 250-rpm agitation shake machine until all Vitamin E was extracted (the extract was no longer colored). The resulting Vitamin E extract is passed over to anhydrous sodium sulfate to release bound water. Vitamin E extract volume is measured. Then the Vitamin E content was analyzed using UV-VIS spectrophotometry at a wavelength of 470 nm.

**Vitamin C Analysis (Spectrophotometric Method):** 5 grams of biscuit sample is weighed and add 50 ml of water. Shake above the shake machine until the sample dissolves. Filter the sample, then measure the volume of filtrate obtained. Measure sample absorption at the maximum wavelength obtained, then determine the concentration of vitamin C contained in the sample using a regression equation obtained from a standard curve.

**Analysis of K, Na and Ca Levels (Atomic Absorption Spectrophotometry):** The sample solution that has been made is taken 1 mL and diluted with water in a 50 mL measuring flask to the mark limit. The levels of potassium, sodium and calcium in the sample solution are determined by measuring their absorption with an atomic absorption spectrophotometer. Potassium metal is measured at wavelength 766.5 nm, Sodium metal is measured at wavelength 285.2 nm and calcium metal is measured at wavelength 589 nm.

### Results

**Proximate Analysis:** The results of the proximate analysis of chayote-based biscuits are shown in Table 1. The highest to lowest contents of carbohydrate, fat, protein, water and ash content have been calculated with an average value of each analysis i.e. carbohydrates (57.66 g/100g), fat (19.39 g/100g), protein (16.99 g/100g), water (6.68 g/100g) and ash (5.28 g/100g).

**Table 1: Proximate composition of chayote flour-based biscuits**

Parameters	Results (g/100 g)
Water	6,68 ± 0,24
Ash	5,28 ± 0,33
carbohydrates	51,66 ± 0,69
fat	19,39 ± 0,36
Protein	16,99 ± 0,24

Source: Primary data 2019, \*Results are expressed as mean ± Std. Dev of 3 replicates

**Mineral and Vitamin Composition:** Biscuits processed from chayote flour showed the highest evaluation results containing vitamin C which was 13.97%, then vitamin E (0.11%) and vitamin A (0.041%) as listed in table 2. The data shown in Table 2 shows the mineral composition of potassium which is the highest mineral in chayote flour-based biscuits (3,902 g/100g), then sodium and calcium (861.0 g/100g and 665.6 g/100g).

**Table 2: Vitamin and mineral composition of chayote flour-based biscuits**

Parameters	Results (g/100 g)
<b>Vitamin</b>	
Vitamin A	0,041 ± 0,0003 <sup>a</sup>
Vitamin C	13,97 ± 0,066
Vitamin E	0,11 ± 0,13
<b>Mineral</b>	
Sodium (Na)	861,0 ± 16,97
Calcium (Ca)	665,6 ± 87,68
Potassium (K)	3.902,0 ± 251,73

Source: Primary data 2019, \*Results are expressed as mean ± Std. Dev of 3 replicates

### Discussion

**Nutritional Evaluation:** The composition of chayote and its products is influenced by climate, region, growth conditions, plant age and processing method<sup>17</sup>. The heating process in biscuit processing greatly influences the nutritional content, this is in line with a research conducted by Patel (2019) concluded that the baking temperature has a significant influence significant (p<0.05) on the quality of bottle gourd biscuits (*Lagenaria siceraria*) and at temperatures up to 220°C showed the most damaging effects

**Content of Water and Ash:** Water content is an important criterion in determining the shelf life and quality of processed foods based on chayote, the higher the water content, the growth of microorganisms increases<sup>18</sup>. Ash content in chayote-based biscuits is 6.68%, this ash content shows the amount of minerals that are quite diverse<sup>10, 19</sup>. Ash content in biscuits can indicate the index of mineral constituents because ash is an inorganic residue that remains after the water content and organic compounds are removed from the biscuits by heating<sup>20, 21</sup>. A research conducted by Islam (2018) shows that the content of fresh chayote ash is 0.30% which is significantly higher than that of chayote-based biscuits or an increase of 6.38%.

**Carbohydrate Level:** Carbohydrates are the main component of chayote-based gourd biscuits 51.66% showing the high starch content in chayote-flour flask as a basic ingredient for making biscuits. Half the carbohydrates in biscuits that cause biscuits can replace the staple food, this role is very good for prediabetes.<sup>22</sup>. Diabetes is a condition that begins diabetes mellitus and continues to increase in prevalence staple food excessively<sup>23, 24</sup>.

**Fat Level:** The composition of fat in chayote-based biscuits can be seen in Table 1. In general, the biscuits that have been analyzed contain 19.39 g/100g (19.39%), the fat content meets the quality requirements of the biscuits, which is above 9.5 g/100g based on the quality requirements of biscuits according to SNI 01-2973-1992. Low fat content make biscuits developed into low-fat foods<sup>25</sup>.

**Protein Level:** Protein is the least macronutrient in chayote flour-based biscuits namely 16.99 g/100g (16.99%), the protein content in biscuits is influenced by the raw material used and processing. Interactions between molecules affect the structure of proteins that can reduce protein content in biscuits, including the binding of phenolic compounds to proteins so that their availability can be significantly reduced<sup>26, 27</sup>.

**Mineral and Vitamin Level:** High vitamin C level made the biscuits chayote flour are very good as a source of antioxidants. Water-soluble Vitamin C is a powerful antioxidant in helping the body resist infection agents and overcome harmful free radicals<sup>21, 28</sup>.

Comparison of sodium and potassium is 0.22 (Na/K ratio <1) this shows that chayote flour-based biscuits is very suitable to be consumed to reduce blood pressure<sup>29, 30</sup>. Sodium and potassium play a role in maintaining the osmotic pressure of body fluids, while calcium is a good mineral for bone formation.

### Conclusion

Carbohydrates (57.66 g/100g), vitamin C (13.97 g/100g) and potassium minerals (3,902 g/100g) are the most macro nutrients and micronutrients (vitamins and minerals) in 100 grams of chayote flour-based biscuits

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**Conflict of Interest:** Nil

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# Trihalomethane Presence in Tap Water, Mahasarakham Province, Thailand

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## Abstract

**Context:** Tap water supply production plants (WSPP) in Thailand currently use chlorination to remove algae and bacterial compounds. The production of tap water may result in its contamination with trihalomethanes (THMs), which may be carcinogenic. This cross-sectional study aimed to determine the presence of THMs in tap water at the WSPP, Mahasarakham Provincial Water Work Authority of Thailand in order to determine the safety of tap water at the studied plant. We collected tap water samples at 8 points: Raw water, Water after pre-chlorination, Water after precipitation, Water after filtered, Tap water, water 2, 4, 6 kilometers from the WSPP. We collected a total of 240 samples, examined each water sample by GC-ECD to determine the presence of THMs. Four types of algae were observed in Raw water: Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta. Our study finding revealed the presence of  $\text{CHCl}_3$ ,  $\text{CHCl}_2\text{Br}$  and  $\text{CHBr}_3$  in tap water but the levels present where consumers obtained tap water did not exceed safe levels. The risk assessment of cancer estimated from THMs in DFTM at the maximum concentration was  $6.75 \times 10^{-5}$  and  $6.49 \times 10^{-5}$  which does not exceed the safe value defined by the WHO. Therefore, we conclude tap water at the study site is safe for consumption. Further studies are needed to determine THMs levels may be reduced further in an economical manner.

**Keywords:** Trihalomethanes (THMs), pre-chlorination, water supply production plant, Tap water

## Introduction

Clean water is important for human survival, good health, agriculture, industry, transportation and other uses<sup>1,2</sup>. Humans need approximately 100-200 liters per capita per year in urban communities<sup>3</sup>. Sources of raw water (RW) include river, reservoirs, groundwater and rainwater. However, RW is often contaminated with plant nutrients, such as nitrate and phosphate, from

urban and agricultural sources, resulting in the growth of several types of algae<sup>4</sup>.

When RW is fed into a water supply processing plant (WSPP), it can reduce the efficiency of the settling tank due to the buoyant force of the algae causing the filter sand to become clogged faster requiring washing more frequently<sup>5</sup>. Changes in chemical properties (conductivity, hardness, alkalinity, and dissolved oxygen (DO))<sup>6</sup>, physical properties (temperature and turbidity)<sup>7</sup> and increases in organic matter content (phosphate and nitrate compounds)<sup>8</sup> result from surface plant production, resulting in algal slime that must be cleaned up<sup>9</sup>. Water pipelines may become clogged due to algae growing in low-light areas<sup>2</sup>. Algae contaminated water in the pipelines results in bad taste water, bad smelling water, changes in water color and the presence of toxic substances harmful to consumers<sup>4</sup>. Some

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algae may be toxic, such as *Microcystis aeruginosa*, *Cylindrospermopsis raciborskii* (Woloszynska) Seenayya & Subba Raju, *Anabaena* spp, and *Oscillatoria* spp, which can increase the risk for liver cancer<sup>10</sup>.

Pre-chlorination defined as adding chlorine to the water prior to water treatment process, is currently used to cheaply remove algae and disinfect RW at WSPP in Thailand. Pre-chlorination results in by-products of the process, including trihalometanes (THMs), such as chloroform (CHCl<sub>3</sub>), bromodichloromethane (CHCl<sub>2</sub>Br) and bromoform (CHBr<sub>3</sub>)<sup>11,12</sup>, which in high concentration may be carcinogenic<sup>13</sup>, may affect reproductive capacity, child delivery, blood circulation and possibly the liver and kidney<sup>14</sup>. The United States Environmental Protection Agency (EPA) has determined THMs should not exceed 80 µg/L<sup>15</sup> and the World Health Organization has stated THMs should not exceed 100 µg/L in tap water<sup>16</sup>.

High level of chlorine used for pre-chlorination may result in high levels of THMs<sup>17</sup> but low levels of chlorine may result in continuing contamination of the water with organic substances. In this study we aimed to determine presence of and concentrations of THMs and the types and amounts of algae and physical quality of water being treatment a WSPP in Mahasarakam province, Thailand in order to determine the safety of tap water at the study location.

## Materials and Method

**We conducted this study during September 2017 -February 2018.**

The water samples for the study were collected at 8 points; 1<sup>st</sup> point: Raw water (RW) prior to treatment, 2<sup>nd</sup> point: water after pre-chlorination (CW), 3<sup>rd</sup> point: water after precipitation (SW) (the formation of a solid in a solution during a chemical reaction), 4<sup>th</sup> point: water after filtering (FW) (slow sand filter), 5<sup>th</sup> point: tap water (TW) immediately upon leveling the WSPP, 6<sup>th</sup> point: water at 2 kilometers from the WSPP (DW1), 7<sup>th</sup> point: water at 4 kilometres from the WSPP (DW2), 8<sup>th</sup> point: water at 6 kilometres from the WSPP (DW3).

At each sample site, the water was sampled 5 times over the 6 month study period. Each water samples was examined as follows: the concentration of algae was measured using a haemocytometer following the whole count method<sup>18</sup>. The physical and chemical qualities of the water studied were: turbidity, pH, temperature,

electrical conductivity, hardness (by Ethylene Diamine Tetra Acetic Acid or EDTA titration, amount of dissolved oxygen in the water (by azide modification), oxygen consumed (by permanganate method), and nitrate level (by brucine method). The 2<sup>nd</sup>-8<sup>th</sup> point samples were analyzed for the type and amount of THMs by gas chromatography, Electron Capture Detector type (GC-ECD). The water quality was analyzed following the Standard Method for the Examination of Water and Wastewater, 20<sup>th</sup> Edition<sup>19</sup>.

**Cancer Risk Estimation:** We estimated the cancer risk from the consumption of the studies samples following the method of the US-EPA<sup>20</sup>. This research found a risk of cancer from exposure due to the consumption of water from DFTMs from 3 kinds of THMs, including CHCl<sub>3</sub>, CHCl<sub>2</sub>Br and CHBr<sub>3</sub>. The gastrointestinal tract risk was modified based on the Thai population's average weight of 55 kg, average age = 64 years<sup>21</sup> amount of water consumption = 3 L/person/day<sup>22</sup>.

The substitution in Equation 1 then creates Equation 2 with the slope factor value representing the cancer potential of 3 types of THMs following the tracts of substance exposure into the body. The formula for the risk assessment of cancer is shown in Equation 2.

$$CDI = \frac{(CW)(IR)(EF)(ED)}{(BW)(AT)} \quad (1)$$

Risk of cancer = (Total amount of substance exposure) (Slope factor value) (2)

where CDI = Chronic daily intake (mg/(kg·day))

AT = Average time (day)

BW = Body weight (kg)

IR = L/day

CW = Concentration of substance in water (mg/L)

ED = Exposure duration (year)

EF = Exposure frequency (event/year)

## Results

**Types and concentrations of algae isolated from study sites:** Four types of algae were detected in RW: Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta at concentrations of 3,746, 647, 207 and

156 cells per liter, respectively; after treatment in TW the concentrations of algae in tap water were 230, 0, 0 and 0 cell per liter, respectively (Table 1).

**Table 1: Algae isolated at study sites in water**

Algae types	Concentrations of algae in cells/ liter of water				
	RW	CW	SW	FW	TW
Cyanophyta (strains)	647	154	52	0	0
Chlorophyta	3,746	1,533	285	312	230
Bacillariophyta	207	78	0	0	0
Euglenophyta	156	0	0	0	0
Total	4,755	1,765	337	0	230

**Remark:** Raw water (RW), Water after pre-chlorination (CW), Water after precipitation (SW), Water after filtered (FW), Tap water (TW)

**Type and concentrations of THMs at study sites:**

The types and concentrations of THMs where water was accessed by customers were: CHCl<sub>3</sub> (37 µg/L at DW1, 39 µg/L at DW2, 38 µg/L at DW3), CHCl<sub>2</sub>Br (14 µg/L at DW1, 14 µg/L at DW2, 14 µg/L at DW3), CHBr<sub>3</sub> (14 µg/L at DW1, 13 µg/L at DW2, 9 µg/L at DW3). None of these exceeded safe acceptable standard thresholds for CHCl<sub>3</sub> (< 300 µg/L), CHCl<sub>2</sub>Br (< 60 µg/L), CHBr<sub>3</sub> (< 100 µg/L) (Table 2).

**Table 2: Types and concentrations of THMs at study sites**

Site sample collected	Concentrations of THMs isolated in µg/L		
	CHCl <sub>3</sub>	CHCl <sub>2</sub> Br	CHBr <sub>3</sub>
RW	ND	ND	ND
CW	107	32	17
SW	53	20	15
FW	44	15	14
TW	112	20	16
DW1	37	14	14
DW2	39	14	13
DW3	38	14	9
<b>Acceptable standard threshold</b>	<b>300</b>	<b>60</b>	<b>100</b>

**Remark:** trihalometanes (THMs), chloroform (CHCl<sub>3</sub>), bromodichloromethane (CHCl<sub>2</sub>Br) and bromoform (CHBr<sub>3</sub>), Raw water (RW), Water after pre-chlorination (CW), Water after precipitation (SW), Water after filtered (FW), Tap water (TW), water at 2 kilometers from the WSPP (DW1), water at 4 kilometres

from the WSPP (DW2), water at 6 kilometres from the WSPP (DW3)

**Cancer Risk Assessment:** According to our calculations, the highest concentrations of CHCl<sub>3</sub>, CHCl<sub>2</sub>Br and CHBr<sub>3</sub> at the place of consumption were 112 µg/L, 32 µg/L, 17 µg/L giving cancer relative risk ratio of 1.30 per 100,000 populations, 4.9 per 100,000 populations and 0.6 per 100,000 populations, respectively (Table 3), where the acceptable cancer relative risk ratio is < 1.0 per 1,000 populations (20). With the same calculation, the other risk factors, such as CHCl<sub>2</sub>Br and CHBr<sub>3</sub>, were 14 and 14 µg/L for cancer risk ratios of 4.86E-05 and 5.85E-06, respectively.

**Table 3: Estimated cancer risk due to exposure to THMs**

THMs detected	Maximum Concentration in µg/L	Cancer Relative Risk Ratio Per 100,000 population
CHCl <sub>3</sub>	39	1.3
CHCl <sub>2</sub> Br	14	4.9
CHBr <sub>3</sub>	14	0.6
Total		6.8

**Discussion**

This study clarifies the impacts of pre-chlorination on removing algae in the WSPP process and from the consumption of drinking water from DFTMs. This study indicates the risk of cancer consumers are exposed to through THMs in the drinking water from DFTMs possibly directly affects consumers, such as people who live near the university. In addition, 4 algae species Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta were found in this study and might affect human health, as Carmichael and Falconer<sup>23</sup> have stated that the primary agent associated with health risks is prolific cyanobacteria growth, which is associated with nutrient-rich waters, warm temperatures and sufficient light<sup>24,25</sup>. Cyanobacteria are known to produce acute hepatotoxins, cytotoxins, neurotoxins, gastrointestinal disturbances, and respiratory and allergic reactions<sup>24,26</sup>. The principle cyanobacteria toxin considered in drinking water guidelines is microcystin-LR. Falconer<sup>26</sup> reported a provisional drinking water guideline of 1 µg/L for the US, while Canada recently approved a guideline concentration of 1.5 µg/L. Microcystin-LR specifically targets the liver, kidney and small intestine<sup>27</sup> and causes acute hepatotoxicosis. The physical and chemical qualities of water in this study of the WSPP were impacted



by turbidity, and the colloidal particles that might cause turbidity can also harbour pathogenic microorganisms, thereby making disinfection ineffective.

THM formation relies on several factors including the concentration and nature of natural organic matter, raw water quality, disinfection contact time, temperature, pH, quality of water and chlorine dose<sup>28</sup>. The THM concentration less than the standard value was not due to chlorination alone and may also be caused by many other factors, such as organic compounds, free-chlorine, and a lower pH, which may cause THM formation<sup>29</sup>. Our study found less  $\text{CHBr}_3$  in CW, echoing the results of Pardakhti et al<sup>30</sup>, Summerhayes et al<sup>31</sup>, Uyak<sup>17</sup>. The lifetime cancer risk for THM exposure (multiple toxicants may result in additive effects, and interactive effects may be synergistic or antagonistic) from high to low concentration for a series of  $\text{CHCl}_3$ ,  $\text{CHCl}_2\text{Br}$  and  $\text{CHBr}_3$  is averaged<sup>32</sup>.

The assessment results show that the substance with the maximum concentration is  $\text{CHCl}_3$ . However, when the cancer risk is assessed, the most carcinogenic substances are  $\text{CHCl}_2\text{Br}$  and  $\text{CHCl}_3$ . As these results indicate, cancer risk may differ among various geographic areas because the THMs may be different or because other water contaminants are also present. More comprehensive water quality data must be collected or simulated to improve exposure assessment in epidemiological studies. There should be regular awareness of the possible harm from exposure to THMs in drinking water from DFTMs. Even though the 3 types of THMs were detected less frequently, THMs in the WSPP and DFTMs should be monitored to ensure the safety of water consumers. Therefore, the monitoring and maintenance of DFTMs should be implemented correctly and applied to tap water<sup>33</sup>. A method should be developed for detecting THMs using a low-cost device that permits fast monitoring of concentrations without the need for complex analysis in laboratories<sup>34</sup> (Manlika and Phongsi, 2007). Lee notes that boiling water or exposing it to the sun by opening the lid of a container for 20-30 minutes until the water is odourless removes chlorine<sup>35</sup>.

## Conclusions

The result of this study found that the efficiency of pre-chlorination for removing number of each type of algae in raw water at the WSPP such as pre-chlorination, precipitation filtration system and post-chlorination

processing until acceptable level of the algae be reduced. Nevertheless twice chlorination treatment to reduced algae but seems to be increased impacted residual risk of THMs which less than upper limited threshold level founded.

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**Ethical Clearance:** Research does not involve human or animal subjects.

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# Development of Strategic Implementation Indicators for Nursing Organizations at Community Hospitals in Thailand

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## Abstract

**Background:** Strategy implementation is the most important stage of strategic management to achieve organizational goals. Top Nursing Management Team (TNMT) was clear strategic planning while the implementation stage of the strategy is still unclear, so they need the knowledge to assess the components and indicators of the strategy implementation stage.

**Aim:** To develop indicators of strategy implementation for nursing organization at community hospitals

**Method:** They study was descriptive quantitative research. The samples of this study were the 332 top nursing management team members from 26 community hospitals in Thailand. The concept of strategy implementation was based on Pearce and Robinson (2000) which consists of rationalization of strategy and institutionalization of strategy adopted from the Kobuti's strategy implementation questionnaire using the back-translation method with monolingual test with the following steps: 1) forward translation from the original English into Thai 2) review of the translated version by reviewers 3) backward translation from Thai into English 4) comparison of the original version and the back-translated version 5) content validity testing by five experts, in nursing management field, with a CVI at one 6) determining the internal consistency reliability with thirty TNMT members from community hospitals, with a Cronbach's Alpha Coefficient at 0.95, and 7) testing of the construct validity by using factor analysis to extract indicators from the strategy implementation then confirmation the indicators by using confirmatory factor analysis with 332 top nursing management team at community hospitals.

**Results:** The strategy implementation indicators of nursing service organizations at community hospitals have two components with 10 indicators: 1) operationalization of strategy (factor loading = 0.81) including development of specific functional tactic, determining policy to guide decisions, creating clear objective and allocation resource 2) institutionalization of strategy (factor loading = 0.87) including creating a culture relevant strategy, personnel arrangement with appropriate skill, demonstration leadership in driving the strategy, matrix system review, organizational restructuring relevant with strategy.

The development strategy implementation instrument was congruent with the empirical data (CMIN/df=1.32, RMR=.02, GFI=.98, AGFI=0.96, RMSEA=0.03, CFI=.99).

**Conclusion:** The development strategy implementation instrument can measure the strategy implementation of nursing organizations at community hospitals. It should be used to assess the efficiency of strategy implementation stage.

**Keywords:** Strategic implementation, Indicator, Nursing organization, Community hospitals

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## Introduction

In Thailand, the government intends to develop the bureaucratic system in accordance with the

Royal Decree on Criteria and Procedures for Good Governance, B.E. 2546 for the organization to be effective, being capabilities and being international standards achievement.<sup>1</sup> Strategic management is the administrative principle that gives the organization direction, being an effective guide line for strategic implementation.<sup>2,3</sup>

Strategy implementation is a critical key to transforming the strategic implementation into action.<sup>3</sup> From a literature review of the strategy implementation concept, Pearce and Robinson's strategy management concept explain strategy implementation by operationalization of strategy and institutionalization of strategy.<sup>2</sup> Top management team is an important role in driving the strategy into organizational practice transforming the strategy into action only ten percent of organization accomplished.<sup>3</sup>

The nursing organization has a strategic plan covering all four stages, namely strategy formulation strategic planning implementing the strategy and monitoring and evaluation.<sup>4</sup> In nursing organization of the community hospital, the nursing organization management committee play roles as a top management team. The TNMT have to management the strategies by co-formulating and co-planning a strategic hospital committee, selection the grand hospital strategies which were related to nursing organizational issues. After receiving the strategic plan, TNMT transferred a strategy plan by meeting and booklet distribution, then controlling and evaluation stages of strategy management by monitoring the operationalization of each unit in each trimester of the fiscal year, and evaluation of an action plan by the end of the fiscal year. As the strategy implementation measurement is a potential role to achieve the nursing organization goal, the top nursing management team should have tools to measure strategy implementation.

Presently, the strategic implementation indicators have not been studied in nursing organizations at community hospitals. From strategy management was not clear in the strategy implementation stage it was an incomplete process, only meeting and booklet distribution. To fill the gaps of knowledge of the strategic implementation studies in the field of nursing organization especially in the community-hospital level, the aim of this study to develop a tool that helps top nursing management team to assess the implementation of the strategies to nursing units in community hospitals.

## Method

The population used in this research is 2,158 the TNMT members in large-size community hospitals. Determining sample size by using the sample calculation from the formula of Krejcie and Morgan, determine the population representation at the 95% confidence level and the tolerance level 0.05% to get complete information.<sup>6</sup> The researchers then adjusted the size of the group according to the formula of Gupta and the faculty by calculating the dropout rate of ten percent.<sup>7</sup> The sample group in this study was 362 people with cluster and simple sampling.

**Indicator Development:** The researcher developed and tested the quality of strategic implementation indicators of nursing service organization based on concept's Pearce & Robinson.<sup>2</sup> Using Kobuthi's strategic implementation questionnaire which five type likert scale along with back-translation method with six steps as follows: 1) forward translation from English to Thai 2) review of the translated version by reviewer 3) backward translation from Thai to English. The researcher sent questionnaires to the experts who are not the same person as the translator in the first step and never seen the questionnaire original set 4) comparison of the original version and the back-translated version. At this stage, the researcher and advisor jointly verify the correctness of the language to consider appropriately for both language and culture and adjust questions to suit the context of a large community hospital upwards.<sup>8</sup>

5) Conducting content validity, this study had five experts considering the consistency between the question and the operational definition of variables. Content validity index (CVI) was using for consideration of overall content validity and index for index content validity (I-CVI) for scales equals one.<sup>9</sup> 6) The preliminary tryout of the items was conducted with 30 top nursing management team. Data were used to calculate the instrument's components reliability by using Cronbach's Alpha Coefficient was 0.95. Conducting statistical data analysis was performing explanatory factor analysis and confirmatory factor analysis.

**Statistics:** The data were analyzed using the following statistical analysis: 1) descriptive statistics were used to determine means and standard deviations, 2) exploratory factor analysis was used to organize components of strategic implementation, 3) confirmatory factor analysis was performed to test for the goodness of fit of the structural model of the factors, weights were

assigned to constructing the indicators and empirical data to determine the weights of the main variables used in constructing the indicators, and 4) Cronbach's Alpha Coefficient provided a measure of the internal consistency of the scale and describes the extent to which all the items in a test measure the same construct.

**Results**

Three hundred and thirty-two top nursing management member of nursing organization responded to answer the self-administered questionnaire (response

rate = 91.71%). Most of the participants were female (98%), a half was 50 years old and older (59%), and master's degree level was 27.4 percent. The study found that the three high-level of Mean of strategic implementation indicators for nursing organization were 1) nursing organization has policies that adequately guide decision making established programs and procedures of how things are done 2) all nursing units make their contribution to strategy implementation, and 3) all nursing units have short term objectives (mean= 3.91,3.86, 3.85) respectively (Table 1).

**Table 1: Means and standard deviations of strategic implementation indicators for nursing organizati**

No	Indicators	Mean	SD
1	Nursing service organization has policies that adequately guide decision making established programs and procedures of how things are done.	3.91	.63
2	All nursing units make their contribution to strategy Implementation.	3.86	.71
3	All nursing units have short term objectives.	3.85	.72
4	Strategy development is combined with resources allocation that adequately supports the activities.	3.78	.71
5	Strategy implementation uses a metric system that   includes regular reviews, financial and non-financial data.	3.58	.73
6	Able leadership with talent that drives initiative to implement strategy is demonstrated	3.75	.70
7	Staff with the right skills are deployed to implement high priority strategic initiatives	3.73	.71
8	A culture that is aligned with the strategy of the organization is in functional.	3.78	.65
9	We have in place an organizational structure that enables employees to effectively execute their strategic roles.	3.71	.69
10	The organization has aligned rewards and incentives with the achievements of individual and organizational objectives	3.51	.77

Data suitability was tested in line with the conditions of statistical data analysis. Factor analysis found significant Bartlett's Test of Sphericity (p-value < 0.01), the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .93 meaning the variables were related. The data had high suitability for analysis using factor analysis statistics.<sup>10</sup>

According to the exploratory factor analysis, the strategic implementation indicators of nursing service organization had ten indicators with two components. The components of strategic implementation consisted of: 1) six indicators in the institutionalization of strategy and 2) four indicators in operational of strategy. The percentage of total variance accounted for the factors could be explained at 72.19 percent (Table 2).

**Table 2: Eigenvalues, percentage of variance and number of indicators of each component of strategic implementation**

Component name	Eigen value	Percentage of variance	Percentage of cumulative	Number of indicators
1. Institutionalization of strategy	5.959	59.59	59.59	6
2. Operationalization of strategy	1.260	10.26	72.19	4

When considering the factor loading according to each component, it was found that operationalization of strategy consists of four variables with factor loading from .74 - .90 with a statistical significance of .01 for all of them. The variable with the highest factor loading was that all nursing units made their contribution to strategy

implementation. The institutionalization of strategy consisted of six variables with factor loading from .70 - .87 with a statistical significance of .01 for all of them. The variable with the highest factor loading was a culture that was aligned with the strategy of the organization was in functional. (Table 3)

**Table 3: Factor loadings of strategic implementation indicators for nursing organization.**

No	Indicators	Factor loading
<b>Operationalization of strategy</b>		<b>0.87</b>
1	All nursing units make their contribution to strategy Implementation.	.90
2	We have policies that adequately guide decision making established programs and procedures of how things are done.	.82
3	All nursing units have short term objectives.	.76
4	Strategy development is combined with resources allocation that adequately supports the activities.	.74
<b>Institutionalization of strategy</b>		<b>0.81</b>
5	A culture that is aligned with the strategy of the organization is in functional.	.87
6	Staff with the right skills are deployed to implement high priority strategic initiatives	.86
7	Able leadership with talent that drives initiative to implement strategy is demonstrated	.81
8	Strategy implementation uses a metric system that includes regular reviews, financial and non-financial data.	.77
9	We have in place an organizational structure that enable employees to effectively execute their strategic roles	.76
10	The organization has aligned rewards and incentives with the achievements of individual and organizational objectives	.70

Confirmatory factor analysis found the strategic implementation model to be consistent with the evidence-based data as a perfect fit by considering chi-square statistics equal at .097 CMIN/df= 1.36, RMR=.013, GFI= .98, AGFI = 0.96, RMSEA =0.03, CFI = .99. The results showed that the component of strategy operationalization was more relationship with the strategic implementation than the component of strategy institutionalization. (Table 4).

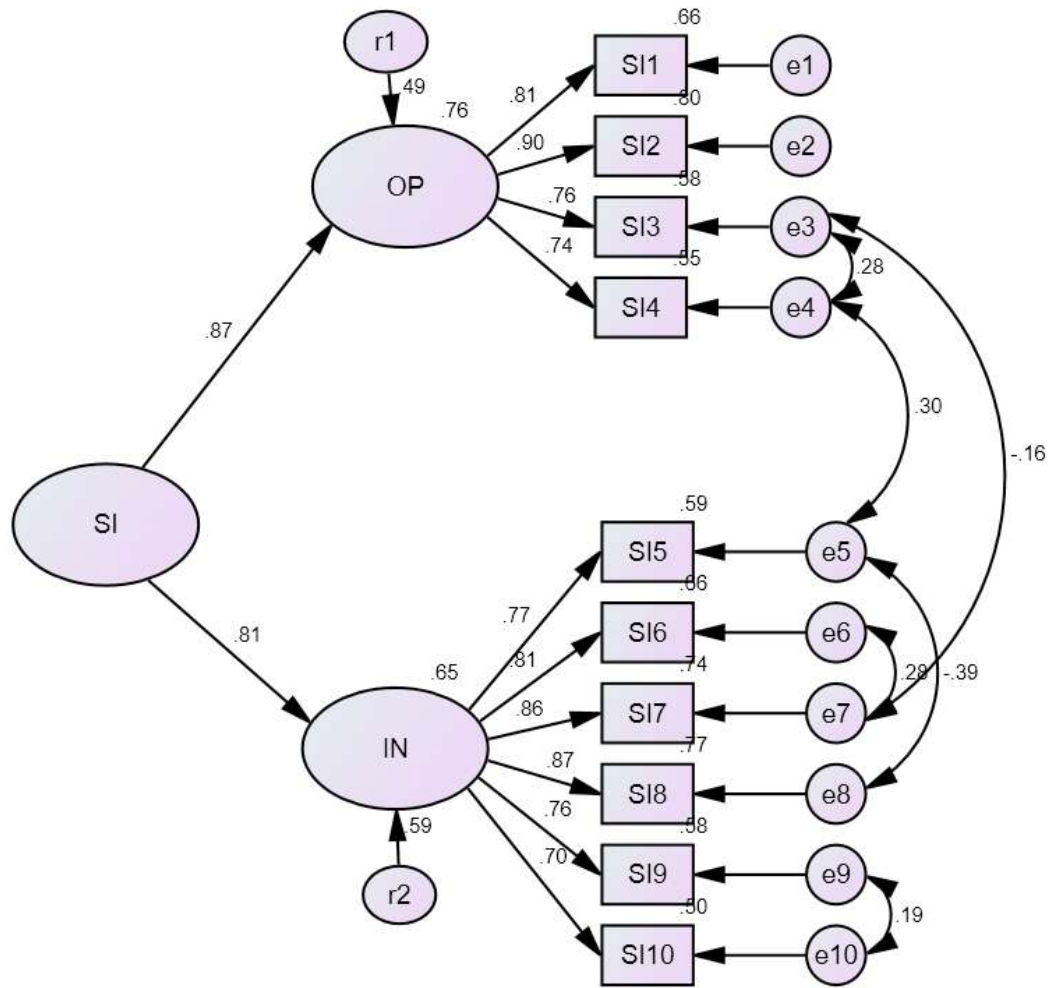
The data was tested by determining the internal consistency of ten strategic implementation indicators of nursing organization. Cronbach’s Alpha Coefficient for the entire set after construct validity analysis was at 0.93. Cronbach’s Alpha Coefficient in each component was at 0.88 – 0.91 and item analysis and inter-item

correlation had values of 0.44 – 0.77. Corrected item – total correlation was at 0.67 – 0.80.

**Table 4: Statistics from analysis of relationships between variables of strategic implementation component models of nursing service organization at community hospitals.**

Component	Component factor	Factor loading	R <sup>2</sup>
Operationalization of strategy	4	0.87	.76
Institutionalization of strategy	6	0.81	.65

CMIN/df= 1.36, RMR=.013, GFI= .98, AGFI = 0.96, RMSEA =0.03, CFI=.99.



**Figure 1: Secondary Confirmatory factor analysis model of strategic implementation of the nursing organization in community hospitals.**

### Discussion

This study found that the strategy implementation of nursing organizations in community hospitals had two components, namely operationalization of strategy and institutionalization of strategy. It was similar to the strategy implementation concept of Pearce & Robinson (2003), as well as the Najagi and Kombo's study<sup>11</sup>, which studied strategy implementation in commercial banks in Kenya. Like as Kobuti's study, which studied in firms listed on the Nairobi Securities Exchange of Kenya.<sup>12</sup> and similar to Simon and Ronoh's study, which studied strategy implementation in non-governmental organizations.<sup>13</sup>

Operationalization of strategy component of nursing organization had four indicators including: 1) all nursing

units make their contribution to strategy Implementation, 2) nursing organization policies that adequately guide decision making established programs and procedures of how things are done, 3) all nursing units have short term objectives and 4) strategy development is combined with resources allocation that adequately supports the activities. This component was different from Kobuti's study that operationalization of strategy consisted with five indicators which one more indicator was the strategy implementation uses a metric system that includes regular reviews, financial and non-financial data<sup>12</sup>. On the contrary, Simon and Ronoh's study the strategy operationalization had two indicators including allocation of resources, staff involvement and operating procedures.



From this study, institutionalization of strategy component had six indicators including: 1) a culture that is aligned with the strategy of the organization is in functional, 2) staff with the right skills are deployed to implement high priority strategic initiatives, 3) able leadership with talent that drives initiative to implement strategy is demonstrated, 4) strategy implementation uses a metric system that includes regular reviews, financial and non-financial data, 5) organizational structure that enable employees to effectively execute their strategic roles, and 6) the organization has aligned rewards and incentives with the achievements of individual and organizational objectives. Kobuti's study had only five indicators because one indicator was moved to the strategy operationalization component. In contrast, Simon and Ronoh's study had one more indicator of the strategy institutionalization component that was the indicator for communication and reward systems.

Strategic implementation indicator of nursing organization has an acceptable level of content trust and reliability. The results of the structural validity testing found that both components could explain the total variance of 72.19 percent. Operationalization and institutionalization of strategy enable to describe 76.00% and 65.00% respectively. Strategic implementation concept of Pearce and Robinson (2003) used in business organizations and Non-Governmental Organizations of Kenya and can be adapted for use in the context of nursing organizations community hospitals in Thailand.

### Conclusion

**Implementation:** Strategy implementation indicators of nursing organizations at the community hospitals in Thailand had structural accuracy and consistent with the strategic management concepts of Pearce and Robinson. Top nursing management team should focus on the order of factor loading of each element from the highest to the lowest, namely operationalization of strategy and institutionalization of strategy accordingly. This study reveals new knowledge of strategic implementation indicators for nursing organizations. Top nursing management team can be used to assess the implementation of the strategy. It also can be expanded research studied and implied these strategies for nursing organizations in other hospital types such as general hospitals or private hospitals.

**Source of Funding:** A part of the study was supported by Christian University of Thailand in 2019.

**Conflict of Interest:** The authors have no conflicts of interest.

**Ethical Clearance:** Ethical clearance was taken from the ethical committee of Christian University of Thailand (registration no. N.25/2561) on June 26, 2019. The protected samples were obtained as personal information and ethical concerns which included informed-consent and maintaining confidentiality. They had the right to cancel participation in the study at any time without any impact on participants.

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# Medication Safety Climate Perception among Registered Nurses in a University Hospital, Thailand

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## Abstract

**Background:** Medication safety climate perception among registered nurses is one important factor involved in patient safety from medical care activities, since nurses are in direct contact with patients at all steps during their stay in hospital.

**Objectives:** To assess level of medication safety climate perception and identify related factors among registered nurses in a university hospital.

**Methodology:** A descriptive study was conducted. Sample size was calculated as 706 samples. The questionnaire was composed of 3 parts 1) general information, 2) nursing drug administration perception and 3) medication safety climate questionnaire, for which the Cronbach's alpha is 0.89. Data were collected through an online questionnaire. Descriptive statistics, 95%CI, Chi-squared, independent sample t-test and multiple linear regression were applied for data analysis.

**Results:** The response rate was 95.32%. More than half of nurses had age in the range 23-36 years old. Almost half of sample had working experience of less than 10 years. The mean score of medication safety climate perception was 3.57 (SD 0.29) (95%CI: 3.54, 3.59). This study found factors related to medication safety climate perception as age group ( $\beta$  0.05 95%CI: 0.01, 0.09) and nursing drug administration perception ( $\beta$  0.32 95%CI: 0.28, 0.44).

**Conclusion:** This study provides an understanding of medication safety climate perception among nurses and to strengthening medication safety climate perception, the nursing drug administration activities are recommended. Also, young nurses are suggested as targets for an intervention group.

**Keywords:** Medication safety climate perception, Registered nurse.

## Introduction

The concept of "safety climate" was first used to improve safety in various high-risk sectors. It was shown that a high safety climate level in service units performing high-risk operations<sup>1</sup>, such as hospitals, led to adverse events to patients. The concept of safety climate is shared by all hospital staff, especially nurses, and their perceptions of the priority of safety at their unit and the organization at large, especially in situations

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where safety competes with other performance facets such as care medication administration and its quality.

The term 'safety climate' has been widely discussed in the literature in the area of patient safety, it has been used as a synonym for culture. Safety climate may be defined as the temporal indicator of the institution's state of safety culture, and it may be measured by individual perceptions of the organization's attitudes regarding safety culture<sup>2</sup>. The implementation of safety culture in health care institutions may have a direct association with the decrease in adverse events and mortality, resulting in improvements in the quality of health care<sup>3</sup>.

In the process of medication management and medication safety, nurses are one of the professionals who have direct contact with patients. The roles of clinical nurses in medication management are complex and multifaceted, including administering medication safely and efficiently, assessing and monitoring for desirable and unwanted effects, discharge planning, and providing patient education<sup>4</sup>. Thus, in terms of patient care among nursing professionals, care involves a potential for error and some degree of risk to patient safety is inescapable<sup>4</sup>.

A previous study demonstrated that the perception of nurses about patient safety decreases the medication error rate, and the highest level of perception is for the dimension of managing safety risks<sup>5</sup>. In addition, nurse perceptions of the safety climate in Australian acute hospitals found nurses held positive attitudes towards job satisfaction, followed by the teamwork climate which leads to developing a hospital safety intervention<sup>6</sup>. However, there have been few studies in medication safety climate perception among registered nurses in Thailand. Besides, the university hospital in Khon Kaen University provides tertiary care, in which the hospital policy focuses on a culture of safety towards patients, which highlights the importance of tailoring and targeting quality improvement initiatives at all level. The program initiative deploys medication error prevention intervention, such as the system of Computerized Physician Ordering Entry (CPOE), Dispensing Robot and an improved drug distribution system in wards. However, in the part of human error prevention, a medication safety climate perception assessment is needed, which will provide fruitful information about implemented strategies to improve patient safety, reducing medication error and developing the culture of safety in organizations.

**Objectives:** This study aims to assess the medication safety climate perception level and identify factors related among registered nurses in a university hospital.

## Materials and Method

A descriptive study was conducted among registered nurses who work full time at In Patients Department(IPD)of Srinagarind Hospital, Faculty of Medicine, Khon Kaen University. Inclusion criteria were being registered nurses who had worked for more than six months and exclusion criteria were being registered nurses with health or mental health problems causing inability to communicate with others.

Sample size was calculated using the Win Pepi Program. Based on simple random sampling technique, estimated for a mean of perceived safety climate from pilot study among 30 nurses of 3.8 (SD 0.7), confidence level 95%, acceptable difference 0.5% of the mean, thus, the sample size required was 706 samples.

The study tool was a questionnaire composed of 3 parts 1) general information, 2) nursing drug administration perception and 3) medication safety climate questionnaire. The part of nursing drug administration perception measured by Likert scale which consisted of 14 items adopted from the study of Armutlu M.et al<sup>7</sup>. A reliability test found Cronbach's alpha coefficient was 0.75 and content validity was reviewed and tested by three Thai experts. The highest mean score being 5. A high level of nursing drug administration perception refers to a mean score of 3.5 and over.

In the part of medication safety climate questionnaire was permitted by the study of Kantilal K.et al<sup>8</sup> which had been translated into Thai language by the back-translation technique<sup>9</sup>. This part consisted of 9 dimensions of medication safety climate:1) teamwork,2) safety climate, 3) job satisfaction, 4) stress recognition,5) perceptions of management, 6) working conditions,7) organizational learning-continuous learning, 8) feedback and communication about errors and 9) management support for medication safety. Before, conducted actual data collection, this part had been reliability and validity checked by three Thai experts and found Cronbach's alpha coefficient as 0.89. The scoring of this part was between 1-5 levels, high perception of medication safety climate was the score close to 5.

Data were collected through an online questionnaire

for 2 months, a link to the web survey was e-mailed to the registered nurse sample from the list compiled by the Srinagarind Hospital Risk Management Committee. E-mail reminders were sent two weeks after the invitation e-mail. The data was transferred into the SPSS of Khon Kaen University licensed for data analysis. The statistical used were frequency, percentage, mean, SD, 95% CI, Chi-squared, independent sample t-test and multiple linear regression analysis.

## Results

The response rate was 95.32%. The sample nurses were more females than males. More than half of nurses had age in the range 23-36 years old. The most of sample was single, the highest education level had completed bachelor degree in nursing, and almost half of them had working experience less than 10 years.(Table 1).

**Table 1: Characteristics of sample nurses (n=673)**

Variable	Number	Percentage
<b>Gender</b>		
Male	36	5.35
Female	637	94.65
Age (years old) Min. 23, Max. 58	Mean 33.42 (SD 8.44)	
<b>Age group</b>		
23-36 years old	493	73.25
36.1-52 years old	137	20.36
52.1 years old and over	43	6.39

Variable	Number	Percentage
<b>Marital status</b>		
Single	401	59.58
Married	252	37.45
Divorced/separated/widowed	20	2.97
<b>Education level</b>		
Bachelor	604	89.75
Master's degree and higher	69	10.25
<b>Working experience in hospital</b>		
Less than 1 year	16	2.38
1-5 years	205	30.46
>5-10 years	232	34.47
>10-15 years	77	11.44
>15-20 years	36	5.35
20 years and over	107	15.90

**Nursing Drug Administration Perception:** This study found the highest mean score of nursing drug administration perception were the role of nurses in drug administration must comply with professional and international standards and severe level of drug errors was reviewed by nursing team for continuous quality improvement. (Table 2)

**Table 2: Nursing drug administration perception by items (total score = 5)**

Item	Mean (SD)		95%CI
1. The important role of nurses in drug administration must comply with professional and international standards	4.64	0.52	4.59,4.67
2. Practice management of patients based on 5 R principles for drug admin. safety in ward	4.47	0.67	4.41,4.51
3. My hospital always allows patients / relatives to participate in the drug administration process to increase safety	4.07	0.82	4.00,4.13
4. Policy/manual/practice guidelines necessary to be up to date for modern drug administration	4.21	0.67	4.15,4.25
5. Good communication and co-operation on drug administration among nurses and other affiliated staff in hospital	4.22	0.57	4.17,4.26
6. Easily inquire about drug administration information when encountering problems	4.14	0.61	4.08,4.17
7. Regularly organizing activities to develop knowledge / potential in the safety of drug administration for the nursing team	4.25	0.56	4.20,4.28
8. Relevant suggestions on drug administration from the committee/auditor were reviewed to develop and improve for more drug safety quality	4.28	0.62	4.21,4.31
9. Difficult to speak up if you encounter a problem with drug administration errors	2.51	1.22	2.44,2.62
10. When reporting drug administration errors, reporters are often affected or blamed	2.70	1.20	2.63,2.81
11. Severe level of drug errors was always reviewed by nursing team for continuous quality improvement	4.52	0.60	4.46,4.55

Item	Mean (SD)		95%CI
12. Few drug administration errors due to a well-established drug errors prevention system in the hospital	4.20	0.63	4.14,4.24
13. The implementation of drug-related technology systems can help reduce drug administration errors	3.92	0.80	3.86,3.98
14. You are satisfied with the support of the nursing administrators in drug errors surveillance	4.06	0.66	4.00,4.10
Total	4.01	0.36	3.98,4.04

**Medication Safety Climate Perception:** This study found the highest mean score of medication safety climate perception were working conditions, organizational learning-continuous learning and feedback/communication about errors. (Table 3).

**Table 3: Distribution of medication safety climate perception by item**

Item	Mean (SD)		95%CI
1. Teamwork	3.85	0.35	3.82,3.88
2. Safety climate	3.93	0.36	3.90,3.96
3. Job satisfaction	4.05	0.61	4.00,4.09
4. Stress recognition	3.69	0.99	3.62,3.77
5. Perceptions of management	3.62	0.37	3.59,3.65
6. Working conditions	4.15	0.50	4.11,4.19
7. Organizational learning-continuous learning	4.37	0.52	4.33,4.41
8. Feedback/communication about errors	4.17	0.58	4.13,4.21
9. Management support for medicationsafety	3.90	0.50	3.86,3.94
Total mean score of medication safety climate perception	3.57	0.29	3.54,3.59

**Factors related to medication safety climate perception among registered nurses:** This study found that age group, working experience in hospital and nursing drug administration perception were significantly related to medication safety climate perception. (Table 4)

**Table 4: Factors related to medication safety climate perception among registered nurses**

Factor	Medication Safety Climate Perception			
	n	mean	SD	p-value
<b>Gender</b>				
Male	36	3.53	0.39	0.399
Female	637	3.58	0.29	
<b>Age group</b>				
23-36 years old	493	3.55	0.29	0.008*
36.1-52 years old	137	3.60	0.30	
52.1 years old and over	43	3.69	0.26	
<b>Marital status</b>				
Single	401	3.56	0.29	0.242
Married	252	3.58	0.29	
Divorced/separated/widowed	20	3.67	0.23	
<b>Education level</b>				
Bachelor	604	3.57	0.29	0.121
Master’s degree and higher	69	3.63	0.28	
<b>Working experience in hospital</b>				
1-10 years	221	3.56	0.29	0.027*

Factor	Medication Safety Climate Perception			
	n	mean	SD	p-value
>10-15 years	232	3.54	0.31	
15 and over	220	3.61	0.28	
<b>Nursing drug administration perception</b>				
Low level	52	3.24	0.30	<0.001*
High level	621	3.60	0.28	

When controlling other related factors, this study found age group and nursing drug administration perception statistically significant related to medication safety climate perception. (Table 5)

**Table 5: Multivariate analysis of factors related to medication safety climate perception**

Factors	Standardized coefficients (B)	95% Confidence interval for $\beta$		t	p-value
		Lower bound	Upper bound		
Age group	0.05	0.01	0.09	2.091	0.037*
Working experience in hospital	0.01	-0.03	0.04	0.126	0.900
Nursing drug administration perception	0.32	0.28	0.44	8.888	<0.001*
Constant	2.82				
Adjusted R-squared	0.11				
F	29.86				
P-value	<0.001				
n	673				

## Discussion

This study results confirmed by the study at Alexandria Main University Hospital<sup>10</sup> which found medication safety climate perception among nurses at a high level. However, the study found medication safety climate perception higher than the accredited hospitals in South Korea<sup>11</sup>. Due to the difference in a nurse sample age group, which is lower than 36 years old, and the hospital characteristics.

This study found medication safety climate perception among nurses at a high level, due to the responsibility of nurses for the safety of their patients, especially, the division of nursing strongly supported medication administration safety training programs and activities, such as, in-house training, communication about guiding principles for medication safety and the medication safety monthly monitoring by senior and head nurse. In addition, the university hospital policy was strongly support medication safety by set the strategies to encourage and promote practices such as a quality and safety training program for nurses, medication safety training on technology, reporting system for medication errors, communication and data feedback to team. Moreover, the root cause analysis was always reviewed

in harm to severe level cases of medication errors by the nurses' team and Risk Management Committee, doctors, pharmacists for continuous quality improvement.

In the part of age group, this study found age group related to nurses' perceptions of the medication safety climate. This study confirmed the Fasolino<sup>12</sup>, which revealed that age was related to the medication error among nurses, in particular the medication error incidence was higher among the young nurse group. Moreover, the age of nurses and their working experience was significantly associated with medication administration errors.

Medication administration is the most important, complex and the most vital process of nursing care in the medication management system, which requires the right knowledge and function of a competent nurse. Medication administration is defined as preparing, giving and evaluating the effectiveness of prescription and nonprescription medications<sup>13</sup>. This study found the highest mean score was nurses perceived their role under professional and international standards and severe level of drug error was always reviewed by the nursing team.

Due to nursing being a professional career which

responsibility to prevent, evaluate and report side effects or adverse drug events. Nurses also play a major role in reducing medication errors, and frequently administer medications in patients' healthcare settings. Therefore, the nurses' role is the last line of defense to safeguard against medication errors, as administration is the last part of the medication process<sup>4</sup>. Consequently, professional and international standards are always recognized by nurses for medication administration safety, which leads to a high level of perception.

Even though, the measurement of medication safety climate perception is a subjective evaluation; it relies on the nurses' perception, mood and attitude which all change over time. However, the strength of this study was a high response rate, which indicated an answer to the research question. The implications of this study will be used to improve the medication safety climate in Srinagarind Hospital and other similar hospital contexts.

### Conclusion

This study found the medication safety climate perception among nurses at a high level. When controlling others related factor, multiple linear regression revealed significant factor were nurse age group and nursing drug administration perception. Intervention need to be considered to modify these significant factors and intervention should be provided to the young age nurses.

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# Characteristics of Outpatient Pre Diabetes Dr. Dody Sarjoto Hospital, Maros Regency, South Sulawesi, Indonesia

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## Abstract

**Introduction:** Prediabetes is a condition that increases blood glucose levels but does not meet the criteria for Diabetes Mellitus. The International Diabetes Federation (IDF) is estimated that 6.7% of the adult population with prediabetes in the world and in 2040 reached 7.8% of the population. The purpose of this study was to determine the characteristics of outpatient prediabetes patients in the Internal Medicine polyclinic Dr.Dody Sarjoto Hospital 2018-2019.

**Material and Method:** Analytical research design with a cross sectional approach, the study population of outpatients in the polyclinic in Dr. Dody Sarjoto Hospital, 143 sample numbers according to the specified variables, using secondary data, were analyzed using Chi Square and Fisher's Exact.

**Findings and Discussion:** The highest proportion of prediabetes to age 40-50 years (58.7%), female sex (73.4%), general high school education (58.7%), with a family history of DM (81.1%), the highest prediabetes is prediabetes combination (41.3%).

**Conclusion:** Characteristics of outpatient prediabetes in the clinic Dr.Dody Sarjoto Hospital The highest frequency of prediabetes based on age is 40-50 years as many as 84 (3.5%), the highest occupation in respondents who do not work is 81 people (56.6%), the highest level of education at school Intermediate General is 84 (58.7%) and based on family history of DM the highest frequency is 116 people (81.1%).

**Keywords:** *Fasting glucose, Prediabetes, Tolerance*

## Introduction

Pre diabetes is a world health problem that must be a concern for all of us. Basically pre diabetes has a higher prevalence than the incidence of diabetes itself, according

to the International Diabetes Federation it is estimated that 6.7% of the adult population with prediabetes or equivalent to 318 million population under 50 years, one third between the ages of 20 and 39 years. It is estimated that up to 2040, 7.8% of the adult population will suffer from pre diabetes, equivalent to 480 million adult populations of the world population<sup>1</sup>. while in Indonesia it is predicted that 10% of the population in Indonesia (33 provinces) will experience pre diabetes<sup>2</sup>.

The term prediabetes describes the condition of an increase in elevated blood sugar levels but does not

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yet meet the diagnostic criteria for Diabetes Mellitus. Prediabetes is if found fasting blood glucose levels between 100-125 mg / dl this is also called interference of fasting glucose and or an increase in blood sugar levels after 2 hours of loading (75 mg glucose) between 140-199 mg/dl or also called impaired glucose tolerance (IGT) or a combination of both, namely an increase in fasting blood glucose levels and blood sugar levels 2 hours after loading<sup>3</sup>. According to several studies that prediabetes can develop type 2 diabetes mellitus between 3-10 years<sup>4</sup>.

Prediabetes in the course of the disease has three possibilities namely 1/3 cases will become type 2 DM, the next 1/3 will remain prediabetes, and the remaining 1/3 will be able to return to normoglycemia. Prediabetes has a 2-10-fold risk factor for Diabetes Mellitus (DM) so early identification is needed in the prevention of the incidence of type 2 DM and its complications<sup>5</sup>. There are 2 risk factors in outline in prediabetes namely risk factors that can be changed and cannot be changed. Risk factors that can be changed for example obesity, physical activity, nutrition and irreversible risk factors such as genetic, age, gestational diabetes, these risk factors will increase complications such as atherosclerosis, heart disease and other macrovascular diseases<sup>6</sup>. Prediabetes with high blood fat and insulin resistance can increase metabolic syndrome. thereby increasing the risk of heart disease and premature mortality<sup>7</sup>.

The purpose of this study was to determine the characteristics of Prediabetes sufferers who are outpatient in the Polyclinic of the disease in the hospital Dr. Dody Sarjoto, Maros Regency.

**Material and Method**

The research design was cross sectional approach, the type of research was descriptive analytic to know the description of prediabetes characteristics from age, sex, education, occupation, family history of diabetes, in Dr. Dody Sarjoto, Maros, South Sulawesi hospital patients.

Sampling with Purposive Population Sampling method, the study sample is all outpatients who seek treatment at the disease clinic in the hospital Dr. Dody Sarjoto starting in April 2018-April 2019 as many as 2,150 patients, after the inclusion and exclusion criteria, the total sample of 143 people data collected from secondary data obtained from the medical record book of Dr. Dody Sarjoto hospital which is then selected based on inclusion and exclusion criteria.

The inclusion criteria are: male and female aged between 18-70 years, fasting blood glucose levels 100-125 mg/dl and blood glucose levels 2 hours after loading (postprandial) values 140-199 mg/dl. Exclusion criteria are: DM sufferers, Severely ill, currently pregnant. Data collected were processed using a computer using the SPSS program, presented in the form of narratives and tables, analyzed using the chi-square test and Fisher’s test.

**Findings and Discussion**

Based on table 1 shows that the highest age of prediabetes at the age between 40-50 years is as many as 84 people (3.5%). the lowest is age <28 years, which is as many as 5 people (3.5%). The highest percentage of prediabetes in patients who did not work was 81 people (56.6%) and at the highest level of prediabetes education in high school education and the lowest in junior high school education, a history of diabetes milletus DM showed the highest percentage of 116 people (81,1%), Prediabetes is a condition where blood sugar levels rise above normal but have not entered criteria as Diabetes Mellitus, in the table above (table 1) Prediabetes increases in old adulthood, 40-50 years, this high prevalence because at that age has occurred the aging process (aging) causes the production of enzymes that bind insulin begin to be disrupted and there is a change in cell permeability and the response of the cell nucleus to the hormone insulin this condition allows for an increase in blood glucose levels / hyperglycemia<sup>8</sup>. In this study the frequency of prediabetes increased in women this is because women generally have less muscle mass than men so it is easy to experience insulin resistance in the muscles both moderate and severe<sup>9</sup>.

**Table 1: Frequency distribution of characteristics based on Age, Gender, Education Family history of DM in prediabetes patients (n = 143)**

Characteristics of respondents	Frequency	Percentage (%)
<b>Age</b>		
<28 years	5	3.5
29 years to 39 years	13	9.1
40 years to 50 years	84	58.7
> 51 years old	41	28.7
<b>Gender</b>		
Male	38	26.6
Female	105	73.4
<b>Occupation</b>		

Work	62	43.4
Not Working	81	56.6
<b>Qualification</b>		
Diploma 1 - Diploma 3	21	14.7
Bachelor degree - Doctor	28	19.6
Junior high school	10	7.0
Senior High School	84	58.7
<b>Family History DM</b>		
Yes	116	81.1
No	27	18.9

The frequency of prediabetes increases in patients who do not have a job (permanent work), this happens because they do not do routine physical activities along with work schedules, so they sit more at home and watch television (TV, Youtube, social media, etc.) this behavior increase the risk of prediabetes because it is usually accompanied by food. at the high frequency level of education in high school graduates, this is presumably because in Indonesia the largest graduates are public high schools so that many respondents are in such education. History of DM in parents has a risk of prediabetes in their children, this is in accordance with the table above, respondents who have a family history of DM, the frequency is 116 people (81.1%), this is consistent with the multicenter study by Wagner in Germany showed that family history of DM was significantly associated with the risk of developing prediabetes (OR = 1.4 with 95% CI = 1.27: 1.54, p <0.001). Family history of DM has an increased risk for suffering from prediabetes around 40%<sup>10</sup>.

Type of prediabetes	Frequency	Percentage(%)
Combined fasting glucose disorders and impaired glucose tolerance	59	41,3
Glucose disorders Fasting	57	39,9
Impaired glucose tolerance	27	18,9
Total Responden	143	100,0

Table 2 shows the highest frequency in mixed prediabetes namely fasting glucose disorders and glucose tolerance disorders of 59 people (41.3%) and the lowest in the frequency of glucose tolerance disorders of 27 people (18.9%). in mixed prediabetes, there is a combination of physiological disorders in both peripheral tissues and major metabolic organs such as the liver so that micro / macrovascular complications following dyslipidemia can be the result of this condition. the incidence of prediabetes both is

increasing throughout the world not least in developed countries, especially in Indonesia there has been an almost threefold increase in prediabetes from about 10% in 2007 for urban populations 20 to 29.9% in the same population in 2013<sup>11</sup>, It is suspected that the occurrence of mixed prediabetes due to lifestyle changes due to the influence of urbanization, this is certainly a warning of the dangers of predibetes which are risk factors for the onset of diabetes mellitus in the future.

### Conclusions

The highest frequency of prediabetes based on age is 40-50 years as many as 84 (3.5%), based on the highest occupation of respondents who are not working by 81 people (56.6%), based on the highest level of education in high schools by 84 (58.7%) and based on family history of diabetes mellitus DM the highest frequency of 116 people (81.1%).

**Conflict of Interest;** There is no conflict of interest to be declared.

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**Ethical Clearance:** This study was approved by the head of the hospital Dr. Dody Sarjoto Maros Regency, South Sulawesi.

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# Factors Affecting Satisfaction and Necessity of Suicide Prevention Program

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## Abstract

**Purpose:** The purpose of this study is to supplement the overall system of the projects and to seek improvement plans by analyzing factors affecting the satisfaction and necessity of the suicide prevention project operated in district C of Korea.

**Method:** The subjects recruited 15 cities and counties suicide prevention projects operators in district C, and a total of 113 people's data were collected and 112 data were analyzed excluding one data with insufficient responses. The data were analyzed with descriptive statistics, multiple regression analysis, and a principal components analysis by a varimax rotation.

**Results:** Satisfaction with suicide prevention projects was higher when goal achievement was higher ( $\beta=.355$ ,  $p<.001$ ), better project operation ( $\beta=.311$ ,  $p<.001$ ), and better partnership ( $\beta=.306$ ,  $p<.001$ ), and these three factors are explaining 77% of satisfaction. The necessity of suicide prevention project was higher when the goal achievement was higher ( $\beta=.518$ ,  $p<.001$ ), and when the partnership was better ( $\beta=.514$ ,  $p<.001$ ), the administrative support was less ( $\beta=-.145$ ,  $p=.042$ ), and these three factors are explaining 74% of the necessity.

**Conclusion:** Through this study, it was found that set realistic project goals and systematic project operation and communication and cooperation among members of the region to achieve it was important to enhance the satisfaction of suicide prevention projects.

**Keywords:** *Suicide prevention, satisfaction, necessity*

## Introduction

The suicide rate in Korea was 24.3 per 100,000 people as of 2017,<sup>1</sup> with an average of 34.1 people committing suicide per day.<sup>2</sup> It ranks second behind Lithuania in suicide rates in OECD countries, more than twice higher than 11.58 out of 100,000 people which is average in 33 OECD countries.<sup>3</sup> The suicide rate in Korea's district C was 31.7 per 100,000 people in 2017, It is the area with a high suicide rate compared to other regions, even

it is the number one suicide rate among the regions in Korea as well.<sup>1</sup> Especially the district C's aging index is 119.6 and an aging population ratio of 17.15,<sup>4</sup> which has many elderly populations and a high elderly suicide rate. District C's higher the age-standardized suicide rate is 26.2,<sup>5</sup> higher than the age-standardized suicide rate of 23.2 for the district D,<sup>5</sup> which is similar to district C's the aging index (116.1), and the aging population ratio (15.83).<sup>4</sup>

Korea established 'comprehensive mental health measures' in 2016 and set a policy goal of 'safe social realization without suicide' in 2018,<sup>6</sup> and the local autonomous entity is also proceeding various suicide prevention projects with a focus on the community.<sup>2</sup> In the district C, since the pilot project was carried out in 2011 as a rural type suicide prevention project for

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3 years, and since 2015, it has expanded to the entire district C and has been promoting suicide prevention projects. Suicide prevention projects are needed to be operated systematically and efficiently by kept up with these suicide prevention policies of the government or the region. However, analysis has not been made on the contents and satisfaction of the operated project to date. For the successful operation of the project and expansion of the project in the future, systematic supplementation is needed through structural analysis such as the difficulties and requirements of the project operation appreciated by the project operators. Therefore, this study was conducted to identify factors of impact on the satisfaction and necessity of suicide prevention projects operating in district C to find ways to improve them so that tangible results of suicide prevention projects can be derived in the future.

## Method

**Subjects:** This study was convenience sampling targeted to experts who were operating suicide prevention projects in 15 cities and counties in district C, fully explaining the purpose of the research and subjected who agree to participate in the research in the written consent. The number of samples, when the significance level .05, power 90%, average level of effect size .15, and input variable were 4 in regression analysis using G\*Power 3.0 program, was 108 appropriate number of subjects. The questionnaire was distributed to that human subjects and 113 were retrieved. Among them, 112 questionnaires were included in the final analysis except for one with an insufficient answer.

**Instruments:** The research tool was developed questionnaire items for each area by the researcher based on the literature review and the meeting with the currently proceeding suicide prevention project working group as there was no existing developed tool. To improve the content validity of the questionnaire, the researcher modified some questionnaire items through an advisory meeting with two mental health professionals with more than 15 years of experience in the mental health center and one mental health professional with more than five years of experience and developed and used them as the final question.

The satisfaction and necessity of the project were measured on a five-point scale. The satisfaction has consisted of five items and the necessity has consisted of four items. The project promotion process was a

total of nine questionnaire items and classified into two factors based on Eigen value 1 as a result of a principal component analysis by varimax rotation in order to verify its construct validity. The first factor was named 'Administrative support' as four items, and the second was named 'Partnership' as five items. These two factors are explaining 78.18% of the project promotion process. The reliability of the internal consistency of the project promotion process tool was 'Administrative support' Cronbach's  $\alpha=.92$ , 'Partnership' Cronbach's  $\alpha=.91$ , and overall, Cronbach's  $\alpha=.94$ .

The result of factor analysis in the eight items related to Post-project outcome, six items out of a total of eight items were classified as Eigen value 5.72 as the first factor. This first factor named 'Goal attainment'. Two items were Eigen value 0.72, and classified as the second factor. The Second factor named 'Project operation'. These two factors are explaining 80.53% of the variate of post-project outcomes. The reliability of the internal consistency of the post-project outcomes tool was the 'Goal attainment' factor Cronbach's  $\alpha=.95$ , the 'Project operation' Cronbach's  $\alpha=.74$ , overall items Cronbach's  $\alpha=.94$ .

**Data Collection:** Data collection of this study was conducted for about two months from January 2019 to February 2019. This survey was conducted on suicide prevention project operators in 16 mental health centers in 15 cities and counties in district C. The purpose and intention of this study were explained, and an online questionnaire or self-reporting questionnaire was provided to those who voluntarily agreed to participate in the study with written consent and let completed it themselves. Subsequently, 113 data were collected, and 112 data were used for data analysis, except for one copy with an insufficient answer.

**Data Analysis:** The collected data were processed computerized statistics by using SPSS/WIN 19.0 program. Descriptive statistics were obtained on the general characteristics. Factor analysis was conducted as a principal component analysis by varimax rotation on the survey tools of the study subjects. Factors that affect the satisfaction and necessity of suicide prevention projects were analyzed through stepwise multiple regression analysis.

## Results

**General Characteristics of Subjects:** The general characteristics of subjects who responded to this suicide

prevention operation are as follows in (Table 1). In gender, Women were 94.5%, in age, 50~59 were 64.5%, in the workplace, health care clinics were 71.8%, and in the experience, over 20years were 57.3% that show the largest number. The region where the suicide occurred after the project operation was 11.3 % of the respondents.

**Table 1: General characteristics of subjects N=112**

category	subcategory	n	%
sex	male	6	5.5
	female	103	94.5
age	20-29	3	2.7
	30-39	24	21.8
	40-49	11	10.0
	50-59	71	64.5
	60-69	1	.9
type of work place	community public health center	4	3.6
	branch office of the community health center	22	20.0
	community mental health center	5	4.6
	health care clinic	79	71.8
work period (year)	<5	27	24.5
	5≤□<10	6	5.5
	10≤□<15	7	6.4
	15≤□<20	7	6.4
	20≤	63	57.3
whether or not there have been suicides since the operating of the program	no	94	88.7
	yes	12	11.3

**Satisfaction and necessity of the project:** The satisfaction of the suicide prevention project was an overall average of  $3.57 \pm .77$ , among them, the highest with project promotion process of  $3.69 \pm .86$ , and the post-project outcome of  $3.69 \pm .86$ , and the lowest with  $3.15 \pm .95$  for the mentoring project. The necessity of suicide prevention projects was an overall average of  $3.75 \pm .91$ , among them, the highest with the program necessity of  $3.85 \pm .96$ , and the lowest with overall project necessity of  $3.65 \pm 1.09$  (Table 2).

**Table 2: Satisfaction and necessity of the project**

Category		Mean	SD	M±SD
Satisfaction	Overall project satisfaction	3.63	1.00	3.57±.77
	Promotion process satisfaction	3.69	.86	
	Project contents satisfaction	3.72	.89	
	Mentoring project satisfaction	3.15	.95	
	Post-project outcome satisfaction	3.69	.86	
Necessity	Overall project necessity	3.65	1.09	3.75±.91
	Program necessity	3.85	.96	
	Resident's position program necessity	3.79	.96	
	Program continuity necessity	3.72	.98	

**The project promotion process and the post-project outcome:** In the process of project promotion, 'partnership' was the higher satisfaction than 'administrative support' among the two factors. In the "administrative support" factor, the satisfaction of "administrative support and cooperation" was the highest at  $3.51 \pm .99$ , while that of "resource support" was the lowest at  $3.27 \pm 1.05$ . The 'partnership' had the highest 'resident collaboration' with  $3.71 \pm .91$ , and 'citizens participatory excellence' was the lowest with  $3.42 \pm 1.02$  (Table 3).

The ‘goal attainment’ part of the post-project outcome was 3.64±.75 on the overall average, and the satisfaction of the part that contributed to ‘improving happiness and decreasing depression after the project’ was the highest at 3.82±.89, and the lowest part of the satisfaction was ‘overall satisfaction judged by experts’ at 3.40±.86. The overall average of ‘project operation’

was 3.49±.85 and the highest ‘appropriateness of budget execution’ was 3.62±.92 among them. The overall average of ‘project operation’ was 3.49±.85 and the highest ‘appropriateness of budget execution’ was 3.62±0.92 among them. The ‘goal attainment’ factor was 3.64±0.75, which was higher than the ‘appropriateness of budget execution’ factor of 3.49±0.85 (Table 3).

**Table 3: The satisfaction of project promotion progress and post-project outcome.**

Category	Factor	Content	Mean	SD	Mean	SD
Project promotion process	Administrative support	Administrative support and cooperation	3.51	.99	3.35	.91
		Budgetary Support	3.28	1.06		
		Resource support	3.27	1.05		
		Process of converging the project discussion	3.37	.98		
	Partnership	Resident collaboration relationship	3.71	.91	3.56	.82
		Administrative-Residents-Experts Cooperation	3.56	.94		
		Program configuration plan	3.59	.99		
		Human resources recruitment	3.56	.96		
		Citizens participatory excellence	3.42	1.02		
Post-project outcome	Goal attainment	Overall goal attainment judged by experts	3.40	.86	3.64	.75
		Change in the perception of suicide prevention	3.58	.83		
		Contribution to Improving happiness and decreasing depression	3.82	.89		
		Improve community awareness or relationships	3.75	.85		
		Increasing interest in improving one’s mental health	3.78	.82		
		Increasing interest in the perception of suicide crisis on others	3.57	.82		
	Project operation	Appropriateness of budget execution	3.62	.92	3.49	.85
		Efficiency of project operation	3.45	.97		

**Project satisfaction and necessity impact**

**Factors:** To identify factors affecting the satisfaction and necessity with the suicide prevention project in this study, the main predictive variables of this study, administration, partnership, goal attainment, and project operation were used as independent variables and stepwise multiple regression was conducted (Table 4). As a result of testing the assumptions of the regression model, the homoscedasticity was found and the Durbin-Watson statistic for the verification of the independence of the residuals was 2.06-2.09, which satisfied the assumption of independence. Also, the normality was verified by showing the normal distribution as a result of examining the P-P plot for the normality test of the error terms. The results of confirming the multicollinearity

between the independent variables showed that the variance inflation factor (VIF) was between 2.520 and 2.662 in satisfaction, 2.093-2.990 in necessity so there was no multicollinearity. Therefore, it is believed that this research model has satisfied all assumptions for regression analysis.

The factors affecting the satisfaction of the project were the goal attainment ( $\beta=.355, p<.001$ ), project operation ( $\beta=.311, p<.001$ ), partnership ( $\beta=.306, p<.001$ ), and the most influential variable was the goal attainment of the post-project outcome parts. In other words, the higher the goal attainment and the better the project operation and partnership, the satisfaction with the suicide prevention project has been shown to be



higher. This is explaining 77.0 % of satisfaction with suicide prevention project with the three factors.

**Table 4: Factors affecting satisfaction of suicide prevention project**

Variables	B	$\beta$	t	p
constant	.237		1.311	.193
goal attainment	.365	.355	4.893	<.001
project operation	.281	.311	4.112	<.001
partnership	.288	.306	4.097	<.001
F=123.73, p<.001, Adj R <sup>2</sup> =.770				

The factors affecting the necessity of suicide prevention projects were the goal attainment ( $\beta$ =.518, p=<.001), partnership ( $\beta$ =.514, p=<.001), administrative ( $\beta$ =-.145, p=.042), and the most influential variable was the goal attainment among the post-project outcomes. So, the necessity of suicide prevention project was shown as high when the higher the goal, the better the partnership, and the less administrative support. This is explaining 74.0 percent of necessity with suicide prevention project with the three factors(Table 5).

**Table 5: Factors affecting necessity of suicide prevention project.**

Variables	B	$\beta$	t	p
constant	-.097		-.427	.263
goal attainment	.629	.518	7.349	<.001
partnership	.571	.514	6.108	<.001
administrative	-.144	-.145	-2.056	.042
F=105.09, p<.001, Adj R <sup>2</sup> =.740				

### Discussion

This study attempted to present data on the improvement direction of the ‘suicide prevention project’ by analyzing factors that affect the satisfaction and necessity of suicide prevention projects conducted in district C. The study found that project operators perceived the need for suicide prevention projects higher than satisfaction. The part with the highest satisfaction among the project satisfactions was about the ‘project contents’, but the part with the lowest satisfaction was the ‘mentoring project’, which is because the mentoring project is a way for the general public, not experts, to be mentors and provide one-on-one management of suicide risk groups, so it is believed that the project operators are under pressure to have to monitor several mentors and manage not only the mentor’s education but also the response to mentees. In the necessity part, the ‘necessity

of program’ was the highest at 3.85, so it is recognized that the program operated with the village unit needs to be operated continuously. On the other hand, there are various types of projects that are currently operating due to the lowest ‘need for the overall project’, so it is necessary to strengthen only essential project parts and exclude the area where the burden of other work is increased or supplement it.

The project promotion process shows that ‘administrative support’ is lower than ‘partnership’, so it is necessary to present a common resource that can be used as a regional unit so that the limitations of resource utilization in the region can be supplemented and to have a system so that operators can utilize it only. The cost analysis of the budget necessary for the project operation should be supported for the appropriate budget is allocated and performance is shown. Also, the reason why citizens’ participatory excellence of the ‘partnership’ factor has low is that the cooperation and communication of the residents, the rationality of communication and etc may have affected the process<sup>7</sup>so when promoting the project, it is necessary to encourage participation and come up with collaborative measures through meetings and discussions among various officials and residents.

The highest satisfaction among the results after the project can be interpreted as reaching some of the expected effects of the suicide prevention project due to ‘improving happiness and decreasing depression after the project’. But the part of ‘increasing interest in the perception of suicide crisis on others’, which is the lowest satisfaction relatively, is related to the goal in mentoring project or gatekeeper training project, so it is thought that it will need to improve awareness and publicize related to the interest in residents in order to achieve outcome of this part. As the satisfaction with ‘efficiency in project operation’ is the lowest, measures should be taken to complement the autonomy of budget execution and to increase efficiency in project operation.

The common impact factor on the satisfaction and necessity of the suicide prevention project is goal attainment and partnership, so the appropriate project goal setting before the project and the business contents should be promoted accordingly. Also, it shows the importance of communication and collaboration among the members of the community. Other factors that affect satisfaction are project operations, requiring supplementation to ensure that the budget is properly invested and operated. In necessity, the administrative

shortage has emerged as the major factor, so the allocation of resources to underprivileged areas is necessary. It is expected that it can complement the systematic composition and operation of suicide prevention projects in district C through this study.

### Conclusions

As a result, it was found that setting realistic project goals and systematic project operation and communication and cooperation among members of the region to achieve it was important to enhance the satisfaction of suicide prevention projects.

**Ethical Clearance:** Not Required

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Effect of an Educational Program on Knowledge and Practices of Alzheimer Patient's Caregivers

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## Abstract

**Background:** Alzheimer disease is a condition that causes abnormal changes in the brain, disturbing memory, and other mental abilities. Currently, over 50 million people worldwide live with Alzheimer disease, which is the most common form of dementia and the fifth leading cause of death.

**Objective:** The purpose of the current study is to assess the effect of an educational program on knowledge and practices of Alzheimer patient's caregivers.

**Design:** A quasi-experimental one-group pretest-posttest with three months follow-up design was used.

**Setting:** the study was conducted in three elderly nursing homes in Amman, Jordan.

**Sample:** a purposive sample of 50 caregivers from the selected elderly nursing homes were included.

**Results:** Alzheimer patient's care givers showed a significant gain in knowledge and improved practice after program implementation with highly statistically significant differences between pre, post, and three months at p-value <0.01.

**Conclusions:** Findings demonstrated that Alzheimer caregivers' education program can effectively provide knowledge and improve practice among caregivers.

**Recommendation:** Conduct future studies to determine the best method of education and training for Alzheimer patient's caregivers.

**Keywords:** *Alzheimer disease, Alzheimer caregivers, Educational Program. Alzheimer caregivers' knowledge, Alzheimer caregivers' practice*

## Introduction

Alzheimer disease (AD) and other dementias are a global public health concern. Currently, over 50 million people worldwide live with AD, which is the most common form of dementia, and the fifth leading

cause of death.<sup>1</sup> AD is a condition that causes abnormal changes in the brain, disturbing memory, and other mental abilities. The standard first symptom of AD is the loss of memory; as the disease progresses, the loss of reasoning, language, decision-making ability, and other critical skills make crossing day living incredible without help from others.<sup>2</sup>

In the Arab region, the percentage of older adults (60 years or more) is projected to climb to 19 % in 2050 compared to 7 % in 2010.<sup>1</sup> The number of older adults is projected to increase from 22 million in 2010 to 103 million by 2050 in Arab countries.<sup>3</sup> Recently, the number

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of Alzheimer patients in the Arab area is increasing due to increased longevity and improvement in the health care system. Nevertheless, the region needs to conduct the policies and educational programs to promote caregivers practices in nursing homes and community, as well as increase the level of awareness about AD.<sup>3</sup>

Caring with AD patients can be demanding, because it is a progressive disease, and caregivers must accept additional responsibilities to provide care, with limited or no training. Alzheimer Association(2017)reported that everyday caregiving tasks include instrumental activities of daily living, such as household tasks, finances, and medication management, in addition to basic activities of daily living, such as bathing, grooming, dressing, Toileting and eating. Moreover, inadequate education and challenging work environments contributed to higher turnover rates. Alzheimer Disease facts and figures(2018)reported that training programs to improve the quality of Alzheimer care in nursing homes and hospitals have positive benefits and recommended that the content of educational programs should focus more on knowledge and skills related to caring for individuals with Alzheimer and other dementias.

In Jordan, according to the Department of Statistics (2017), the percentage of population Age 65+ years is 3.7%. Furthermore, the percentage of older adults (60+) will be increasing over the coming years to a projected rate of 8.6% by the end of 2030 and 15.8% by the end of 2050.<sup>7</sup> Although the number of elderlies is increasing in Jordan, there is no precise estimate of AD, none of the health authorities release community figures on the numbers of people with AD.<sup>1</sup> Nevertheless, according to the report of the National Centre for Human Rights in Jordan (2017), there are no specific qualifications of caregivers, and most of them do not have any qualifications to work in the elderly homes. Hence, the role of a community health nurse is essential in assisting the caregivers of Alzheimer patients in providing proper care for these patients and maintain the Alzheimer patients independent in everyday life as possible.

**Aim of the Study:** the current study aims to assess the effect of an educational program on knowledge and practices of Alzheimer patient's caregivers.

**Research Hypothesis:** Caregivers' knowledge will be increased, and reported practices will be improved after the implementation of the educational program.

## Material and Method

**Design:** A quasi-experimental one-group pretest-posttest with three months follow-up design was used

**Setting:** This study was conducted in three elderly homes in Amman, Jordan. These homes were selected randomly.

**Sampling:** A purposive sample of 50 caregivers from elderly homes who fulfilled the inclusion criteria were included in the study. Inclusion criteria required participants to be working for at least 8 hours per day, five days per week, with at least three months' experience in their job. The data was collected within five months, from January 2019 to May 2019.

**Tools and Data Collection:** Data of this study was collected through Alzheimer Caregivers' knowledge and reported practices questionnaire, which was developed by the researcher based on an extensive review of national and international literature to assess Alzheimer caregivers' knowledge and reported practices. It consists of three parts:

**Part I:** It includes Five questions related to demographic characteristics of caregivers of Alzheimer patients related to gender, age, education level, experience and previous training about Alzheimer.

**Part II:** This part includes 40 questions to assess Alzheimer patient's caregivers' knowledge related to definition and risk factors, stages, symptoms, and method of treatment and care. Each question has a three-point Likert scale with responses choices ranging between: Agree (2), Disagree (1), I don't know (0). Caregivers who got < 50% were considered as having poor knowledge, while those who got from 50 to < 70%, were considered as having fair knowledge, and those who got >70% were considered as having good knowledge, the questionnaire used before, immediately, and three months after the implementation of the program.

**Part III:** This part aims to assess the reported practice of Alzheimer patient's caregivers. It includes 46 questions in six subscales: bathing, dressing, grooming, toileting, feeding, and communication. Each question has three points Likert scale with response choices ranging between: Agree (2) Disagree (1), I don't know (0). Caregivers who got < 50% were considered as having poor practice, while those who got from 50 to < 70%

were considered as having satisfactory practice, and those who got >70% were considered as having a good practice, the questionnaire was used before, immediately, and three months after the implementation of the program.

**Validity & Reliability:** Five experts from the community health nursing department, Cairo university were asked to check the tools for content validity, including clarity, wording, format, and overall appearance of the tools. Modifications were made according to the panel judges. The tool was tested for reliability using Cronbach’s Alpha 0.76

**Data Collection:** Data collected for the study before the educational program implementation, all caregivers completed informed consent, demographic characteristics, then the pretest conducted for assessment of the knowledge, and reported practices of caregivers. Posttest had conducted immediately and three months after

the educational program implementation for all caregivers.

The time spent to fill the questionnaires ranged between 10-15 minutes (pre and posttest). The program was implemented separately in each elderly home. The study sample was divided into three groups based on the availability of the caregivers, with the mean of 6 caregivers in each group. The duration of each session was about 30 minutes. Teaching method and media included were group discussions, videos, case scenarios, and power point presentations. The program was implemented on 6 sessions from the first of January 2019 to the end of January 2019

**Data Analysis:** Statistical Package for the Social Sciences (SPSS) program, version 20. Numerical data were expressed as means and standard deviations. Quantitative data were expressed as frequencies and percentages. Comparison between pretest, posttest, and 3 months follow up test was done by using t-test and ANOVA

### Result

**Table 1: Mean scores of Alzheimer patient’s caregivers’ knowledge pre- post and three months after implementation of the education program (n=50).**

Knowledge items	Pre-program		Post-program		3 months later (Follow up)		F test
	Mean	SD	Mean	SD	Mean	SD	P-value
Disease definition & risk factors	8.14	3.69	15.70	3.48	14.98	3.21	107.17 .000**
Disease stages	8.58	2.98	11.76	2.20	10.98	1.83	25.09 .000**
Signs and symptoms	14.32	5.08	18.70	5.54	18.20	3.91	16.72 .000**
Method of treatment and care	12.98	3.90	20.36	4.25	18.08	3.81	80.793 .000**
Total score	44.02	12.21	66.52	13.71	62.24	10.04	95.58 .000**

F test = repeated measures ANOVA \*\* statistically highly significant value p<.01

Table (1) reveals that knowledge means cores increased in the post, and 3 months after the program implementation, with highly statistically significant relationship among them, (p=.000).

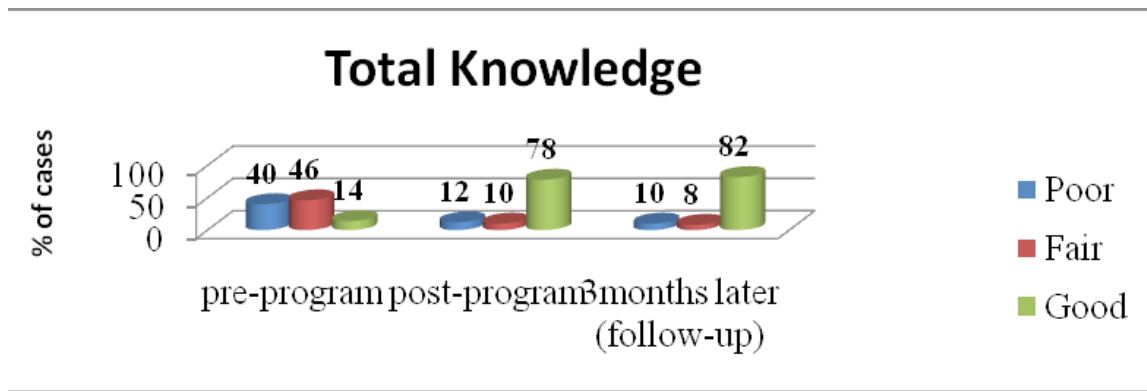


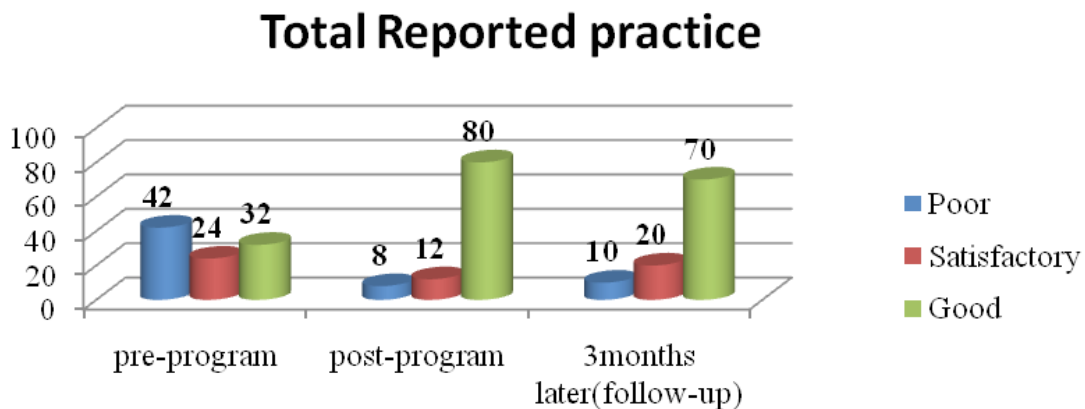
Figure (1): Percentage distribution of Alzheimer patient's caregivers' level of knowledge scores before and after program implementation and 3 months later (n=50).

Table 2: Mean scores of Alzheimer patient's caregivers' reported practice pre-post and three months after implementation of the education program(n=50).

Reported practice Items	Pre-program		Post-program		3months later (Follow up)		F test
	Mean	SD	Mean	SD	Mean	SD	P-value
Bathing	8.92	2.776	12.16	2.582	12.02	2.045	42.377 .000**
Dressing	8.54	2.525	11.64	2.848	11.46	2.224	29.884 .000**
Grooming	9.72	2.365	11.96	2.539	11.62	2.165	17.517 .000**
Toileting	8.16	2.958	11.72	2.770	10.98	1.790	37.178 .000**
Feeding	8.50	2.750	12.28	2.322	11.50	2.341	35.287 .000**
Communication	12.12	4.322	18.24	4.601	17.38	3.933	31.758 .000**
Total score	55.96	12.60	78.00	15.84	74.96	11.58	56.87 .000**

F test = repeated measures ANOVA \*\* statistically highly significant value  $p < .01$

Table (2) reveals that reported practice mean scores increased in the post, and 3 months after the program implementation, with highly statistically significant relationship among them. ( $p = .000$ ).



**Figure (2): Percentage distribution of Alzheimer patient's caregivers' level of reported practice scores before and after program implementation and 3 months later (n=50)**

### Discussion

Caregivers in a nursing home have to face the unique features of Alzheimer disease, such as impaired communication, disorientation, confusion, and behavioral changes, and required training to increase their understanding of caregiving. The need for sufficient training for caregivers working with Alzheimer patients has been identified in the literature to understand the disease better and improve practice among caregivers.<sup>9</sup> Discussion of the study findings are categorized under the following parts:

**First part:** Assessment of the Alzheimer patient's caregivers' knowledge pre/post and three months after education program implementation:

Regarding the knowledge of Alzheimer patient's caregivers in the present study, more than three-quarters of caregivers had a good level of knowledge immediately and three months after program implementation (Figure 1), with a statistically significant difference of caregivers' knowledge scores before, immediately and three months later (Table 1). This improvement in caregivers' knowledge may be due to the effect of the education program on caregivers, which indicates the effectiveness of the program. This result is in agreement with a study conducted by Yusoff et al.<sup>10</sup>, Malaysia, who found a significant improvement in knowledge about dementia and its management among health care staff post-training program. Also, the previous result is supported by El-Kattan et al.<sup>11</sup>, Cairo, who revealed that there was a significant improvement in knowledge among formal caregivers after the training program. Such similarities in the results suggested that education and training programs for Alzheimer patient's caregivers in nursing homes had a positive effect on their knowledge related to Alzheimer disease.

**Second Part:** Assessment of Alzheimer patient's caregivers' reported practices pre/post and three months of education program implementation:

More than three-quarters of the caregivers had a good level of reported practice immediately and three months after program implementation (Figure 2), with a statistically significant difference before, immediately,

and three months later (Table 2). This improvement in caregivers' practice may be due to the positive effect of the program, which improved caregivers' practices immediately and 3 months after the program. This result is incompatible with a study conducted by El-Kattan et al.<sup>11</sup>, Cairo, who indicated that highly statistically significant improvement among caregivers' practices level after the training program. Moreover, the result is in agreement with a study conducted by Dobbs et al.<sup>9</sup>, USA, who found that the nursing home staff gained more confidence in caring for dementia patients after a training program. These similarities in results suggest that nursing home policies should focus on providing training and supporting programs for Alzheimer patient's caregivers to enable them to provide proper care. Finally, the results of this study justified the hypothesis that caregivers' knowledge increased, and reported practice improved after implementation of the educational program.

### Conclusion

Based on the study results, it can be concluded that knowledge and reported practices of Alzheimer caregivers had been improved after program implementation with statistically significant differences between pre, post, and three months later.

**Recommendation:** According to the result, the following recommendations are suggested:

- Conducting continuing education programs for Alzheimer caregivers in the nursing homes to promote their knowledge and practices and evaluate these programs to stand upon deficiencies and priorities that need improvements.

- Conduct future studies to determine the best method of education and training for Alzheimer patients' caregivers.

**Ethical consideration:** The researcher emphasized that participation in the study was entirely voluntary, written informed consent was obtained from each participant, after explanation of the study objectives and procedures. Anonymity and confidentiality were assured. Participants were assured that all data would not be reused in another research without taking the permission of the participants.

**Source of Support:** Self

**Conflict of Interest:** None

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# To Evaluate the Correlation of Stature with Hand & Foot Width in Subjects

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## Abstract

**Background:** Estimation of stature by different method has a significant importance in the field of forensic investigations. The present study was conducted to assess correlation of hand and foot width with stature.

**Materials and Method:** The present study was conducted on 185 students of both genders. Stature was measured as vertical distance from vertex to the floor in mid-sagittal plane. Hand width was measured from base of 5th to 2nd metacarpal using a standard vernier caliper. Foot width was measured from base of 1st to 5th metatarsal using standard vernier caliper.

**Results:** The mean height of males was 176.2 cm and in females was 158.4 cm. The difference was significant ( $P < 0.05$ ). The mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm. The difference was significant ( $P < 0.05$ ). The mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Authors found that there was positive correlation of stature with hand and foot width in subjects.

**Keywords:** Hand, Foot, Stature

## Introduction

Estimation of stature has a significant importance in the field of forensic anthropology.<sup>1</sup> Establishing the identity of an individual from mutilated, decomposed, & amputated body fragments has become an important necessity in recent times due to natural disasters like earthquakes, tsunamis, cyclones, floods, man-made disasters like terror attacks, bomb blasts, mass accidents, wars, plane crashes etc and homicides. It is important

both for legal & humanitarian reasons. Stature is one of the most important elements in the identification of an individual.<sup>2,3</sup>

Hand Length (HL) and Hand Breadth (HB) have been extensively used in research to estimate stature of individuals for identification and have received scant attention from forensic anthropologists. This is due to the established strong correlation between stature and hand dimension.<sup>4</sup>

Literature review suggests that many studies have been undertaken to demonstrate that it is possible to calculate stature through regression equation from hand length & hand breadth. Amirshaybani, et al<sup>5</sup> demonstrated hand length as good predictor of body surface area. Thus it can be extracted that relationship of hand length & hand breadth with various measurements

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of the human body have been studied but none of the studies provide information regarding the correlation between two of them. The present study was conducted to assess correlation of hand and foot width with stature.

### Materials and Method

The present study was conducted in the department of Anatomy in MGM Medical College, Aurangabad. It comprised of 185 students of both genders. Ethical approval was obtained from institutional ethical committee prior to the study. All patients were informed regarding the study and written consent was obtained.

General information such as name, age, sex etc. was recorded. A thorough physical examination was performed in all subjects.

Stature was measured as vertical distance from vertex to the floor in mid-sagittal plane. Hand width was measured from base of 5th to 2nd metacarpal using a standard vernier caliper. Foot Width was measured from base of 1st to 5th metatarsal using standard vernier caliper. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

### Results

**Table I: Assessment of height of subjects**

Height (cm)	Mean	DF	Mean square	F	Sign.
Male	176.2	1	8523.4	176.2	0.001
Female	158.4				

Table I shows that mean height of males was 176.2 cm and in females was 158.4 cm. The difference was significant (P< 0.05).

**Table II: Assessment of hand width of subjects**

Width (cm)	Right	Left	DF	Mean square	F	Sign.
Male	7.6	7.4	1	8511.2	162.9	0.001
Female	6.5	6.2				

Table II shows that mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm. The difference was significant (P< 0.05).

**Table III: Assessment of foot width of subjects**

Width (cm)	Right	Left	DF	Mean square	F	Sign.
Male	8.7	8.3	1	8586.2	171.1	0.001
Female	8.1	7.6				

Table III shows that mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. The difference was significant (P< 0.05).

**Table IV: Correlation of stature with hand and foot width of subjects**

Pair	r	P
Stature & Hand width	0.726	0.02
Stature & foot width	0.681	0.01

Table IV shows positive correlation of stature with hand and foot width. The difference was significant (P< 0.05).

### Discussion

Hand length and hand breadth has been studied extensively in relation to various body measurements but the correlation between these two variables has not yet been studied.<sup>6</sup> It is well established that bilateral symmetry exist in human population i.e. the difference between the measurements of the left and right side of the human body thus standard range was predicted for both the sides of the hand. Many different body parts can be used in the estimation of stature.<sup>7</sup> Certain long bones & appendages can be aptly used in the calculation of height of a person. Many studies have shown the correlation of stature with body appendages & with long bones. But there are inter-racial & inter-geographical differences in measurements & their correlation with stature. What may be true for one race or one region may not be true for the other.<sup>8</sup> Present study was conducted to assess correlation of hand and foot width with stature.

In present study mean height of males was 176.2 cm and in females was 158.4 cm. The mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm. Sanli et al<sup>9</sup> evaluated a possible correlation between stature of an individual & six parameters; hand-length, hand-width, foot-length, foot-width, forearm length & knee-to-ankle length individually in a local population. A sample of 300 medical students; 147 male

& 153 female was considered & measurements were taken for each of the parameters. It was found that all the six parameters showed a correlation with stature but at different degrees (significance calculated through the paired t-test). Forearm-length showed the highest degree of correlation ( $r = 0.6558$ ) followed by foot-length ( $r = 0.6102$ ). Knee-to-ankle length showed the lowest degree of correlation ( $r = 0.2086$ ). Mathematical formulae for estimating stature were developed for each of these parameters through basic linear regression.

We found that mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. There was positive correlation of stature with hand and foot width. Manoonpol et al<sup>10</sup> in their study two hundred subjects comprising of 100 males and 100 females in 20-30 years age group were included. Dimensions of hands and feet viz: hand length, hand breadth, foot length and foot breadth were measured independently on left and right side of each individual using a sliding caliper. Stature of individuals was measured with the help of a stadiometer. Statistical analysis indicated that the bilateral variations were insignificant for all the measurements except foot breadth among females ( $p < 0.001$ ). The paired sample t-test showed that the statistical difference between males and females was highly significant for all the measurements ( $p < 0.001$ ). The correlation between the stature and various parameters studied in males and females were found to be positive and statistically highly significant. Linear and multiple regression equation for stature estimation were calculated separately for males and females.

### Conclusion

Authors found that there was positive correlation of stature with hand and foot width in subjects.

**Conflicts of Interest:** The author declare that there is no conflict of interest regarding the publication of this paper.

**Source of Funding:** Self

**Ethical Clearance:** Ethical clearance has been taken from Institutional Ethical Committee

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# Health Risk Assessment on the Glyphosate Exposure of Knapsack Sprayers

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## Abstract

**Context:** Herbicide poisoning has been increasing among agriculturists in the northeast of Thailand. The aim of this cross-sectional study was to assess the health risk of glyphosate exposure among knapsack sprayers. A health risk assessment matrix was applied to 243 sprayers by considering the extent of glyphosate exposure per year according to the actual amount of glyphosate (48 %w/v) dispensed and frequency of exposure. In addition, use of personal protective equipment (PPE) was taken into account. The second component of the risk matrix was the severity of the recorded adverse effects in the same group. The results revealed that 76.95% of sprayers were slightly exposed (100 to 499 milliliters of glyphosate used per year) and 57.20% wore at least four types of protection, comprised from any of the following types: gloves, mask, boots, trousers, long-sleeved shirt, and others. A majority had a slight likelihood of glyphosate exposure (69.14%) and a minority experienced a mild level of adverse symptoms (17.28%), including rash, dizziness and headache. Some sprayers (36.20%) had a health risk of glyphosate exposure higher than an acceptable level, which might explain the adverse health effects of long-term exposure. This health risk assessment tool combined with PPE usage of a herbicide applicator would be useful for the health surveillance program.

**Keywords:** *Glyphosate, Health risk assessment, PPE, Sprayer*

## Introduction

Health effects from the application of herbicide is a current problem among Thailand's farmers. From 2011-2017, herbicide was the most imported of all pesticides used for agriculture; the highest quantity and value of herbicide was reported in 2017 by the Office of Agricultural Data. Glyphosate is widely known and is a herbicide intensively used by farmers to control weeds and to increase production. The highest amount of glyphosate-isopropylammonium was imported in 2018 and its use is likely to increase further<sup>1,2</sup>.

Generally, glyphosate is considered to be a non-selective herbicide. The commercial formulations of glyphosate contain surfactants that vary in nature and concentrations that increase pure glyphosate toxicity, and are known by a variety of names<sup>3</sup>. Glyphosate toxicity inhibits cytochrome P450 (CYP) enzymes in mammals, and could be a factor in the following diseases: obesity, depression, autism, Alzheimer's disease, Parkinson's disease, multiple sclerosis, cancer, cachexia, infertility and malformation development<sup>4</sup>.

Hence, the International Agency for Research on Cancer (IARC) determined that glyphosate was probably carcinogenic to humans (group 2A), and the case control studies of occupational exposure in the USA, Canada and Sweden showed an increased risk of non-Hodgkin's lymphoma<sup>5</sup>. Occupational exposure to glyphosate was associated with a high risk of cutaneous melanoma<sup>6</sup>.

Although pure glyphosate probably has low toxicity, it is increased by the volume of surfactants in

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formulations marketed for domestic use. Consequently, farmers are occasionally exposed to glyphosate formulations more than in other careers while working on mixing and loading applications, and other processes. In France, detected glyphosate reached a peak of 9.5 µg/L in the urine samples of farmers who sprayed glyphosate<sup>7</sup>. The highest concentration of atmospheric glyphosate (42.96 µg/m<sup>3</sup>) was measured in the air of the operator's breathing zone<sup>8</sup>. Therefore, workers exposed to glyphosate through the inhalation route excreted glyphosate in the urine. Reported cases of the toxic effects of pesticides from 2007-2013 were found predominantly in the northeastern region of Thailand<sup>9</sup>.

Thailand's farmers' attitudes toward pesticide knowledge, behaviors using pesticides, and use of personal protective equipment (PPE) have been unsafe with regard to occupational practices of pesticide use<sup>10</sup>. Health risk behaviors regarding agrochemical use have been a lack of attention to safety precautions and the use of inappropriate protective equipment<sup>11</sup>. Currently, there are no glyphosate regulations or standards in occupational health and safety, which is concerning with regard to the health effects on farmers exposed to glyphosate. Hence, the aim of this study was to apply a health risk assessment matrix by considering the likelihood of glyphosate exposure combined with personal protective equipment (PPE) use behavior and adverse effects to predict farmers' risk and create guidelines for health surveillance.

## Material and Method

**Data Collection:** The study was designed as a cross-sectional study and carried out from November to December 2019; the sample was chosen from 487 farmers who performed pesticide application and whose information was in the Nampong district office of Public Health record. From these farmers, 243 farmers were eventually chosen to be included in the study; this number was calculated under the known number of population in a small size<sup>12</sup>, and by using a previous finding of proportion of glyphosate detection in urine of 0.60<sup>13</sup>. Data was collected by using a questionnaire on personal data, health effects, application information and personal protection equipment. The second tool was an applied risk matrix for health risk assessment, which consisted of two parts: likelihood of glyphosate exposure and severity of subsequent symptoms from exposure to glyphosate. The section on PPE use was an additional component used to assess any decrease in the likelihood

of exposure<sup>14</sup>.

**Health Risk Assessment Tool:** In the present study, the likelihood of glyphosate exposure (amount of pure glyphosate multiplied by spraying frequency per year) was divided into four levels of scoring according to the quantity of glyphosate applied per year: score of 1: below 100 milliliters; score of 2: 100-499 liters; score of 3: 500-1000 milliliters; and a score of 4: above 1000 milliliters. PPE use behavior was classified as one of four scores: score of 0: wearing at least four types of PPE comprised from rubber gloves, N95 /carbon mask, boots, trousers, long-sleeved shirt or others; score of 1: wearing at least four types of PPE comprised from any type of gloves, mask, boots, trousers, long-sleeved shirt or others; score of 2: at least three types of PPE comprised from any type of gloves, mask, boots, trousers, long-sleeved shirt or others; and score of 3: at least two types of PPE comprised from any type of gloves, mask or others. Therefore, four levels of likelihood of glyphosate exposure according to quantity of glyphosate applied and use of PPE were calculated by using a behaviour score combination as follows: level 1 is a low likelihood of exposure (score: 1-2), level 2 is a slight likelihood of exposure (score: 3-4), level 3 is a moderate likelihood of exposure (score: 5-6) and level 4 is a high likelihood of exposure (score: 7).

Severity of glyphosate toxicity experienced six months after application was assessed by using a symptom questionnaire which looked at the adverse health effects according to four criteria: level 1 is no symptoms expressed, level 2 is mild symptoms (headache, dizziness, rash, cough, numbness, stuffy nose, sore throat, hand irritation, itchy skin, drowsiness, fatigue and xerostomia), level 3 is moderate symptoms (nausea, vomiting, chest pain, oliguria, skin burning, burning-stinging-itchy eyes, eczema, blurred vision, exfoliation and diarrhea) and level 4 is severe symptoms (wheezing, hematemesis, kidney failure, pneumonia, shock and syncope). Finally, the likelihood and severity of glyphosate exposure scores were applied in the health risk assessment matrix<sup>14</sup>, in which four resulting risk levels were calculated: level 1 is acceptable risk (score: 1-2), level 2 is low risk (score: 3-4), level 3 is medium risk (score: 6-9) and level 4 is high risk (score: 12-16).

## Results

The results revealed that a majority of the 243 farmers (88.07%) were male. The participants' ages

ranged from 50 to 69 years old, with an average age of 53.0±9.19 years. A majority of farmers (73.25%) had completed primary school and 45.68% of participants had an average income of about 50,855 baht per year. The farmers' glyphosate spraying experience was divided into periods of 5 to 10 years (43.62%), 11 to 20 years (25.93%), less than 5 years (18.11%) and more than 20 years (12.35%). The percentage of farmers who sprayed glyphosate as non-employees was 69.14%, while 28.40% sprayed as both non-employees and employees and 12.35% sprayed only as employees. Approximately 60.49% of farmers had a frequency of exposure which was below five times per year, with an average frequency of 9.64 times per year.

**Glyphosate exposure according to application amount and PPE use:** The majority of farmers who participated in this study (76.95%) had an applied glyphosate (48%w/v) amount per year resulting in a score of 2, while a minority had an applied amount resulting in a score of 3 and a score of 1, respectively, as shown in Table 1.

**Table 1: Glyphosate amount exposed to from application (quantity per year)**

Score	Glyphosate exposure (milliliters)	Number (%)
1	< 100	19(7.82)
2	100-499	187(76.95)
3	500-1000	30(12.35)
4	>1000	7(2.88)

The PPE that was most widely worn was a combination of four types of PPE, from any type of gloves, mask, boots, trousers, long-sleeved shirt or others, worn by 57.20% of farmers, while overall, the best combination tended to be one comprised from rubber gloves, N95 /carbon mask, boots, trousers, long-sleeved shirt and others, worn by 5.76% of farmers, as shown in Table 2.

**Table 2: Personal protective equipment usage behavior**

Score	PPE usage	Number(%)
0	at least four types of PPE comprised of rubber gloves, N95 / carbon mask, and two other types	14(5.76)
1	at least four types of PPE comprised of any type of gloves and three other types	139(57.20)
2	at least three types of PPE comprised of any type of gloves and two other types	42(17.28)
3	at least two types of PPE comprised of any type of gloves, mask or others	48(19.75)

**Health risk Assessment:** The participants were assessed with regards to the likelihood of glyphosate exposure according to quantity of glyphosate applied combined with PPE use. Accordingly, the likelihood of glyphosate exposure was found to be slight in 69.14% of cases, moderate in 20.99% of cases, and low in 9.05% of cases, as shown in Table 3.

**Table 3: Likelihood of exposure according to quantity of glyphosate used and PPE**

Likelihood	Number(%)
Low	22(9.05)
Slight	168(69.14)
Moderate	51(20.99)
High	2(0.82)

The severity of health adverse effects with regard to symptoms associated with glyphosate usage was assessed by using a questionnaire, and it was found that 186 (76.54%) of the farmers had a history of glyphosate exposure but no signs or symptoms of poisoning. The other 42 (17.28%) farmers had mild symptoms, of which the three main symptoms expressed were rash (9.47%), dizziness (8.23%) and headache (7.82%), while the most reported moderate symptom was burning-stinging-itchy eyes (4.12%), as shown in Table 4.

**Table 4: Severity of adverse symptoms among sprayers**

Mild symptom	Number(%)	Moderate symptom	Number(%)
Headache	19(7.82)	Nausea	2(0.82)
Dizziness	20(8.23)	Vomiting	3(1.23)
Rash	23(9.47)	Oliguria	1(0.41)
Cough	7(2.88)	Skin burning	3(1.23)

Mild symptom	Number(%)	Moderate symptom	Number(%)
Numbness	2(0.82)	Burning-stinging-itchy eyes	10(4.12)
Stuffy nose	14(5.76)	Eczema	3(1.23)
Sore throat	1(0.41)	Exfoliation	1(0.41)
Hand irritation	1(0.41)	Diarrhea	2(0.82)
Itchy skin	1(0.41)		
Drowsiness	1(0.41)		
Fatigue	1(0.41)		
Xerostomia	1(0.41)		

Therefore, 155 (63.79%) of the participating farmers had an acceptable level of risk, 25.51% had a low level of risk, 10.70% had a medium level of risk and no farmers were found to have a high level of risk in the present study, according to the matrix in which health risk assessment was combined with personal protective equipment usage (PPE), as shown in Table 5.

**Table 5: Matrix of health risk assessment combined with PPE usage among sprayers**

Severity of symptoms	Likelihood of exposure; number(%)				Risk		
	Low(1)	Slight(2)	Moderate(3)	High(4)	Score	Risk	Level
Severe(4)	0	0	0	0	12-16	High	4
Moderate(3)	1(0.41)	8(3.29)	6(2.47)	0	6-9	Medium	3
Mild(2)	4(1.65)	26(10.69)	12(4.94)	0	3-4	Low	2
None(1)	17(6.99)	134(55.15)	33(13.58)	2(0.82)	1-2	Acceptable	1

## Discussion

Farmers mix amounts of pure glyphosate (48% w/v) which are quite low in knapsack containers. Most farmers use backpack sprayers with a volume capacity of 10 to 20 liters<sup>15</sup>. More than half of the farmers in the present study had a spraying frequency of less than five times per year, probably resulting in a low level of annual exposure among the participants. More than half of the farmers exhibited good behavior with regard to PPE usage, which agreed with a study in eastern Thailand which reported that 80% of farmers had a high level of self-protection by wearing mask, glasses, rubber gloves, trousers, long-sleeved shirt, boots and hat while spraying<sup>16</sup>. In northern Thailand, farmers who applied herbicide did not use PPE such as gloves, mask and goggles all the time, while some farmers also used them improperly and lacked attention with regard to protective equipment<sup>17,18</sup>. In one Thai study, it was found that less than half of the Thai farmers knew that they should use PPE while spraying<sup>19</sup>, while the study also reported that almost half of the farmers exhibited unsafe behavior in the use of PPE<sup>20</sup>. While spraying, workers either did not have access to a filter mask or did not want to wear it in hot weather conditions, indicating

use was unbearable<sup>21</sup>. In our study, about one fifth of the farmers exhibited improper usage of PPE, which led to an increased likelihood of glyphosate exposure.

In northern Thailand, another study found that the highest percentage of farmers with health effects were those who exhibited mild symptoms of headache, dizziness and rash or roseola symptoms after pesticide application<sup>22</sup>. This study found that farmers expressed burning-stinging-itchy eyes and skin burning as per previous reports<sup>23</sup>.

In this study, the fact that severe symptoms were not found may be since pure glyphosate has very low toxicity to humans in short-term exposure. However, acute effects caused by glyphosate have been reported, such as drowsiness, vomiting, sore throat and an alert mental state which may result in suicide attempts and accidents<sup>24</sup>.

In the present study, a health risk assessment combined with PPE usage showed that some sprayers were at risk of long-term adverse health effects. The sprayers had a low to medium level of health risk according to actual amounts of glyphosate dispensed,

frequency of exposure, and behavior in the use of PPE. Therefore, primary health care centers should be able to assess the health risks of herbicide application among farmers through health surveillance programs.

### Conclusion

**Conflict of Interest:** There is no conflict of interest in this paper.

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# To Assess Correlation of Stature with Hand & Foot Length

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## Abstract

**Background:** Human stature is an anatomical complex of linear dimensions, including skull, vertebral column, pelvis and lower extremities. The present study was conducted to assess correlation of stature with hand & foot length.

**Materials and Method:** The present study was conducted on 185 students (males- 81, females- 104) in the age group of 18-24 years. Stature, hand length and foot length was measured in all subjects with the help of digital verniercalipers.

**Results:** The mean height of males was 172.3 cm and females was 156.8 cm. The difference was significant ( $P < 0.05$ ). The mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm. The difference was significant ( $P < 0.05$ ). The mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. The difference was significant ( $P < 0.05$ ). A positive correlation of stature with hand and foot length was found.

**Conclusion:** Authors found a positive correlation of stature with length of hand and foot in subjects.

**Keywords:** Hand, Foot, Stature

## Introduction

In forensic anthropology, determination of sex, age and stature is the foremost task for establishing the biological profile of an individual, which may consequently lead to a positive personal identification. In case of dismembered bodies, this task is more complicated so it is important to search for method that can be used for estimating the above mentioned basic individual characteristics.<sup>1</sup>

Human stature is an anatomical complex of linear dimensions, including skull, vertebral column, pelvis and lower extremities, so that it is assumed that significant associations exist between the total stature and these individual body parts.<sup>2</sup>

Human beings are considered to be bilaterally symmetrical. However, there is an asymmetry in the length of the feet irrespective of sex or handedness. Hand has been used as a tool for estimating the area of burn injury.<sup>3</sup> The area of palmar surface of one's hand has been estimated to be 1% of the body surface area. When hand length was compared with the body weight for both males and females there were a curvilinear relationship which was not far from being linear.<sup>4</sup> The hand length has therefore been considered as an excellent predictor of body surface area and body mass. Change of foot length and width with age has been reported in a few

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anthropometric studies in literature. The foot length and width were found to be increasing significantly on weight bearing between 3 and 18 years of age and in both genders.<sup>5</sup>The present study was conducted to assess correlation of stature with hand & foot length.

### Materials and Method

The present study was conducted in the department of Anatomy in MGM Medical College, Aurangabad. It comprised of 185 students (males- 81, females- 104) in the age group of 18-24 years. All patients were informed regarding the study and written consent was obtained. Ethical approval was obtained from institutional ethical committee prior to the study.

General information such as name, age, sex etc. was recorded. A thorough physical examination was performed in all subjects.

Stature was measured as vertical distance from vertex (the highest point on the top of head) to the floor in midsagittal plane with subject standing barefooted, on an even floor and the head being oriented in the Frankfurt's plane. Stature was measured with the help of Stadiometer (Anthropometer). Hand length was measured as the straight distance from mid-point of a line connecting the styloid processes of radius and ulna to the anterior-most projection of the skin of the middle finger. It was measured with the help of digital vernier calipers. Foot length was measured as the distance from the most posterior point of the heel to the most anterior point of the longest toe. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

### Results

**Table I: Assessment of height of subjects**

Height (cm)	Mean	DF	Mean square	F	Sign.
Male	172.3	1	8563.2	171.3	0.001
Female	156.8				

Table I shows that mean height of males was 172.3 cm and in females was 156.8 cm. The difference was significant (P< 0.05).

**Table II: Assessment of hand length of subjects**

Length (cm)	Right	Left	DF	Mean square	F	Sign.
Male	18.6	18.3	1	8564.7	172.6	0.001
Female	16.5	16.2				

Table II shows that mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm. The difference was significant (P< 0.05).

**Table III: Assessment of foot length of subjects**

Length (cm)	Right	Left	DF	Mean square	F	Sign.
Male	28.7	28.3	1	8572.5	175.1	0.001
Female	22.5	22.1				

Table III shows that mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. The difference was significant (P< 0.05).

**Table IV: Correlation of stature, hand and foot length of subjects**

Pair	R	P
Stature & Hand length	0.71	0.01
Stature & foot length	0.65	0.01

Table IV shows positive correlation of stature with hand and foot length. The difference was significant (P< 0.05).

### Discussion

Hand length and foot length has been studied extensively in relation to various body measurements but very few studies were available to predict the correlation between these two variables.<sup>6</sup>A number of studies have presented the relation between stature, foot length and foot breadth among different human populations utilizing linear and multiple regression equations. Foot measurements, such as foot navicular and malleoli height were used for the first time in Ozaslan et al<sup>7</sup> to estimate stature and sex. Several studies have attempted to derive regression equations from measurements of footprints and foot outlines. Although upper extremities are not part of this complex, previous research has shown that the dimensions of upper extremities are also associated with stature to some degree. A number of studies on the relationship between hand measurements

and stature to calculate population-specific regression equations have been reported. It needs to be taken into the consideration that the equations derived from one population cannot be used for other populations as the body dimensions show ethnic variation due to here detained environmental conditions.<sup>8</sup> The present study was conducted to assess correlation of stature with hand & foot length.

In present study mean height of males was 172.3 cm and in females was 156.8 cm. We found that mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm.

Uhrova et al<sup>9</sup> assessed the stature, hand length, hand breadth, foot length and foot breadth of 250 young Slovak males and females, aged 18–24 years by standard anthropometric procedures. The results revealed significant sex differences in hand and foot dimensions as well as in stature ( $p < 0.05$ ). There was a positive and statistically significant correlation between stature and all measurements in both sexes ( $p < 0.01$ ). The highest correlation coefficient was found for foot length in males ( $r = 0.71$ ) as well as in females ( $r = 0.63$ ). The results of this study indicate that hand and foot dimensions can be used to estimate stature for a Slovak individual for the purpose of forensic investigation.

We found that mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. We found a positive correlation of stature with hand and foot length. The difference was significant ( $P < 0.05$ ). Fawzy et al<sup>10</sup> included a total 400 healthy and normal adult medical students (200 male and 200 female) between age group 18-25 years with no obvious deformities or previous history of trauma to the hands or feet. The hand length and foot length of both the sides of individuals were measured with the help of sliding calipers and spreading calipers respectively and the data was analyzed statistically for correlation. **Results:** The correlation between hand lengths and foot lengths found to statistically highly significant on both sides in both sexes with  $p$  value  $< 0.0001$ . Correlation coefficients between hand lengths and foot lengths were higher for females than males.

### Conclusion

Authors found a positive correlation of stature with length of hand and foot in subjects.

**Conflicts of Interest:** The author declare that there is no conflict of interest regarding the publication of this paper.

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# Teenage Girl Dating Experience: A Qualitative Study

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## Abstract

**Background:** During puberty, most teenagers' sexual activities are increasing due to the hormonal changes. In this period, adolescents usually begin to approach other individuals of the opposite sex marked by mutual recognition of both the advantages and disadvantages of each individual.

**Objective:** The purpose of this study is to observe the positive and negative impacts of dating experienced by junior high adolescents, specifically girls.

**Method:** This qualitative research used a descriptive phenomenology method. The population was schoolgirl registered in the "X" Junior High School in Cipayung Community Health Center, East Jakarta, Indonesia. The sample of this study was twelve schoolgirls selected through a purposive sampling technique. This study conducted a Focus Group Discussion in order to collect data for this study.

**Results:** Four themes were identified in this study, namely (1) the meaning of relationship or dating, (2) the reasons for dating, (3) the impression of dating, and (4) the expectation in undergoing a relationship.

**Conclusion:** The findings suggest that health promotion programs can put their effort into preventing juvenile delinquency from dating.

**Keywords:** *Dating, health adolescence, negative impact, positive impact, relationship*

## Introduction

The adolescence stage starts from 10 to 13 years old or considered secondary school students. During this period, adolescence begins their puberty in which there is a transition from childhood to adulthood. Puberty is a rapid change in physical maturity, which includes bodily and hormonal changes that mainly occurred during early adolescence. Moreover, puberty is marked by the maturity of the reproductive organs.<sup>1</sup>

Biology changes in puberty contribute to the increasing integration of sexuality into attitudes and behavior in pre-adulthood.<sup>1</sup> Teenage girls will fully attempt to become fully-grown women, while boys will try their best to become men as best as they can. The girls usually will behave affectionately, sensitively, attractively, and speak smoothly, while the boys usually will behave in assertive, arrogant, cynical, and aggressive

ways because they realize such behaviors can boost their sexuality and attractiveness. Teenage sexual activity also increases along with the occurrence of hormonal changes during puberty.

Adolescents normally begin to know about dating during this period. Dating is an activity of identifying and familiarizing two individuals of the opposite sex characterized by the recognition of both the advantages and disadvantages of each individual.<sup>2</sup> A survey on adolescent reproductive health finds that Indonesian adolescents' first date is commonly at the age of 12 years old.<sup>3</sup> Dating is a term to describe two adolescence individuals associated with a high level of affectionate.<sup>4</sup> Dating is synonymous with premarital relationships though the assumption is not entirely correct. Most people are thinking of dating as a period of identifying each other, knowing, and acknowledging each other before.

There are two types of dating, namely, healthy and unhealthy dating. A healthy relationship ideally may affect each individual's physical, psychological condition, and social needs. Meanwhile, unhealthy dating involves any sexual encounters or activities, including kissing, necking, stroking, and sexual intercourse. Today, the dating behavior is quite distressing as well as increasingly permissive. There are also 92% of adolescents reportedly holding hands while dating. 82% of adolescents have kissed, while 63% of adolescents have caressed each other. These behaviors lead them to sexual interaction.<sup>3</sup> Each teenager has different perspectives to dating; some follow the trend, some are plain curious, where some admit as being in love.

### Material and Method

The research is qualitative with the phenomenological approach. Data was collected after passing the ethical test from the Polytechnic of the Ministry of Health Jakarta III. The data collection strategy employed in this study was an in-depth interview. Participants were twelve subjects, carefully selected using the purposive sampling technique. Criteria include: girl students of junior high within the cluster of Puskesmas Cipayung, East Jakarta, aged between 12-15 who have never been dating and a relationship for at least one month, showed consent of full involvement, as well as be able to share their dating experiences in Bahasa Indonesia.

The Colaizzi approach was used in the data analysis with the steps as follows: (1) describing the to be studied phenomena; (2) collecting descriptions of the phenomena through participant interview process; (3) analyzing all participants' responds as well as identifying keywords through screening of significant participant statements with the phenomenon under study; (4) finding the meaning of each keyword; (5) organizing the meaning that has been identified into several themes; (6) integrating all research results into narratives.

**Fundings:** Data analysis found four themes related to the teenage girls' experience of dating in junior high school. The themes are the participants' view on dating, reasons for having a boyfriend, the impact of having a boyfriend, and expectation in having a boyfriend.

**Participants' Views on Dating:** All participants revealed that boyfriends are close friends whom they like and love. Participants' understandings are illustrated as follows:

*"I'd say boyfriend is one's closest friend ..."* (P1, P2, P3, P10)

*"A boyfriend is a guy we like ..."* (P2, P4, P6, P9, P11)

*"For me, a boyfriend is someone who is really nice, and care about me..."* (P5, P8, P11)

*"A boyfriend is when we like a guy, and that guy likes us back..."* (P7, P10, P12)

Most participants interpreted her boyfriends as close friends, someone whom she likes, and she cares. These interpretations are similar to the term indicated in the Bahasa Indonesia Dictionary, where boyfriend (or girlfriend) is a close friend of the opposite sex and has a relationship based on love. This definition is similar to the findings which revealed that a girlfriend or boyfriend is a close friend who loves and cares. The emergence of affection in the opposite sex among adolescents and curiosity to try something new. Among adolescents today, it is no longer an out of bounds thing to explore a special relationship commonly referred to as 'dating'.<sup>5</sup>

The term dating is identical with love and affection. Both are considered as stimuli or motives for dating. The term love in the Bahasa Indonesia Dictionary, which is interpreted as; dear really; very love; captivated; (between men and women); Eager to; very hopeful; miss; kl distressed (worried). Implicitly the meaning of the word is difficult to pin down into its true meaning. This difficulty is related to love as an emotion. Various emotions, such as fun, scary, sad or something else will arise when you feel love. Besides being difficult to define, the word love is also difficult to measure. So both love and love have interrelated meanings, like interpreted love and love interpreted like, where adolescents pour out love and love earlier in dating activities . Boyfriends become a very proud identity, teenagers will be proud and confident if they already have a boyfriend. Conversely teenagers who do not have a boyfriend are considered less sociable and outdated. Therefore, looking for a girlfriend among adolescents is not only a biological need but also a sociological need, so it is not surprising, that now the majority of teenagers already have a special friend called "PACAR".

**Reasons to Have a Boyfriend:** Almost all participants understand the reason for having a boyfriend, that is, as a place for sharing and encouraging. The participant statement describing the participant's

understanding of the reasons for having a boyfriend is as follows:

*“A good boyfriend, I think, for instance, whenever I feel tired, he’s kinda the go-to place to let all the burden out. Fed up with things at school? Friends? He’s the place to be. Got upset? Then again, he kinda lightens me up...” (P4, P5, P7, P8, P9, P10, P11, P12)*

Participant go on a date for a number of reasons, e.g., a boyfriend is where she seeks encouragement. Reasons having boyfriend proposed by some experts are media socialization where the dating helping interaction will occur, telling each other as friends with other people.<sup>1</sup> Teenage dating has become trendy. Teenagers who do not date are seen as less sociable or romantically outcast, thus among teenagers, going on a date is rather a necessity.

The reason why many teenagers date is the need for a friend to talk personal things with and to seek someone who might help them solve problems is substantial. It’s not uncommon for some teenagers to get into dating from a talk. Teenagers share with each other the problem they experienced and give each other pieces of advice. This leads to a connection, where eventually a more serious relationship ensued. The presence of a significant other helps to ease the burden, solve problems, kill boredom, and straighten mind. He may also help to keep her life motivated and managed so as to add more meanings to her life.<sup>1,11,12</sup>

There were several causes of adolescent dating, including the influence of the globalization era that facilitated information from anywhere that could be received quickly including information on adolescent relationships, weakened environmental control, shifting family values and functions, lack of parental attention and reduced communication in the family, decreased ability of perception and interception of religious and cultural values, lack of directional method of sexual education for adolescents, and the high desire of adolescents to try something new.<sup>6</sup>

Teenagers tend to shut parents and feel more comfortable talking about problems here and ask for opinions to friends or peers. Teens who begin to close in the elderly affect social attitudes and teenagers as if separated from the supervision of parents. These teens will be more comfortable and listen more to what their peers say than to listen to what their parents say. This is

in line with research into factors relating to the behavior of adolescent dating areas, namely family, peers and school transitions.<sup>7</sup>

Teenagers think that their peers could understand them better. They believe that parents do not know what they wanted. To them, parents often restrict them from doing everything they want. Teenagers dislike control; they are in an age of experimenting where they like to try new things. This is coherent with the study that there is an effect of education using audiovisual media and leaflets on improving the knowledge and attitudes of overweight adolescents wherein engaging information, to adolescents, is easier for them to learn, follow and imitate.<sup>8</sup>

**Impact of Having a Boyfriend:** Almost all participants understand the effects of dating. The participants accounted as follows:

**Negative Impact:** *“Sometimes, I feel annoyed by him, he is so unpredictable... so irritating” (P2, P8)*

*“My boyfriend can be bothering. At one time, all of a sudden he held me, I went silent, and then kissed me. I was afraid by that time since kissing is forbidden” (P4, P9, P11)*

*“We often argue, because he won’t let me hanging with other boys. Since then, I had to tell him where I was going, so frustrating. He drives me crazy sometimes” (P1, P5, P12)*

**Positive impact:** *“... going to school becomes more exciting” (P3, P6, P7)*

*“... having a boyfriend makes me want to achieve good scores” (P10)*

These participants’ accounts are coherent with study in which he reveals several positive and negative impacts of dating, including:<sup>6</sup> 1) an individual’s life achievement can be accomplished depending on someone gets support and enthusiasm from a boyfriend, on the contrary achievements will decrease if there are problems that are quite heavy and interfere with concentration in learning, 2) Association with peers can be more widespread or vice versa narrows. Relationships will be narrowed when a pair of lovers spend more time together. The longer a person will depend on his partner and close themselves from the association of other friends, 3) Dating affects the type of activity in filling spare time. Activities to fill spare time can be more varied if the dating activities are

carried out with things such as joint sports, gardening, raising animals and so on .

Moreover, 4) A date can give a sense of security, calmness, and comfort. Emotional relationships that form in dating will lead to a feeling of security, and comfort if gone well. However, if feelings of comfort and security are received through merely physical intimacy then what arises is not love but lust. Thus the need for a work to limit themselves, and 5) Stress. Differences in characteristics will make the relationship with a girlfriend sometimes faced with problems that can make us stressed because of thoughts that are too excessive for the relationship being lived. There are 26% of junior high school students who have ever engaged in sexual activities. This is due to the lack of proper sex education and the youth's own curiosity from seeing or reading from the internet.<sup>9</sup>

**The expectation of Having a Boyfriend:** All participants expressed their expectation of having a boyfriend. Some participants stated their expectations would be able to maintain relationships, which could make themselves a better individual. The description of the participant's expectations can be seen as follows:

*"I hope it'll last longer... we could be more mature ..."* (P1, P2, P5, P6, P7, P8)

*"... if possible, I hope we can get married later"* (P3, P4)

*"I hope my boyfriend can make me a better person..."* (P5, P7, P9, P10, P11, P12)

To support the previous notion, revealed eight dating functions, namely 1) Dating as a recreational period, 2) Dating as a social status and achievement, 3) Dating as social needs, 4) Dating as a vessel in fulfilling intimacy, 5) Dating as a normative adjustment, 6) Dating as individuals' expression, 7) Dating as an identity development, and 8) Dating as a period of choosing a potential life partner.<sup>10</sup> Adolescent's pattern of thinking revolves around the fact that they are invincible and invulnerable<sup>13</sup>.

### Conclusion

The reasons for having a boyfriend are to share feelings and to encourage each other. The positive impacts of dating or having a boyfriend are: improved learning achievement, expanded social needs and connection, improved adulthood development, getting

more connected with each other. Meanwhile, the negative impacts of having an unhealthy relationship are damaged learning achievement and limited opportunities for social connections. In general, dating may limit social interaction with a strong stigma on sexual activities while dating and highly correlated to severe stress. Adolescents expect to be able to maintain their relationships longer and to be a better self in the future.

The school has adopted preventive and promotive activities that can improve the students' health status and may prevent them from juvenile delinquency as the result of unhealthy dating. Family is encouraged to maintain communication between parents and their children, for the children can be more open and more comfortable with their families. Family can also give education and understanding of religious matters to present to children about religious rules and laws. Health professionals must also improve health promotion activities for adolescents, especially in sexual misconduct. Further study may proceed empirically on the effectiveness of health promotion programs for adolescents to determine the successes and obstacles in the implementation of the program.

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# Diet Compliance Against Blood Pressure Control in Hypertensive Patients in Tegal Gundil public Health Center, North Bogor District: A Longitudinal Study

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## Abstract

**Background:** One contributing factor of deaths due to uncontrolled hypertension is dietary disobedience because food affects blood pressure. Thus, Dietary Approach to Stop Hypertension for Indonesian (DASHI) is recommended, because it can control blood pressure in hypertensive patients.

**Objectives;** This study aims to investigate the impact of DASHI diet adherence on systolic blood pressure (SBP) and diastolic blood pressure (DBP) changes in hypertensive patients.

**Material and Method:** We performed a longitudinal study from May to September 2017 using primary data and non-random sampling method with purposive sampling. The data on blood pressure, food intake, physical activity, medication adherence, stress levels, smoking habits, routine blood pressure checks and routine weighting habits was collected via interviews, questionnaires and measurements.

**Result:** For SBP, the first- and second-month average measurement in non-adherent respondents of the DASHI diet was 145.68 and 148.82 mmHg, respectively. Conversely, the third-month average measurement in obedient respondents was 137.88 mmHg. For DBP, the first-, second- and third-month average measurement in non-adherent respondents was 88.61, 87.84 and 84.48 mmHg, respectively.

**Conclusion:** This study establishes a difference in SBP and DBP changes depending on the DASHI diet compliance based on the comparison of measurement results, including the first- and second-month measurement compared to third after controlling smoking and medication compliance covariates.

**Keywords:** *compliance, hypertension, blood pressure*

## Introduction

In Indonesia, a high incidence of hypertension is a major health-related challenge mostly found in primary health care. In 2013, Riskesdas reported that hypertension is one of the health-related problems with a high prevalence of 25.8%. In urban communities,

such as Bogor, hypertension is mostly attributed to lifestyle. A study in Bogor revealed that the incidence of hypertension based on the sodium consumption was affected by the high consumption of fat and sugar, lack of vegetable consumption and physical activity, increasing age, sex (male) and the severity of smokers.<sup>1</sup> This unhealthy lifestyle in hypertensive patients results in uncontrolled hypertension and eventually death. About 40% of deaths caused by hypertension are out of control, and patients are unaware of their hypertensive condition. Regular administration of anti-hypertensive drugs and modification of their lifestyle is recommended.<sup>2</sup> Of note, uncontrolled hypertension is a measurement performed on patients who receive anti-hypertensive treatment

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with SBP and DBP >140 mmHg and >90 mmHg, respectively, based on an average of three measurements at different examinations.<sup>3</sup> Reportedly, the management and control of blood pressure in hypertensive patients can be executed by treatment and triggering some strict lifestyle changes.<sup>4</sup>

Several studies of the Dietary Approach to Stop Hypertension (DASH) intervention revealed that lifestyle changes could be a factor in decreasing blood pressure in hypertensive patients.<sup>5</sup> Thus, this study aims to investigate the impact of DASHI diet adherence on SBP and DBP changes in hypertensive patients.

## Method

In this longitudinal design study, we collected data for each variable at  $\geq 2$  specific time-points. Data collection was performed at Tegal Gundil Health Center, Bogor Utara sub-district, Bogor, on five periods, from May to September 2017. Sampling was performed using non-random sampling method with purposive sampling. We selected this method based on the study population that fulfilled the inclusion criteria. The number of subjects in this study ( $n = 96$ ) fulfilled the minimum sample size evaluated according to the different hypothesis test of two proportions. The selection of the study sample was based on eligible subjects meeting the inclusion criteria of hypertensive patients who routinely controlled their condition for the last 6 months and aged 25–65 years. We collected data by interviewing respondents directly using the provided instruments. Data collection included questionnaires about respondents' characteristics, interviews about physical activity, stress level, smoking habit, routine blood pressure measurement, weight weighing and medication adherence. Patients' blood pressure was measured using a sphygmomanometer, whilst data on compliance was obtained via interviews of respondents based on the questionnaire and Semi-Quantitative Food Frequency Questionnaire. Further, we analysed data using repeated measures ANOVA test and multivariate analysis covariance GLM (MANCOVA).

Repeated measures ANOVA was used to determine the DASHI diet compliance by comparing differences in the SBP and DBP over time in hypertensive patients, namely in the DASHI diet group and those who did not comply with the DASHI diet. Conversely, GLM MANCOVA was used to determine the effect of DASHI dietary adherence on differences in the SBP and DBP after adjusting for the influence of covariate variables.

## Results

### 1. SBP and DBP Based on Three Measurements:

The three measurements of the SBP revealed that the highest and lowest average blood pressure was 148.41 and 138.96 mmHg in the second- and third-month, respectively. The repeated measures ANOVA at 95% confidence level obtained  $p$  value of 0.000 or  $< 0.05$ , suggesting a change in the SBP at three measurements. For DBP at three measurements, the average lowest and highest DBP were found to be 84.24 and 87.80 mmHg in the third- and first-month, respectively.

### 2. SBP and DBP at Three Measurements Based on the DASHI diet compliance:

The SBP examination revealed that 52 respondents were quite obedient to the DASHI diet and 44 were not. The average SBP measurement in non-compliant and compliant respondents of the DASHI diet was 145.68 and 145, 148.82 and 148.06 and 140.23 and 137.88 mmHg in the first-, second- and third-month, respectively.

The DBP examination revealed that 52 respondents were quite adherent to the DASHI diet, whereas 44 were not. The average DBP measurement of non-compliant and compliant respondents on the DASHI diet was 88.61 and 87.12, 87.84 and 85.90 and 84.48 and 84.04 mmHg in the first-, second- and third-month, respectively.

### 3. Pairwise Comparisons Test:

The difference between the first- (145.31 mmHg) and second-month (148.41 mmHg) SBP measurement was not statistically significant ( $p > 0.05$ ), with a blood pressure increase of 3.094. Conversely, the difference between the first- (145.31 mmHg) and third-month (138.96 mmHg) SBP measurement was statistically significant ( $p < 0.05$ ), with a blood pressure decrease of 6.354. Further, the difference between the second- (148.41 mmHg) and third- (138.96 mmHg) SBP measurement was statistically significant ( $p < 0.05$ ), with a blood pressure decrease of 9.448.

The first- (87.8 mmHg) and second-month (86.72 mmHg) DBP exhibited no statistically significant difference ( $p > 0.05$ ), with a blood pressure decrease of 1.01. Additionally, the first- (87.8 mmHg) and third-month (84.24 mmHg) DBP was significantly different ( $p < 0.05$ ), with a blood pressure reduction of 3.563. Further, the difference between the second- (86.72 mmHg) and third-month (84.24 mmHg) DBP

measurement was significant ( $p < 0.05$ ), with a blood pressure reduction of 2.552.

Overall, there was no effect of the DASHI diet compliance (quite obedient and disobedience) on differences in the SBP and DBP ( $p > 0.05$ ; Table 1).

The effect of DASHI diet compliance on the measurement of the first-month SBP (145.34 mmHg) compared with second-month (148.4 mmHg) revealed no significant difference ( $p > 0.05$ ), with a blood pressure increase of 3.097 (Table 2). The effect of the DASHI dietary adherence on the first-month SBP measurement (145.34 mmHg) compared with the third-month (139.05 mmHg) revealed significant differences ( $p < 0.05$ ), with a blood pressure decrease of 6.285. Further, the effect of the DASHI diet compliance on second- (148.438 mmHg) and third-month (139.05 mmHg) SBP revealed significant differences ( $p < 0.05$ ), with a blood pressure decrease of 9.382.

The effect of the DASHI diet compliance on the first- (87.86 mmHg) and second-month (86.87 mmHg) DBP revealed significant differences ( $p > 0.05$ ), with a blood pressure reduction of 0.992. Additionally, the effect of the DASHI dietary adherence on the first- (87.86 mmHg) and third-month (84.25 mmHg) DBP revealed significant differences ( $p < 0.05$ ), with a blood pressure reduction of 3.607. Further, the effect of the DASHI dietary adherence on the second- (86.87 mmHg) and third-month (84.25 mmHg) DBP revealed significant differences ( $p < 0.05$ ), with a blood pressure decrease of 2.615.

4. **MANCOVA Test:** The MANCOVA GLM analysis revealed an effect of DASHI diet compliance on differences in SBP after covariate control of smoking habits ( $p < 0.05$ ; Table 3). Further, we observed the effect on DBP differences after covariate compliance with medication and smoking habits ( $p < 0.05$ ; Table 4).

**Table 1: Pairwise Comparisons Test Based on DASHI Diet Compliance**

Blood Pressure	DASHI dietary compliance	Mean	p-value	95%CI	
				Min	Max
Systolic	Disobedience	144.909	0.661	-4.439	6.692
	Quite obedient	143.647		-6.692	4.439
Diastolic	Disobedience	86.977	0.334	-1.349	3.931
	Quite obedient	85.686		-3.931	1.349

**Table 2. Pairwise Comparisons Test Based on Diet Compliance DASHI On Each Measurement Variance**

	Blood pressure	Mean	p-value	95%CI	
				Min	Max
	<b>Systolic</b>				
1	2	-3.097	0.106	-6.861	0.667
	3	6.285	0.002	2.408	10.161
2	1	3.097	0.106	-0.667	6.861
	3	9.382	0.000	6.140	12.624
3	1	-6.285	0.002	-10.161	-2.408
	2	-9.382	0.000	-12.624	-6.410
	<b>Diastolic</b>				
1	2	0.992	0.301	-903	2.888
	3	3.607	0.000	1.925	5.288
2	1	-0.992	0.301	-2.888	0.903
	3	2.615	0.003	0.923	4.306
3	1	-3.607	0.000	-5.288	-1.925
	2	-2.615	0.003	-4.306	-0.923

**Table 3: Mancova Test SBP**

Covariate	Variable	B	P-value	95% CI	
				Min	Max
Smoking Habit	Systolic1	-4.405	0.146	-10.374	1.563
	<b>Systolic 2</b>	-5.872	<b>0.015</b>	-10.580	-1.165
	Systolic 3	-1.603	0.494	-6.232	3.027

**Table 4: Mancova Test DBP**

Covariate	Variable	B	P-value	95% CI	
				Min	Max
Compliance with medication	<b>Diastolic 1</b>	4.658	<b>0.022</b>	.685	8.631
	Diastolic 2	5.146	<b>0.017</b>	.923	9.369
	Diastolic 3	1.406	0.280	-1.161	3.974
Smoking habits	<b>Diastolic 1</b>	-7.821	<b>0.006</b>	-13.304	-2.337
	Diastolic 2	-4.432	0.134	-10.260	1.396
	Diastolic 3	-2.494	0.166	-6.037	1.050

### Discussion

The DASH diet is low in saturated fat and cholesterol. This diet is recommended by the American Heart Association to lower the blood pressure based on the results of a study assessing a clinical approach to investigate the effect of food consumption on blood pressure in subjects 22 years with the systolic blood pressure <160 mmHg and diastolic 80–95 mmHg in America. The results of this study revealed an average systolic and diastolic drop of 6 and 3 mmHg, respectively, in the DASH diet group, whilst in those receiving a diet rich in fruit and vegetables, the systolic and diastolic pressure dropped by 3 and 2 mmHg, respectively.<sup>6</sup>DASHI is a modification of DASH regarding the type and frequency of food and the amount of energy given. Compared with the DASH menu, the DASHI menu differs in the types of food, namely carbohydrate sources, generally derived from rice, vegetables derived from those available in the area and fat derived from oil and coconut milk; it emphasises on vegetables and fruits and consumption of low-fat milk.<sup>7</sup>

In this study, the diet compliance variable was measured using DASHI based on the Harahap study in 2009, which was assessed based on scoring, followed by categorisation into quite obedient and less obedient. According to the WHO, dietary compliance in developed countries is an average of 50%, whilst for developing countries, it is lower. This study indicated that of 96

respondents, 54% sufficiently adhered to the DASHI diet and 45.8% were not compliant, revealing that the number of respondents less obedient and relatively obedient to the diet is not quite different.

This study assessed how dietary adherence affects changes in SBP and DBP differences at three time-points. We found no significant differences between diet-compliant and non-diet-adherent groups with a decrease in the SBP and DBP ( $p > 0.05$ ). Conversely, comparison of first- and second-month measurements and second- and third-month measurements exhibited differences in the SBP and DBP. Some studies indicated a favourable effect of reducing the SBP and DBP in adults on DASH diet. Despite variations in blood pressure reduction rates in different subgroups, the consumption of DASH diet resulted in a reduction of 6.74 mmHg in SBP and 3.54 mmHg in DBP amongst adherents.<sup>8</sup>

The distribution of plots in this study of hypertensive patients quite adherent to the DASHI diet was better in lowering SBP and DBP. Some studies have suggested that a combination of DASH diet with sodium reduction or weight loss exerts a marked effect on the blood pressure reduction. This effect was observed in stage 1 hypertensive patients in African–American populations.<sup>9</sup>

In this study, most respondents had a healthy lifestyle, such as avoiding smoking, monitoring blood pressure and regularly weighing, accounting for considerable blood pressure differences at each measured time-point.

However, the SBP in the first- and second-month had increased, which could be attributed to the high-sodium consumption habits of respondents. In the second-month, the examination was a transition after that the Eid al-Fitr ceremony, increasing the likelihood of dietary changes at that time. Based on studies in Asia, the prevalence of increase in the SBP correlates with an increase in body mass index and waist circumference.<sup>10</sup>

Studies in Chinese and Korean women suggested that abdominal obesity, which is based on the waist circumference, markedly correlates with an increase in the SBP. Additionally, several factors can increase the SBP, one of which is sleep quality.<sup>11</sup> Respondents in this study had overweight BMI, and most respondents who experienced moderate stress had difficulty sleeping (poor sleep quality).

Most respondents (85 patients) in this study were non-smokers because they were well aware of hazards of smoking through media and counselling by public health workers. Covariate factors in this study that affected differences in the SBP and DBP to the DASHI diet compliance in hypertensive patients are smoking habits. Cigarettes contain substantial nicotine, tar, carbon monoxide, which are very dangerous and can enter and damage the lining of the endothelium in the blood vessel wall, ultimately causing hypertension. A study reported male and female smokers exhibited high SBP and DBP than non-smokers.<sup>12</sup>

Adherence to medication also affects the blood pressure control in hypertensive patients. In this study, 74% of respondents did not adhere to the medication given by health workers. Most patients do not consume the medication regularly and only take drugs if there are symptoms, accounting for uncontrolled blood pressure in hypertensive patients.

In conclusion, this study establishes differences in the SBP and DBP at three measurements. Overall, dietary compliance (DASHI; quite obedient and disobedience) exerts no effect on differences in the SBP and DBP. However, effects of DASHI diet compliance were noted on differences in the SBP and DBP on blood pressure measurements in the first-and second-month compared with the third.

### Conclusion

There are differences in SBP and DBP on 3 measurements. Overall there is no effect of diet

compliance (DASHI) (quite obedient and disobedience) on differences in SBP and DBP with  $p\text{-value} > 0.05$ . There is effect of diet compliance (DASHI) on differences in SBP and DBP measurements the first month compared to the third month with a  $p\text{-value} < 0.05$ , and the second month's blood pressure compared to the third month with  $p\text{-value} < 0.05$

Multivariate test results showed that there were differences in SBP on DASHI diet compliance after being controlled by smoking covariates, and there were differences in DBP on DASHI diet compliance after control of compliance covariates medication and smoking.

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**Conflict of Interest:** The authors have no conflict of interest to disclose in this work.

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# A Case Study of the Impact of Overweight on Body Image and Self-Esteem in a Population of Moroccan Adolescents and Adults

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## Abstract

**Context:** According to WHO, obesity or overweight are risk factors of psychological disorders and quality of life deterioration.

**Objective:** Evaluating the impact of overweight on body image and self-esteem in a population of Moroccan adolescents and adults.

**Method:** The study was carried out on 288 subjects (150 men, and 138 women), aged on average  $34,86 \pm 0,82$  years [15 -76]. Over weight was measure dusing the Body Mass Index (BMI), body image was evaluated using the Physical Appearance Comparison Scale (PACS), and self-esteem was evaluated using the Rosenberg Self-Esteem Scale (RSES).

**Results:** 43,28 % (n= 103) of subjects had a normal body weight, 25,63% (n=61) were overweight and 16,81% (n=40) were obese. 66,67% (68/102) of over weight subjects reported having compared their physical appearance to others. However, 60,46 % (78/129) of thosewith normal BMI also reported having compared their appearance to others some times or often. Among obese subjects, 73,68% (42/57) tend to compare their physical appearance to others some times or often. In terms of self-esteem, 85,3% (n=209) have a low to verylow self-esteem, 13,1% (n=32) have a moderate self-esteem and 1.6% have a high self-esteem. However, only 15,13% (28/185) of subjects with normal BMI had a moderate to high self-esteem.

A negative correlation was found between PACS and RSES ( $r = -0,139$ ) and statistically significant correlations were found between BMI and both PACS ( $r = +0.125$ ) and RSES ( $r = -0.189$ ).

**Conclusion:** Consequently, it is recommended to establish multi-disciplinary programs for management of over weight among adolescents and adults, to mainstream the care received and reduce the pressure they experience.

**Keywords:** Obesity, BMI, Body Image, Self-esteem, Prevalence, Morocco.

## Introduction

According to WHO (2016), obesity is considered a chronic disease due to its negative impact on general health. In adults, there are reference values to define overweight and obesity, according to the value of the Body Mass Index (BMI). We talk about overweight when BMI is greater than or equal to 25 kg/m<sup>2</sup>, and about

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obesity if BMI is greater than or equal to 30 kg/m<sup>2</sup><sup>1</sup>. Age and sex are also taken into account when interpreting BMI<sup>2</sup> values. The prevalence of overweight and obesity among adolescents has doubled worldwide since the end of the seventies up until beginning of the first decade of 2000.

Obesity can cause several psychological impairments like low self-esteem and body image<sup>3</sup>

**Dissatisfaction:** The psychological distress among obese subjects is often linked to social stigma, lack of self-esteem and dissatisfaction with body image. Many studies have demonstrated that overweight or obese adolescents are at high risk of developing low self-esteem, body image issues and low performance in social and sport activities leading to a lack of socializing<sup>4-7</sup>.

Body image is linked to the individual's perception of his own body, influenced by the socio-cultural context where he grows<sup>8</sup>. It is subject-specific and impacts self-esteem<sup>9</sup> significantly. Self-esteem and the physical element is linked to are indicators of individuals' mental health<sup>9</sup>. This health issue may have serious psychological and social consequences on adolescents' school performance and the way and frequency of their social interactions, which may last till their adult life<sup>10</sup>.

## Material and Method

**Study Sample:** The study was carried out on 288 participants (n=288), 51,9% (n=150) males, and 47,8% (n=138) females. The average age among subjects is 34,86 ± 0,82 years [15,76]. It was carried out in big Moroccan cities: Tangier, Rabat, Casablanca, Fez, Marrakech, Agadir and Oujda, the study sample has been selected randomly to ensure homogeneity and representativity.

**Method:** The study used BMI, defined as ratio of weight in kilograms by the body area in square meters (kg/m<sup>2</sup>). According to WHO body weight classification, for normal body weight, BMI is 18.5-25 kg/m<sup>2</sup>, for overweight BMI is 5-30 kg/m<sup>2</sup>, and for obesity it is ≥30 kg/m<sup>2</sup>.

Furthermore, the study used the 5-items Physical Appearance Comparison Scale (PACS), which assesses the tendency of individuals to compare their physical appearance in five social

situations. Subjects report how often they compare their physical appearance with others on a scale of 1 to 5: where 1 means never and 5 means always. Total scores range from 5 to 25, where higher scores indicate a strong tendency to compare one's appearance with others.

In addition, the impact of obesity on self-perception was measured using the Rosenberg scale of self-esteem (Rosenberg 1965), which measures overall self-esteem. It comprises ten statements to which subjects need to express their level of agreement on a scale similar to "Likert" scale from 1-4, where 1 means "totally agree", to 4 meaning "totally disagree".

**Statistical Analysis:** To verify the participants' understanding of the test's elements, a preliminary one was carried out on twelve subjects, no aberrations noted. The validity of the criterion of simultaneity of the PACS and the self-esteem was studied by analyzing their association with the BMI.

Data collected were analyzed by SPSS (ver.20). Results were expressed in average ± standard deviation (SD) for quantitative variables, and in frequency for qualitative variables. Multiple correlations analyses were carried out like X<sup>2</sup> test with 5 % error and ANOVA (one way).

## Results

**Socio-demographic and anthropometric characteristics:** The study was carried out with 288 subjects, 52,8% (n=150) are males, and 47,9% (n=138) are females. Average age among males is 33,5 ± 1,09 years [16,76], and among women is 35,79 ± 1,20 years [15,71]. The test of Fisher hasn't demonstrated a significant difference in age between genders (Fisher=1,98; p<0,16). The distribution per age groups shows that 63,2% (n=182) are adults, and 36,8% (n=121) are adolescents (15-25 y.o). The distribution per school attainment shows that 58% (n=167) are university graduates vs. 42% (n=121) reaching secondary school. However, across all single subjects, 52,19% are adolescents and 45,05% are adults.

The average BMI of participants is 26,04 ± 6,30, [15,61:75,12]. The difference of average BMI across gender groups is statistically significant, (males; 24,68 ± 4,92 vs. females; 27,53 ± 7,10); t (286) = 3,98, p<0,000) (Table 1).

**Table 1: Sociodemo graphic and an thropometric characteristics of participants**

Variable	Value	Sample size (N=288)	Percentage
Gender	Male	150	52,1
	Female	138	47,9
Level of studies attained	Secondary	121	42
	Graduate	167	58
Age category	Adolescent	106	36,8
	Adult	182	63,2
BMI	Normal	129	44,79
	Overweight	102	35,42
	Obese	57	19,79

**Study of the Physical Appearance Comparison**

**Scale:** The distribution of scores per percentiles, shows that 34,7% (n=100) of subjects have answered rarely or never to the statement of “I compare my appearance to the appearance of others”, while 43,1% (n=124) have answered sometimes, and 22,2% (n=64) answered often.

The tests of Chi Square show statistically significant associations between the PACS and variables like: sex, highest level of studies achieved, age and BMI, for which the p-values are respectively: (p<0,66) (p<0,047), (p<0,032) and (p<0,013).

From the point of view of the level of studies achieved,

the rate of people having reached secondary school, and those with university degrees who have reported that they often compare their appearance to others are respectively 26,45% and 19,16%. Amongst those study participants who reported comparing their appearance to others only sometimes, 35,54% have reached secondary school vs. 48,50% who are university graduates.

In terms of age group, among adolescents (n=103), 51,46% reported comparing their physical appearance to others sometimes, while 22.33% reported doing it often. However, among adults (n=179) 21,23% reported comparing their physical appearance to others often vs, 39,11% of those who did it sometimes only. With regards to the distribution of PACS and BMI, the Chi square test confirmed a significant association between both variables (Chi square=8,45; 51,46%). Indeed, the rates of overweight and obesity among participants who reported comparing their physical appearance to others often, are respectively 19,61% and 35,09%. Although 47,6% of overweight participants and 38,6% the obese have reported doing it only some times, the tendency to compare one’s physical appearance to others is much more accentuated among obese subjects (73,68%) than among overweight ones (66,67%). Now, among obese subjects (n=57), 14 females and 7 males reported comparing their physical appearance to others often, while among those who reported doing it some times, 13 were females and 9 were males (Table 2).

**Table 2: Association of the PACS score with sex, level of studies attained, age and BMI**

Variable		PACS Score			Total	X <sup>2</sup> (p value)
		“I compare my physical appearance to others”				
		Rarely (n=100)	Sometimes (n=124)	Often (n=60)		
Sex	Male	54	64	32	150	0,12 (p<0,66)
	Female	46	60	32	138	
Level of studies achieved	Secondary	46	43	32	121	5,45 (p<0,047) *
	University	54	81	32	167	
Age	Adolescent	28	53	25	106	4,58 (p<0,032) *
	Adult	72	71	39	182	
BMI	Normal	51	54	24	129	8,46 (p<0,013) *
	Overweight	34	48	20	102	
	Obese	15	22	20	57	

\*: Significant difference with 5% margin of error

**The study of Rosenberg scale of self-esteem (RSES):** The distribution of scores obtained shows that 85,3% (n=209) had a low to verylow self-esteem,13,1% (n=32) had a moderate self-esteem and 1.6% (n=4) had a high self-esteem. The Chi-squared test shows a significant association between self-esteem and variables like:level of studiesachieved and BMI, with p-values

(p<0,016) and (p<0,023) respectively. Indeed, 90,78% of subjectshadachieveduniversitystudies vs. 77,88% whohadreachedsenaryschool, all of whichhad a low to verylow self-esteem. 85,36% of overweightsubjects and 92,85% of the obese had a low to verylow self-esteem (Table 3).

**Table 3: Comparison of the RSES based on sex, level of studies, age and BMI**

Variables		RSES			Total N	X <sup>2</sup> (p value)
		Low	Moderate	High		
		(n=209)	(n=32)	(n=4)		
Sex	Male	111	19	3	133	1,14 (p<0,58)
	Female	98	13	1	112	
Level of studies achieved	Secondary	81	21	2	104	8,30 (p<0,016) *
	University	128	11	2	141	
Age	Adolescent	81	9	1	91	1,60 (p<0,45)
	Adult	128	23	3	154	
BMI	Normal	157	27	1	185	11,35 (p<0,023) *
	Overweight	35	3	3	41	
	Obese	13	1	0	14	

\*: Significant difference with a margin of error of 5%

The correlationanalysis by multiple correlationof variablesinvolved, shows that the PACS isnegativelycorrelatedwith the RSES (r=-0,139; p<0,030), demonstratingthatsubjectswith high PACS score have a low self- esteem and vice-versa. However, itwasdemonstratedthat BMI ispositivelycorrelatedwith PACS (r=0,125; p<0,038) and negativelycorrelatedwith RSES (r=-0,189; p<0,033). Age has not shownanysignificantcorrelationwith PACS and RSES, but remains in a significantcorrelationwith BMI with a correlation coefficient of r=+0,337 (p<0,000) (Table 4).

**Table 4: Multiple correlationsbetween PACS, RSES, BMI and age.**

Variables		PAC score	RSES Score	BMI	Age
PAC Score	Correlation of Pearson	1	-,139*	,125*	-,097
	Sig. (bilateral)		,030	,038	,106
Score RSES	Correlation of Pearson		1	-,189*	,046
	Sig. (bilateral)			,033	,472
BMI	Correlation of Pearson			1	,337**
	Sig. (bilateral)				,000
Age	Correlation of Pearson				1

\* The correlation is significant with a p=value of 0.05 (bilateral).

\*\* The correlation is significant with a p=value of 0.01 (bilateral).

## Discussion

This study aimed to explore the relationship between obesity and self-esteem/body image among Moroccan adolescents and adults of both genders (288 subjects). The rate of obese adolescents in our sample reached 9,71%.

However, in Canada and the US data show that more than the third of adolescents are considered overweight or obese<sup>6</sup>. The results of this study show a significant association between BMI and PACS ( $r=0,12$ ;  $p<0,038$ ), which explains the direct impact of weight on body image, which manifests by comparing one's physical appearance to others.

In addition, men and women differ clearly when it comes to self-assessment of their body, on average women perceive themselves more as "fat" than men.

In terms of dissatisfaction with the body image, differences between genders are obvious; it increases more among women than men as BMI increases. The particular focus of women on their weight comes from the collective perception of body image among women, linking body image satisfaction to slimness<sup>11</sup>.

Female adolescents are more targeted than males by media, vector of socio-cultural standards and ideals of beauty, where the ideal body is the one which is slim<sup>12,13</sup>. The most unconfident individuals tend to compare their physical appearance to others most. Furthermore, the results confirm the association between body satisfaction and self-esteem ( $r=0,139$ ;  $p<0,03$ ). This is supported by previous research, demonstrating that the level of body satisfaction is associated with a high self-esteem<sup>14-16</sup> in both genders. In fact, scientific works which studied the correlation between body image satisfaction and self-esteem, confirm the strong association between both, regardless of gender or age.

How body is perceived is at the core of complex processes involving self-expression and self-assessment. More precisely, self-evaluation is imbedded in a common perceptive process, subjacent to self-esteem<sup>17</sup>.

Many studies demonstrated that 50% to 75% of overweight adolescents exhibit low self-esteem. Significant correlation was found between PACS and RSES among overweight adolescents and adults ( $r=-0,139$ ). Other studies demonstrated a disturbed body image and self-esteem among overweight and obese young people<sup>18</sup>, where adolescents are more susceptible

of both low self-esteem and body image issues compared to those with normal body weight<sup>19</sup>

Our results suggest that the need to be socially accepted, over coming shame, and excessive focus on physical appearance are paramount to improving self-esteem. They clarify to what extent the entourage of overweight individuals can influence their self-esteem, their psyche and attitudes. These results are of invaluable interest to social and public health decision makers, to improve the mental health of this growing population in Morocco.

## Conclusion

This study opened new avenues for a need to establish multidisciplinary programs for obesity management, involving the expertise of a variety of healthcare professionals based on the psychological profile of each patient. They suggest that the psychological dimensions related to body image and self-esteem could condition the individual's relationships, his social acceptance and integration. Body satisfaction seems to lead to higher self-esteem among Moroccan females. In summary, the existing relation between body image and self-esteem denotes the importance of restoring the deficient self-esteem, in body image disorders, by establishing an institutional program with a wholistic approach to reconstitute the subjective value that obese subjects associate to their body.

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# Analysis Factors of Nursing Performance at the Mother and Child Hospital in East Java

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## Abstract

**Introduction:** Hospital services are inseparable from the role of a nurse who is demanded to be able to provide the best performance. Factors that can improve nurse performance are motivation and self-esteem.

**Objective:** This study aimed to analyse the factors that can improve the performance of nurses in Mother and Child Hospital.

**Method:** This study used a cross-sectional design and a simple random sampling technique. The calculation result involved 295 samples. The independent variables were intrinsic and extrinsic motivation and self-esteem. The dependent variable was nursing performance. The data was collected using a questionnaire that was tested for validity and reliability. The analysis used a multiple linear regression test with a significance level of  $\alpha \leq 0.05$ .

**Results:** The results showed that the educational level related to the age aspect was associated with job performance ( $p=0.035$ ) and that the intrinsic motivation was associated with job performance ( $p=0.016$ ). Extrinsic motivation correlated with job performance ( $p=0.000$ ).

**Conclusion:** Intrinsic and extrinsic motivation factors with education level have a good effect on improving the performance of nurses. However, the role of the hospital is needed to maintain and improve job performance to be even better. It is recommended that nurses increase their educational level by continuing school to a higher level.

**Keyword:** *Intrinsic motivation, extrinsic motivation, educational level, nurse performance.*

## Introduction

Nurse performance is vital to quality patient care outcomes<sup>1,2</sup>. Job satisfaction is a global concern because of the potential impact on the quality and safety of patient

care in addition to low job satisfaction is a contributing factor associated with nurses leaving their current jobs and the profession<sup>2,3</sup>. The nursing workforce in the healthcare sector has a specific structure that cannot be ignored and motivation can play an integral role in many of the compelling challenges facing the nursing profession today. Although nurses' motivation is a significant element of work performance, it is largely understudied and a better understanding of motivation sources among nurses in Saudi Arabia can give us a deeper understanding of motivators that can be utilised to preserve and increase the number of national nurses in the Saudi Arabia's nursing workforce. Moreover,

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motivation can significantly improve the steadiness of organisational performance<sup>5</sup>.

Motivation is important in management. Performance levels for motivated employees are higher than that for unmotivated ones and vice versa. Intrinsic and extrinsic motivations are positively related to nurses' job performance<sup>6</sup>. Therefore, applying a well designed motivating strategy plays a significant role in enabling employees to use their skills, expertise, and knowledge effectively. Additionally, enhancing employee motivation can help maximise employee skills, sincerity, punctuality, flexibility, and abrupt response to different tasks; as a result of an employee's high performance level, the organisation's overall productivity level is affected positively<sup>7</sup>.

According to the United States National Center for Health Workforce Analysis report in 2012, there are approximately 2.9 million nurses currently active in the United States. The demand on the nursing profession is expected to reach approximately three million in 2025. The shortage of nurses in Indonesia is increasing across the board and is expected to reach approximately 17.402 nurses<sup>8</sup>.

On the positive side, to the extent nurses focus more on patients' accomplishment as a source of self worth, they adopted a more autonomy supportive stance, however, only when their failure based orientation was minimised<sup>7</sup>. When nurses increase their team-based self-esteem that a predictor perceives more team trust, which improves their motivation or confidence to engage in voice behaviour that could be risky in their group<sup>6</sup>. The purpose of this study was to analyse the factors that can improve the performance of nurses in Mother and Child Hospital.

## Method

This study was a descriptive research study that used a cross-sectional design. The sample in this research consisted of 295 nurses of maternal and child hospital utilising simple random sampling. The independent variables of the research included nurses of maternal and child hospital. The dependent variable was nursing performance. The instruments used in the collecting data were a questionnaire for measuring the involved

intrinsic motivation was adopted from Winkel (2009); Fauzan (2006), for the extrinsic motivation variable, was adopted from Amabile (1997); Fauzan (2006), nurse performance was adopted from Mathis and Jackson (2002), the nurse's self-esteem was adopted from Wells and Marwell (1976); Soegianto (2010). All items of the statement were then developed by researchers to suit the conditions of the Mother and Child Hospital. The data analysis used in this research utilised a multiple linear regression test with a significant level of  $\alpha < 0.05$ .

## Results

**Table 1: Respondent Demographic Characteristics (n=295)**

Variable	n	%
<b>Age</b>		
≤ 30 years	34	11.5
31 – 40 years	166	56.3
41 – 50 years	92	31.1
≥ 51 years	3	01.0
<b>Sex</b>		
Male	41	13.9
Female	254	86.1
<b>Education Level</b>		
Diploma Degree 3	93	31.4
Diploma Degree 4	45	15.3
Bachelor Nursing	112	38.0
Registered Nurse (Ners)	45	15.3
<b>Length of Work</b>		
< 1 years	4	01.4
1 – 2 years	49	15.6
3 – 5 years	124	42.0
> 5 years	118	40.0

Multiple Linear Regression Test of the Nursing Performance at the Mother and Child Hospital in East Java.

**Table 2: The Correlation between Motivation and Self Esteem with Nursing Performance at the Mother and Child Hospital in East Java**

Sub Variables	Category	F	%	p
Age	≤ 30 years	34	11.5	0.506
	31 – 40 years	166	56.3	
	41 – 50 years	92	31.1	
Sex	Male	41	13.9	0.275
	Female	254	86.1	
Education Level	Diploma Degree 3	93	31.4	0.035
	Diploma Degree 4	45	15.3	
	Bachelor Nursing	112	38.0	
	Registered Nurse (Ners)	45	15.3	
Length of Work	< 1 years	4	01.4	0.945
	1 – 2 years	49	15.6	
	3 – 5 years	124	42.0	
	> 5 years	118	40.0	
Sub Variables		F	%	p
<b>Intrinsic Motivation (X1)</b>				
Responsible Achievement	Interest to be a Health Care Worker	295	100	0.016
Appreciation	Opportunity to Developed			
<b>Extrinsic Motivation (X2)</b>				
Salary as a Health Care Worker	Physical Conditions	295	100	0.000
Supervision/ Schedules	Hospital policy			
Sub Variables				
<b>Self Esteem (X.3)</b>				
self-acceptance	self-respect	295	100	0.404
self-confidence				

This study found that the level of education and motivation had a significant correlation in association with job performance. Personal factor within the aspects of educational level had a significant relationship with job performance. The results of this study indicate that 38% of nurses with educational background bachelor degree with good performance, bigger compared to the educated diploma (31.4%). As seen in Table 2, the value of educational level was 0.035, which means that  $p < 0.05$ . Intrinsic motivation with responsible achievement, interest to be health care worker, appreciation, the opportunity to developed aspect had a significant relationship with performance of nurse. It also had a  $p$ -value of 0.016, which equals  $p < 0.05$ . Extrinsic motivation within the salary as a health care

worker, physical conditions, supervision/ schedules, hospital policy aspect had a significant correlation with job performance with value was 0.000.

### Discussion

**Educational Level of Job Performance:** In this study nurse with a Bachelor of Nursing educational background had the opportunity to perform better than the educational background of SPK / SPR. This is consistent with <sup>10</sup> nurses with higher education have higher workability. Gibson<sup>11</sup> also suggested that high levels of education generally lead to someone more capable and willing to accept responsibility. Furthermore, researcher<sup>12</sup> explained that education is a picture of individual abilities and skills, is the main



factor that can affect performance. Through Education, a person can increase intellectual maturity so that he can make decisions in action. Besides, it is assumed that someone who has a higher education background has goals, expectations, and insights to improve work performance through optimal performance. The higher the nurse's education, possible analytical power to handle nursing and medical problems the higher so that the application of care nursing to patients is getting better. This result is also strengthened from research<sup>13</sup> which states that education has a significant influence on employee performance.

#### **Intrinsic Motivation of Job Performance:**

Hospital management needs to pay attention to aspects of work motivation of its employees, including nurses. High work motivation can improve the performance of services provided. Efforts are needed to improve work motivation for nurses so that they can have a positive impact on hospital development. Intrinsic motivation sub-variables were consisting of responsibility, recognition, work performance, career development, work and promotion results obtained in general, all intrinsic motivation sub-variables influence employee performance. Intrinsic motivational factors in the form of opportunities for education/career development, the extent of work received is an important factor for doctors to improve their performance which results in job satisfaction levels. Intrinsic motivation can influence opportunities for promotion that can improve one's performance because one's performance is measured in terms of their opportunities for promotion

Intrinsic motivation has a significant relationship with the job performance of nurses, indicating that intrinsic motivation has been able to increase the job performance of nurses in Maternal and Child Hospitals. Intrinsic motivation is characterised by a focus on satisfaction in performing a particular behaviour for its own<sup>14</sup>. The concept<sup>15</sup> that intrinsic motivation is the motivation that the direction of stimulation comes from within a person without interference from outside factors. Where intrinsic motivation as a whole associates motivation with the work that is being done so that someone will feel that his work is fun, binding and satisfying to him. In other words, someone who is intrinsically motivated will find out for himself that the process gives satisfaction to himself. Factors Influencing to Employee's performance such as job stress, physical stress, psychological stress, organisational stress and also motivation and communication<sup>16</sup>. The other

research showed that nurses supposed job satisfaction, logistic provisions, and an enabling work environment as key intrinsic motivation factors that encourage their work performance at the hospital<sup>17</sup>.

#### **Extrinsic Motivation of Job Performance:**

Extrinsic motivation has a significant effect on nurse job performance. The higher effective extrinsic motivation will be effected on the higher the nurse's job performance. External motivation showing a reason to participate in their job to achieve its own goals. Extrinsic motivation mostly influenced by situational aspects, such as the benefits factors<sup>21</sup>. The results of this study contradict<sup>22</sup> which states that extrinsic will question a person getting a response to something outside of his work, especially from others.

On the other hand, this study also proves the items of the theory<sup>23</sup> by providing facts about factors of acceptance, physical working conditions, supervision, and significant organisational policies with motivation nurse job satisfaction. Extrinsic motivation is created from external stimuli and can be stimulated by incentives, awards and other praise. In the health care aspect, extrinsic motivation as a force to interchange nurses to perform excellent behaviour that will bring benefits to their workplace or organisation<sup>24</sup>.

Extrinsic motivation has a significant effect on nurses' performance in Maternal and Child hospitals in East Java. Work performance is linked to efficiency or perception-oriented terms such as supervisory ratings and goal accomplishments<sup>25</sup>. The results of this study reinforce and explain about extrinsic motivation which gives rise to motivation that can help improve the situation. The existence of extrinsic motivation that triggers to increase in nurse performance. Extrinsic motivation in this study was arranged through four indicators, such as grants or salary as paramedics, physical conditions, scheduling official services, and hospital policies. Analysis of four indicators in the structural research model shows the important indicators in designing extrinsic motivation. Increased work performance, job satisfaction and great team are identified effects of nurses' motivation<sup>26</sup>. That situation also creates an environment where people ready to work with initiative, interest and enthusiasm, with a high personal and group satisfaction, and confidence to achieve their personal as well as organisational goals.

Job satisfaction in this study formulates by four indicators such as satisfaction with the salary, their

work, their chief and satisfaction with public works. Other research states that a good leader will have an impact such as trust and opportunities to learn and develop their abilities, in addition to the leader's policy support their on-the-job choices and actions<sup>27</sup>. From the descriptive analysis that has been presented that the job satisfaction variable was significant. These results show that the nurse's job satisfaction has well done, but not yet maximised. This information shows that there is still an opportunity to increase the need for nurses by making effective the job satisfaction of nurses at the mother and child hospital in East Java. The biggest factor that shapes job satisfaction is the satisfaction of coworkers to be able to help while carrying out their duties in the hospital. Employee performance is one of the key factors for reducing the quality of health services<sup>28</sup>.

### Conclusion

Motivation must be more considered to increase work motivation. Providing opportunity broader for employees to continue to grow and get the opportunities more open for education. Then the employee's performance will remain at the highest level that can be a positive impact on the development of the hospital in the future.

**Ethical Clearance:** This study has passed the institutional review board from NyaiAgengPinasih Mother and Child Hospital, East Java Province, Indonesia. The number of ethical consideration: 133/134/RSIA-NAP/C.10/V/2019.

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**Conflict of Interest:** None.

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# Effectivity of Teacher Motivation on Dental and Oral Hygiene of Elementary School Students

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## Abstract

**Background:** Dental and oral diseases can be prevented by keeping them clean through toothbrushing in a proper way. The behavior of the brushing of the students can be influenced by an external motivation by their teacher. The purpose of this study is to identify the influence of teacher motivation on the improvement of dental and oral hygiene of Elementary School students in Bangli regency, Indonesia.

**Method:** This research is an experimental study with a pre-test and post-test control group design. The sample was 248 students, from ten elementary schools randomly chosen in each district, then grouped into an intervention group and control group. The data which was collected are dental and oral hygiene in before and after the intervention. The data was analyzed using Wilcoxon Signed Rank Test and Mann Whitney Test.

**Results:** The result of OHI-S on intervention group obtain p-value in 0.000 which is less than 0.05. Meaning that there is a significant difference of dental and oral hygiene of the respondent before and after the intervention. Meanwhile on the control group, the p-value is 0.284, more than 0.05. Meaning that there is no significant difference in dental and oral hygiene before and after the intervention. Mann Whitney Test OHI-S intervention group and control group has sig=0.000, less than 0.05 which means there is a significant difference in the dental and oral hygiene of the intervention group and control group before and after the intervention.

**Conclusion:** In conclusion, the teacher motivation on dental and oral hygiene for the student is effective to increase the dental and oral hygiene of the 3<sup>rd</sup> grade elementary school students.

**Keywords:** Motivation, OHI-S, student, teacher.

## Introduction

Children are vulnerable to dental and oral disease because of their teeth changes from deciduous to permanent. Therefore, there are some oral health problems can be found such as persistence in which deciduous teeth have not yet fell off, while the permanent

teeth have already arisen. Dental decay is the infectious disease which is resulted by the problem of disruption of normal oral bacteria and overgrowth cariogenic organism <sup>(1)(2)(3)</sup>. In addition, gingivitis can also attack as it is also common disease among population in which may result as tooth loss <sup>(4)</sup>. All the problems of dental including to dental caries mostly caused by the health behavior <sup>(5)</sup>. The ability to keep the dental and oral health are influenced by some factors such as knowledge and willingness. The willingness of someone to do something is strongly influenced by a motivation, internally or influenced by others<sup>(6)</sup>. Especially for elementary student, the motivation may come from their teacher to do some act such as how to keep their dental and oral health properly. Teacher

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being an important and role model for their students. Through motivation which is given by the teacher every morning when student start the learning process maybe can give some impact on altering their student behavior especially on keeping the dental and oral health. Toothbrushing must be adopted from a young age<sup>(7)(8)(9)(10)</sup>.

Bangli district is located in Bali province, Indonesia with 141 public elementary schools spread in 4 sub-districts. There are 48 in Kintamani, 30 in Susut, 29 in Tembuku and 33 in Bangli. There is no recent study conducted on dental and oral hygiene by involving teachers as the motivator to their student. That fact encourages the study about teacher motivation effectivity on the improvement of dental and oral hygiene to be conducted. The purpose of this study is to identify the effectivity of teacher motivation on the improvement of dental and oral hygiene in 3<sup>rd</sup> grade elementary school in Bangli Regency in 2018. We analyze the improvement of dental and oral hygiene before and after the motivation is given.

### Methodology

This research is an experimental community study with pre-test and post-test control group design as mentioned in <sup>(11)</sup>. The population is all of the 3<sup>rd</sup>-grade of Elementary School in Bangli Regency. The minimum sample taken was 124 in each group and the total was 248 students taken from 10 elementary schools and determined by proportional sampling. Elementary school was chosen randomly in each sub district. There were three school in Kintamani, three school in Bangli, three schools in Susut and one school in Tembuku. The type of data collected are primary and secondary data. Primary data of dental and oral hygiene was collected by measuring Oral Hygiene Index Simplified (OHI-S) in both intervention and control group. Health promotion and toothbrushing altogether were carried out to the intervention and control group. A calibration with the principal and teachers was conducted, five 3<sup>rd</sup>-grade teachers were told about the subject that would be delivered to their students and five principals were told about how to observe the process of motivation given by the teachers. At least three weeks in a row, teachers remind and motivate the intervention group to keep their

dental and oral hygiene. At the 21<sup>st</sup> day, the evaluation was done by remeasuring the dental and oral health by using OHIS-S index, then health promotion about dental and oral health and brushing teeth together were done both in intervention and control group. The collected data was analyzed by screening, editing, coding, tabulating, quantitatively by univariate while the effectivity of the teacher motivation on dental and oral hygiene of the students was analyzed by the difference of OHI-S score before and after the treatment in control and intervention group. The test used Wilcoxon and Mann Whitney test<sup>(12)</sup>.

### Results

#### A. Characteristics of Study Subject:

- **Distribution and frequency of teacher motivation:** Table 1 shows all teachers carried out motivational activities for maintaining dental and oral hygiene to the respondents resulted in good criteria with five students (100%).

**Table 1: Distribution and frequency of teacher motivation**

Motivation Criteria	Teacher	
	f	%
Good	5	100
Moderate	0	0
Poor	0	0
Fail	0	0
<b>Total</b>	5	100

- **Distribution and frequency of OHI-S criteria of student (intervention group) before and after treatment:** Table 2 shows the dental and oral hygiene of respondents (intervention group) prior to the treatment mostly resulted in moderate criteria, namely as many as 90 students (72.6%) and the least is in poor criteria, namely as many as one person (0.8%). After the treatment on dental and mouth hygiene of the respondents namely the intervention group was mostly in good criteria, which is 76 people (60.8%), and none of the respondents has dental and oral hygiene with poor criteria.

**Table 2: Distribution and frequency of OHI-S Criteria of The Students (Intervention Group) Before and After Intervention**

OHI-S Criteria	Intervention Group			
	Before		After	
	f	%	f	%
Good (0.0-1,2)	33	26.6	76	60.8
Moderate (1,3-3,0)	90	72.6	48	39.2
Poor (3,1-6,0)	1	0.8	0	0
Total	124	100	124	100

**Table 3: Distribution and Frequency of The Students (Control Group) at The Beginning of Examination and Evaluation Result**

OHI-S Criteria	Intervention Group			
	Before		After	
	f	%	f	%
Good (0.0-1,2)	18	14.5	17	13.7
Moderate (1,3-3,0)	96	77.4	98	79.0
Poor (3,1-6,0)	10	8.1	9	7.3
Total	124	100	124	100

- Distribution and frequency of the students (control group) at the beginning of examination and evaluation result:** Table 3 shows the dental and oral hygiene of respondents (control group) the results of the examination before the intervention were mostly in moderate criteria, namely 96 people (77.4%) and the least is in poor criteria, which were 10 people (8.1%). Dental and oral hygiene after the treatment is mostly in moderate criteria, as many as 98 people (79%).
- Distribution frequency criteria of dental and oral hygiene of the students (intervention group and control group) before intervention:** Table 4 shows the criteria for dental and oral hygiene of the treatment group prior to the intervention being mostly in moderate criteria, namely as many as 90 people (72.6%) and the least is in poor criteria as much as one person (0.8%). While the OHI-S criteria of control group is mostly in moderate criteria as many as 96 people (77.4%) and the least is in poor criteria as many as 10 people (8.1%).

**Table 4: Distribution Frequency Criteria of Dental and Oral Hygiene of The Student (Intervention and Control Group) Before Intervention.**

No.	OHI-S Criteria	OHI-S					
		Intervention Group		Control Group		Total	
		f	%	f	%	f	%
1.	Good	33	26.6	18	14.5	51	21
2.	Moderate	90	72.6	96	77.4	186	75
3.	Poor	1	0.8	10	8.1	11	4
Total		124	100	124	100	248	100

- Distribution and frequency of the students' dental and oral hygiene (intervention and control group) after intervention:** Table 5 shows that the level of dental and oral hygiene of the intervention group after the intervention is in good criteria, as many as 76 people (60.8%), and no one got dental and oral hygiene with poor criteria. The level of dental and oral hygiene in the control group is mostly in moderate criteria, namely 98 people (79%), and the least is in poor criteria, which is as many as nine persons (7.3%).

**Table 5: Distribution and Frequency of Dental and Oral Hygiene of The Student (Intervention Group and Control Group) After Intervention**

No.	OHI-S Criteria	OHI-S					
		Intervention Group		Control Group		Total	
		f	%	f	%	f	%
1.	Good	76	60.8	17	13.7	93	37.5
2.	Moderate	48	39.2	98	79.0	146	58.87
3.	Bad	0	0	9	7.3	9	3.63
Total		124	100	124	100	248	100

**Analysis Result:**

1. **Normality Test:** Table 6 shows the results of the normality test of both intervention and control group before and after the treatment. The value of sig = 0.000 which is less than 0.05. These results

indicate that all data are distributed abnormally. So, the different test analysis used is the Wilcoxon Signed Rank Test to test the sample related data and the Ancova Test for the two unrelated sample data <sup>(12)</sup>.

**Table 6: Normality Test**

No.	Variable	N	Mean	Std. Dev	Sig.	Conclusion
1.	OHI-S Intervention-Pre	124	1.8845	0.73235	0,000	Not Normal
2.	OHI-S Intervention-Post	124	1.2669	0.49041	0,000	Not Normal
3.	OHI-S Control-Pre	124	2.0455	0.73088	0,000	Not Normal
4.	OHI-S Control-Post	124	2.0755	0.71730	0,000	Not Normal

2. **OHI-S Analysis of the Intervention Group Before and After Treatment:** The OHI-S was analyzed using Wilcoxon Signed Rank test statistic. The Wilcoxon Signed Rank Test statistic results before and after the treatment obtain p-value (Asymp.sig 2 tailed) of 0.000, less than 0.05 which means there is a significant difference in the dental and oral hygiene of respondents before and after the intervention.

significant difference of the dental and oral hygiene between the intervention group and control group after the treatment.

**Discussion**

3. **Ohi-S Analysis of the Control Group Before and After Treatment:** OHI-S analysis of the control group before and after intervention was done by statistic Wilcoxon Signed Rank test. The results obtain the Wilcoxon Signed Rank test with *p value (Asymp.sig 2 tailed) = 0.284* more than 0.05 which means there is no significant difference of the dental and oral health of the student before and after treatment.

The control group has a moderate score on the average of dental and oral hygiene before and after treatment. There is no significant difference of dental and oral hygiene before and after the treatment, proven by the result of statistical test Wilcoxon Signed Rank test which resulted p-value (Asymp.sig 2 tailed) 0.284, greater than the critical value of the study 0.05. Meanwhile in the intervention group, there is a significant difference, there is an improvement from moderate criteria to good criteria. Statistically, there is a significant difference on dental and oral hygiene before and after intervention, shown by the result of statistics Wilcoxon Signed Rank Test which resulted p-value (Asymp.sig 2 tailed) 0.000 lesser than 0.05. The result of Mann Whitney test sig is 1.75 which means more than 0.05 showing that there is no significant difference between dental and oral hygiene of control group and intervention group before the treatment was given. Meanwhile the Mann Whitney test after treatment has value sig = 0.000, lesser than 0.05 which means there is a significant difference of dental and oral hygiene after the treatment was given. This is caused by before the motivation was given by the teacher, the students brush their teeth irregularly and improperly. This is supported by <sup>(13)</sup>, which says that if we don't brushed our teeth soon after eating regularly and properly, there will be the cumulation of food or called as debris. The motivation that given by the teacher in the beginning of class will encourage the habit of the student to brush their teeth in the morning

4. **OHI-S Analysis of Intervention Group and Control Group Before Treatment:** The OHI-S analysis result of intervention group and control group before the treatment was analyzed by Ancova. The Mann-Whitney results show the sig value of 1.75 greater than 0.05 which means there is no significant difference of dental and oral hygiene (OHI-S score) between the intervention group and control group before the treatment.

5. **OHI-S Analysis of Intervention Group and Control Group After Treatment:** The analysis of dental and oral hygiene (OHI-S score) of the student in intervention group and control group after the treatment was analyzed using Mann-Whitney test. The results of Mann-Whitney test show that the sig value is 0.000, less than 0.05 which means there is a

after breakfast and at night before sleep routinely. Power and strength in human itself is caused by the motivation which given by others to encourage to achieve a goal<sup>(14)</sup>. The changes on behavior after the student has given a health promotion and given the movie about the impact of careless to the dental and oral health, it can encourage the students from toothbrushing lazily to diligently and can reach the oral and dental health better than it was<sup>(15)</sup>. Thus, the success of effectivity also influenced by the teachers as the school dental service to play a key role in the dental and oral health of the students<sup>(16) (17) (18)</sup>.

### Conclusion

Based on our findings in this research, the following conclusions can be drawn. There is a significant difference of dental and oral hygiene level either before and after treatment at the intervention group and there is no any significant difference at the control group before given the treatment. Significant difference is found at the intervention group and control group after the treatment was given. So, it can be concluded that the motivation given by the teacher about how to keep the dental and oral hygiene is effective to improve the dental and oral hygiene.

**Conflict of Interest:** The author has no conflict of interests related to the conduct and reporting of this research.

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**Ethical Clearance:** Before conduct of the study written permission was obtained from Poltekkes Kemenkes Bali, Indonesia. The consent and willingness were established from all the subjects who meet the criteria for this research.

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# Study Some of the Factors Affecting the Incidence of Diabetes in the Employed Segment in Basra City

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## Abstract

**Context:** Diabetes mellitus (DM) is a lifelong metabolic disease, considered often as an epidemic problem that leads to a reduction in quality and expectancy of life. There is an increasing prevalence of DM throughout the world as a result of changing dietary patterns and decreased physical activity. The aim of this study is to identify some of the factors that affect the incidence of diabetes at the employees ' segment in Basra city. A cross-sectional study was conducted among 120 patients with type 2 diabetes that included 85 male and 35 females. The results have reflected the apparent effect of age, obesity, Genetic history on diabetes, thus Confirmed by the statistical side of the medical opinion and No effect of smoking on diabetes .The results showed the apparent effect factor for age, genetic history and obesity on diabetes while the results confirmed the lack of influence of sex and smoking on diabetes.

**Keywords:** *Diabetes - factors affecting - metabolic disease.*

## Introduction

Diabetes is a chronic disease that occurs when the pancreas is unable to produce insulin in sufficient quantity, or when the body is unable to use effectively the insulin it produces. Insulin is a hormone that regulates the level of sugar by Hyperglycemia or hyperglycemia is a common effect in the body not controlling diabetes, and with time leads to severe damage in many organs of the body, especially nerves and blood vessels<sup>1</sup>, Diabetes and its complications are an effective health problem and it gets more prevalent day by day and is stuck in civilized progress. the scientific progress has been able to reduce or eliminate Some are final. So it has become a problem that deserves to be studied and to stress the need to confront it At different levels of health, global and economic<sup>2</sup>. The aim of this study is to identify some of the factors influencing the disease of diabetes In the city of Basra.

## Literature Review:

**The medical concept of diabetes mellitus (Mellitus Diabetes):** In his daily diet, he eats glucose, which is the source of his body energy, the cells relies in many of its functions on glucose sugar (blood sugar) to keep

the human in good health, and presence of the pancreas and what it produces from the insulin and glucose sugar is transported to Inside the cells, the insulin helps to convert this sugar and food types to the Jalikogen, If the body is not excreted enough insulin or does not use it adequately and properly, the glucose values It will rise in the blood that leads to the person's diabetes. Diabetes Mellitus (Mellitus Diabetes) is defined as a defect in the process of carrying glucose inside the body The cause is a lack of secretion of the pancreas, lack of secretion or lack of efficacy of the insulin and the consequent increase in blood sugar, thus a disturbance in the metabolism for carbohydrates, protein and fats, due to different causes may be organic or psychic or because In the intake of sugars or due to hereditary factors, diabetes can cause significant complications and dangerous, as two of the third people die of the disease in the face of stroke or diseases . The heart, as the risk of death doubles among people with the disease if compared to non-infected Chronic diabetes causes the body's organs to fail to function, 12 especially the eyes and heart Kidneys, blood vessels and hematological<sup>3</sup>.

**Types of Diabetes Mellitus:** Diabetes mellitus is classified into four types according to the organization classification<sup>4</sup>.

**Type 1:** this type is called the old (IDDM) which diabetics depend on the insulin in treating them, most patients of this type are young and infect the persons Between the ages (13-11) This type of diabetes requires a lifetime of insulin injections. Constantly, the disease appears as an emergency and its symptoms are severe nausea, vomiting and drought .

**Type 2 :** most people with this type of sugar are adults, their bodies are resistant to insulin, i.e. they are unable to take advantage of insulin properly. They must pay attention to the quality of their food and exercise in order to control Diabetes this type represents 90% of diabetics, which distinguishes it that patients have a high percentage of insulin in their blood and that the body cells have lost the sensation of this hormone) and a Many people in this type are over the age of 55, and those with a first-class relative are either parents or siblings with diabetes, and also have a history of high blood pressure or high cholesterol and there is no difference in the incidence of diabetes between the sexes during the age of 25 The first 5 years of the life of the injured, but the balance tends to the tendency of the gender of females after this age, that is, females are more likely to be infected with this type of male and obesity plays a big role in the incidence of this type of diabetes, obesity forms more than 70% of patients and obesity is concentrated (trunk or ventral) <sup>5</sup>.

**Type 3:** this type of diabetes is similar to type 2 diabetes, and it gets 2-5% among pregnant women and the ratio increases with age and can continue or disappear after birth. Medical supervision is required during pregnancy <sup>6</sup>.

**Method and Material**

**Design of the Study:** Descriptive, cross sectional study.

**Setting of the Study:** Basra University colleges and various schools in the city of Basra, different circles in the city of Basra, Basra city hospitals.

**The Sample of the Study:** The study was descriptive. A sample of 120 patients with diabetes mellitus type 2 was taken from Basra University colleges and various schools in Basra city, Basra government departments and Basra city hospitals. The information was collected through a direct interview with the injured, a query

about the duration of the disease, the method used in the treatment, and the question of other diseases as well as habits and practices about diabetes. Information has been collected since December 2018 until February 2019. In this sample, some factors have been relied on to measure the extent of they affect in the incidence of diabetes and these factors are (the patient’s age, the patient’s sex, the duration of the disease, the genetic predisposition to disease, the way the patient uses the treatment, the patient’s awareness to take care of himself to minimize complications Diabetes).

**Statistical Analysis:** Study sample data was analyzed using some descriptive statistic method and using the statistical SPSS program.

**Results**

The results in table 1 showed Socio- demographic characteristics of the participants, the sex 35% of the samples were females while the 85% of the samples were male and the 94% of the samples were Greater than 25 years, the 80% were employed on the hospital, the 19% employed on higher education, the 21% employed on education the 98% of them had positive family history of diabetes.

**Table 1: Socio- demographic characteristics of the participants**

Variable		No.	%
Sex	Male	85	83.70
	Female	35	16.29
Age	<25	0	0
	49-25	94	33.78
	65-50	26	66.21
Work place	The hospital	80	66.66
	Higher Education	19	83.15
	Education	21	5.17
Family history of diabetes	Positive	98	81.66
	Negative	22	18.33
Sex		120	99.99

The results in table 2 appeared that the duration of the disease(5%) for < 1 years, (74%)for < 10 years and (18%) for < 15 years,(13%) use diet (61%) use pills, (26%) use Insulin. (79%)smoke 20> cigarette and (5%) have other diseases HY pretension.

**Table 2: participants attitudes toward their illness**

Question	Answer	No.	%
The duration of the disease	< 1 years	6	5
	< 10 years	89	74
	< 15 years	25	18
The Way you use it	diet	34	13
	pills	80	61
	Insulin	6	26
Do you have other diseases accompany	obesity	66	55
	Hy pertension	7	5
	Highgrease	47	39

**Data entered in the program as follows:**

- X1) = The first factor is the patient’s age) Age  
 K=Age groups  
 K= 1,2,3.....5  
 Ages are divided into different categories  
 <15= 0 years  
 15-50=1 Years  
 >= 2 years 50
- Gender (X2) The second factor is the patient’s gender) male = 0  
 Female = 1
- Obesity (x3) The third factor is the patient’s obesity  
 Non obesity = 0  
 Obesity =1

- Smoking (x4) The fourth factor is the patient’s smoking

Non smoking = 0

Smoking = 1

- Genetic factor (x5) The fifth factor is the patient’s genetic factor

Non genetic factor = 0

Genetic factor = 1

No luck in table (3) that the level of the function of the independent variable(X1) age equals (0.00) which is less than (0.05) so we reject the imposition of the absence that provides the existence of effect concerning the age of the person in the incidence of diabetes That is, the age of the injured has an effect on the disease,it was note that the level of the function of the independent variable (X2) sex equals(0.470) which is greater than(0.05), so we accept the imposition of the absence of effect on the sex of the person in the incidence of diabetes, it was note that the of the function of the independent variable X3 has reached zero and that value is much smaller than (0.05) so we reject the Hypothesis of non that the presence of effect of the body obesity in the incidence of diabetes, which means that this factor has a significant effect in the incidence of the disease and that the result of medical opinion the more the level person is overweight the better the chance of getting, it was also note that the function level of the independent of smoking(X4) equals 0.167, which is greater than(0.05) i.e., there is no effect for smoking on diabetes and we not the function level of Genetic history(X5) equals(0 .000),which is smaller than (0.05) there is effect for Genetic history on diabetes.

**Table 3 :Variance Analysis Table using a program**

		Correlations					
		Infected	Age	Gender	Smoke	Obesity	Family History
Infected	Pearson Correlation	1	.543**	-.007	-.089	.175*	.413**
	Sig. (1-tailed)		.000	.470	.167	.028	.000
	N	120	120	120	120	120	120
Age	Pearson Correlation	.543**	1	-.034	-.226**	-.092	.159*
	Sig. (1-tailed)	.000		.355	.007	.160	.041
	N	120	120	120	120	120	120
Gender	Pearson Correlation	-.007	-.034	1	-.386**	.033	-.075
	Sig. (1-tailed)	.470	.355		.000	.361	.208
	N	120	120	120	120	120	120

Correlations							
		Infected	Age	Gender	Smoke	Obesity	Family History
Smoke	Pearson Correlation	-.089	-.226**	-.386**	1	.184*	.027
	Sig. (1-tailed)	.167	.007	.000		.022	.384
	N	120	120	120	120	120	120
Obesity	Pearson Correlation	.175*	-.092	.033	.184*	1	.248**
	Sig. (1-tailed)	.028	.160	.361	.022		.003
	N	120	120	120	120	120	120
Family History	Pearson Correlation	.413**	.159*	-.075	.027	.248**	1
	Sig. (1-tailed)	.000	.041	.208	.384	.003	
	N	120	120	120	120	120	120

\*\* . Correlation is significant at the 0.01 level (1-tailed)., \* . Correlation is significant at the 0.05 level (1-tailed).

### Discussion

These results were consistent with<sup>7</sup>, waynegao<sup>8</sup> found the Excess weight affects two thirds of the U.S. adult population and increases risk for cardiovascular disease and diabetes. All patients should be screened for obesity and most should be screened for pre-diabetes and diabetes. The best treatment for diabetes is prevention. Prevention of diabetes can be accomplished through a 7% weight loss through intensive lifestyle interventions that include caloric reduction and approximately 30 min of daily moderate physical activity<sup>9</sup>. Practitioners will have access to these evidence-based programs soon<sup>10</sup>. The Centers for Disease Control and Prevention are promoting community-based diabetes prevention programs throughout the country<sup>11</sup>.

So the results recommend that you continue to conduct statistical and non-statistical research on diabetes due to the abundance and severity of the disease in order to be more informed about solutions to reduce and cure it and the other recommendation was conducted statistical research on the impact of other causative factors, such as sudden shocks, psychological condition, and other factors that have not been examined.

**Ethical Clearance:** It was part of scientific plan in Nursing College, University of Basra.

**Source of Funding:** It was by ourselves.

**Conflict of Interest:** It was nil.

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# Polyunsaturated Fatty Acid Intake and Symptom Severity of Patients with Schizophrenia in Ernaldi Bahar Hospital, South Sumatra, Indonesia

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## Abstract

**Background/Aims:** The treatment of schizophrenia is commonly viewed from a pharmacological and social perspective, but issues of nutrient intake are seldom examined. However, the various study reported that polyunsaturated fatty acids (PUFAs) concentration is reduced in the plasma of schizophrenic. Therefore PUFAs intake may have a correlation with symptom severity of schizophrenic. This study aimed to assess the PUFAs intake of schizophrenic and its correlation with symptom severity of of schizophrenic.

**Method:** This cross-sectional study was conducted on 63 schizophrenia hospitalized patients in Ernaldi Bahar Hospital, South Sumatra, Indonesia. The symptom severity of of schizophrenic were determined using the validated Indonesian version of PANSS. Dietary intake was assessed using a 3-day food weighing. Correlation between variables was determined using the Spearman Correlation Coefficient.

**Results:** The result showed a significant negative correlation between omega-3 fatty acids and Positive scale, Negative Scale, General psychopathology and risk of aggression with  $r=-0.345$ ,  $r=-0.408$ ,  $r=-0.483$ , and  $r=-0.406$  respectively ( $p<0.01$ ). The omega-6 fatty acids intake were negatively correlated with Positive scale, Negative Scale, General psychopathology and risk of aggression with  $r=-0.390$ ,  $r=-0.496$ ,  $r=-0.525$ , and  $r=-0.389$  respectively ( $p<0.01$ ). A statistically significant correlation was seen between ratio of omega-6/omega-3 and Positive scale, Negative Scale, General psychopathology and risk of aggression with  $r=0.249$ ,  $r=0.256$ ,  $r=0.356$ ,  $r=0.343$  respectively ( $p<0.01$ ).

**Conclusion:** These findings suggest that increasing PUFAs intake might have a positive health outcome in of schizophrenic.

**Keywords:** Omega-3, omega-6, ratio of omega-6/omega-3, schizophrenia.

## Introduction

Schizophrenia represent an important public health problem due to their prevalence and associated incapacity. Schizophrenia is a neurodevelopmental and neurodegenerative disorder displaying disturbance in

multiple neurotransmission that presents as psychosis, often with paranoia and delusion<sup>(1)</sup>. Symptoms of schizophrenia are classified into positive symptoms, negative symptoms and cognitive symptoms. Positive symptoms include auditory hallucinations, which often criticize or abuse them. These auditory hallucinations can lead to the development of strange beliefs or delusions<sup>(2)</sup>. Negative symptoms are reduced motivation, impoverished speech, blunted affect and social withdrawal<sup>(3)</sup>. Cognitive symptoms have shown as poor executive functioning and working memory. This condition could lead to a suicide attempt in schizophrenic. Suicide mortality rate in schizophrenic is

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higher in this group than in the general population. The lifetime suicide rate among schizophrenic is estimated to be 4% to 10%<sup>(4)</sup>

Due to the limitations of antipsychotic drugs to achieve adequate rates of clinical remission and functional recovery in schizophrenic have promoted the search for complementary approaches. Recently, the potential of diet and nutrients to improve the mental health of the population and for the treatment of psychiatric disorders being discussed. Previous research suggests that abnormalities myelination and dopamine system have been implicated in schizophrenia, yet the mechanism underlying these abnormalities are not fully<sup>(5,6)</sup>. Hence PUFAs are essential for neurodevelopment, disturbances of PUFAs metabolism may be involved in the etiology and pathology of neurodevelopmental disorders like schizophrenia. PUFAs are The major constituents of all cell membrane phospholipids and have important role in numerous biological processes including receptor binding, neurotransmission, signal transduction and the synthesis of active metabolites (i.e. eicosanoids)<sup>(5,7,8)</sup>. Furthermore, previous evidence suggests that PUFA also play a role in myelination<sup>(5,9)</sup>.

The PUFAs have the most functional and are divided into two main types: omega-6 and the omega-3. Arachidonic acid (AA) and docosahexaenoic acid (DHA) are the most abundant fatty acids in the central nervous system. AA, dihomogamma-linolenic acid and eicosapentaenoic acid (EPA) are also important as cell-signaling and enzyme-regulating molecules and as precursors of eicosanoids (prostaglandins, thromboxanes, and leukotrienes). Meanwhile, EPA and DHA showed potential beneficial effects on neuropsychiatric diseases<sup>(10,11)</sup>. Moreover, The AA/DHA (omega-6/omega-3) ratio is important in the maintenance of an appropriate level of biological membrane fluidity, which is in turn, essential for ion channel function, membrane receptor activity and the release of neurohormones. Dysfunctional of numerous neurotransmission pathways have been found to be in schizophrenia, which raises the probability that membrane phospholipids that modulate the activity of both receptors and are involved in signal transduction may be implicated of schizophrenia<sup>(7)</sup>. Since the late 1980s, it has been revealed that PUFA metabolism disturbances in schizophrenic. It has been revealed that deficiencies of PUFA described in red blood cell (RBC) membrane<sup>(6,8)</sup>.

Although, it has been proposed the potential of

diet and nutrients to improve the mental health of the population and for the treatment of psychiatric disorders, issues of the nutrient intake of schizophrenic and its correlation psychiatric symptoms in schizophrenia are seldom examined (especially in Indonesia). Therefore, we conducted a study aimed to assess the PUFAs intake of schizophrenic and its correlation with symptom severity of schizophrenic.

## Methodology

**Study Design and Participants:** This cross-sectional study was conducted on 63 schizophrenia hospitalized patients in Ernaldi Bahar Hospital, South Sumatra, Indonesia. Participants with a nasogastric tube and not following all data collection sequences were excluded from the study.

**Weighed Food Records:** Total daily dietary intake data were collected using a combination of a 3-day record and weighing-back method. Food consumption was then registered by keeping records of amounts served and weighing waste after the meal.

Dietary data were converted into PUFAs intake using the Indonesia fatty acid composition table, Singapore Food Nutrition Composition (Singapore Health Promotion Agency) and Nutrisurvey software.

**Symptom Severity of Schizophrenic:** Symptom severity of patients were assessed using Indonesian version of Positive and Negative Syndrome Scale. The assesment was conducted by certified nurse. PANSS consists of 33 items including 7 positive scale items, 7 negative scale items, 16 general psychopathology items, and contains 3 additional points to meet the risk of aggression. PANS is approved by clinicians who are approved and approved on a scale of 1-7 with 1 (none), 2 (minimum), 3 (mild), 4 (moderate), 5 (mild), 6 (severe), 7 (very heavy) with a range of positive and negative scales from 7-49 and range the scale of general psychopathology from 16 to 112.

**Statistic Analysis:** Only data from subjects completing the study were analyzed. Before analysis, the normality test beforehand on all variables used the Kolmogorov-Smirnov test. Correlation between PUFAs intake (Omega-3; Omega-6; Ratio of Omega-6/Omega-3) and Psychiatric symptoms (Positive scale; Negative Scale; General psychopathology; Risk of aggression) were tested using the Spearman Correlation Coefficient.

## Result

**Respondent Characteristics:** Characteristics data showed in this study showed that 43 respondents (68.3%) are male and 20 respondents (31.7%) are female. Mean age of the respondent was 36.5 years old with 20 years old for the youngest and 59 years old for the oldest.

**PUFAs Intake:** This study found that the majority of respondents had an average intake of omega-3 fatty acids that were sufficient and exceeded the recommended adequacy of omega-3 fatty acids with minimum intake 0.5 g and maximum 3.5, meanwhile mostly respondent have omega-6 intake was below the recommended adequacy rate with minimum intake 3.5 g and maximum 16.4 g.

**Table 1: PUFAs Intake**

PUFA	Median (min-max)
Omega-3 (g/day)	1.20 (0.5-3.5)
Omega-6 (g/day)	6.20 (3.5-16.4)
Ratio of Omega-6/Omega-3	5.00:1 (1.4:1 - 7.6: 1)

The ratio of omega-6 / omega-3 ratio data were obtained from the comparison of omega-6 and omega-3 fatty acid intake of respondents. The distribution of ratio of omega-6 / omega-3 respondents can be seen in the Table 1. A lower n-6 to n-3 PUFAs ratio (ideal ratio around 2:1) consumption has been recommended in order to reduce the formation of pro-inflammatory

eicosanoids from omega-6 and to increase the production of anti-inflammatory mediators from omega-3<sup>(13)</sup>.

**Psychiatric Symptoms:** Several previous studies suggest that the negative symptoms of schizophrenia, including social withdrawal, lack of motivation; decreased affective responsiveness, impoverished speech, and movement, contribute more to poor quality of life and functional outcomes for individuals with schizophrenia than do positive symptoms<sup>(15,17)</sup>. The result of psychiatric symptoms assessment using PANSS showed in table 2.

**Table 2: Psychiatric symptoms**

Symptom Severity of schizophrenic	Median (min-max)
Positive scale	14 (7-48)
Negative Scale	13 (7-31)
General psychopathology	33 (18-59)
Risk of aggression	6 (3-15)

**Correlation between PUFAs intake with PANSS score:** EPA and DHA, play important roles in the development and maintenance of normal central nervous system (CNS) structure and function. Evidence has emerged over the last three decades which suggests that the fatty acid composition of the habitual diet may be relevant to the pathophysiology and potentially etiology of neuropsychiatric disorders including schizophrenia<sup>(12,19,20)</sup>.

**Table 3: Correlation between PUFAs intake and symptom severity of schizophrenic**

PUFA	Positive scale	Negative Scale	General psychopathology	Risk of aggression
Omega-3 (g/day)	-0.345*	-0.408*	-0.483*	-0.406*
Omega-6 (g/day)	-0.390*	-0.496*	-0.525*	-0.389*
Ratio of Omega-6/Omega-3	0.249*	0.256*	0.356*	0.343*

\* Significant with *p* value < 0.01

Therefore, we conducted a correlation test between PUFAs intake and symptom severity of schizophrenic (presented in PANSS score). The result showed a significant negative correlation between omega-3 fatty acids and Positive scale, Negative Scale, General psychopathology and risk of aggression. The omega-6 fatty acids intake were negatively correlated with Positive scale, Negative Scale, General psychopathology and risk of aggression. A statistically significant correlation was seen between ratio of omega-6/omega-3 and Positive

scale, Negative Scale, General psychopathology and risk of (Table 3).

## Discussion

PUFA's dietary deficiency and its metabolism abnormalities have been long implicated in the pathophysiology and etiology of recurrent mood disorders including schizophrenia. Previously researchs have provided converging evidence implicating PUFAs insufficiency, and increases omega-6/omega-3 ratio, in



the pathophysiology of mood disorders<sup>(19)</sup>. Low level of membrane and erythrocyte PUFAs have been observed in schizophrenic<sup>(1,21)</sup>. Meanwhile, Omega-3 fatty acids EPA and DHA are derived from ALA and are dietary essential fatty acids<sup>(22)</sup>. Hence improve omega-3 intake may reduce psychiatric symptoms in schizophrenic by speeding up the response to treatment and the tolerability of commonly used antipsychotic drugs due to changes in neurotransmission<sup>(23,24)</sup>.

Previous studies also showed that omega-3 and omega-6 fatty acids in the erythrocyte membranes correlated significantly with improvement in PANSS sub-scale scores<sup>(25)</sup>. Recent studies discussed the possibility that omega-3 fatty acid and dopamine system represent different aspects of the same etiology and pathology of schizophrenia<sup>(6,12)</sup>.

The dopamine system consists of 4 dopaminergic pathways. The nigrostriatal dopamine pathway projects from dopaminergic cell bodies and ends in the caudate nucleus. Low dopamine levels within this pathway are thought to affect the motor organs. The mesolimbic pathway, extending from the ventral tegmental area of the brainstem to axon terminals in limbic areas, plays an important role in the positive symptoms of schizophrenia in the presence of excess dopamine. The mesocortical pathway extends from the ventral tegmental area of the brain stem to the frontal cortex. Low mesocortical dopamine levels cause negative symptoms and cognitive deficits in schizophrenia. The tuberoinfundibular pathway extends from the hypothalamus to the pituitary gland. Normally, the prefrontal dopamine system suppressively controls the limbic dopamine system<sup>(6,12,15,26)</sup>. Previous research predicts that decrease dietary omega-3 fatty acids cause changes in the double layer of cell membrane phospholip. This changes may decrease dopamine concentration in the frontal lobe<sup>(6,12)</sup>. This mechanism might explain the relevance of omega-3 fatty acids intake and psychiatric symptoms schizophrenia.

Another PUFAs beside omega-3 also have a critical role in brain development and maintenance of brain structure and function such as omega-6. Previous studies showed that sufficient levels of omega-6 (especially AA) are required to improve neurological health<sup>(9)</sup>. Meanwhile, AA concentration is found reduced in peripheral blood measures of schizophrenic<sup>(5,21)</sup>. This condition suggests that increase AA intake may have a positive impact on psychiatric symptoms in schizophrenic. The beneficial

effects of omega-3 fatty acids in psychiatric disorders are well publicized, but the omega-6 fatty acids role are seldom discussed. However, these fatty acids (omega-3 and omega-6) are proven involved in the production of eicosanoids and affect the membrane fluidity, by their incorporation into membrane phospholipids<sup>(13)</sup>.

Hence the same enzymes are involved in the generation of long chain n3-PUFAs and long chain n6-PUFAs, ALA and LA and their respective metabolites compete for the same enzymatic machinery. In consequence, high levels of LA may inhibit the conversion of ALA to long chain n3-PUFAs and vice-versa. Consequently, there are strong indications that an increased ratio of omega-6 to omega-3 may reduce the availability of omega-3, which triggers oxidative stress that involved in the pathogenesis of depression<sup>(9,20)</sup>.

Previous study showed that increase omega-6 to omega-3 ratio may be induce of a pro-inflammatory response. Therefore a stronger inflammatory response may increase the production of free radicals and reduce PUFA levels. Reduced anti-inflammatory activity may be involved in negative symptoms and cognitive impairment observed during the acute stages of schizophrenia episodes<sup>(27)</sup>. Consistent with previous research, the result of our study also showed that the ratio of omega-6 to omega-3 intake has a significant positive correlation and PANSS score.

## Conclusion

Nutritional intervention through adequate and balanced intake of PUFAs might decrease the symptom severity of schizophrenic which can be seen based on PANSS score, but the improvement in PANSS score is also inseparable from pharmacological and psychological intervention.

**Competing Interest:** There is no competing interest in conducting this research.

**Ethical Clearance:** Ethical Approval from Ethics committee of Universitas Esa Unggul was taken (No. 0337-18.327/PKE-KEP/FINAL-EA/UEU/VIII/2018).

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# A Study of Cyber Bullying Behavior in Middle-Schools in Rabat- Morocco: Prevalence and Risk Factors

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## Abstract

**Background:** Cyber bullying is considered a public health issue in many developed countries while in Morocco there is a lack of data about this phenomenon.

**Objective:** The aim of this study is to investigate the prevalence of cyberbullying among students in middle schools in Rabat and to determine risk factors among students' cyberbullying profiles.

**Method:** It's a cross-sectional study based on an anonymous self-report questionnaire about inflicted cyberbullying during the last twelve months. Data were collected in 16 middle-schools in the urban area of Rabat. A total of 1914 students aged from 12 to 16 years participated in the study.

We used a Multinomial Logistic Regression to examine the relationship between the cyber bullying categories and our independent variables.

**Results:** Cyber bullying has been reported by 54,5%(n=1043) of the sample, of which 18,8%(n=360), being victims only, 11,7% (n=224) being perpetrators only, and 24,0% (n=459) being perpetrators/victims. There wasn't a significant difference in profile between genders. Most popular types of cyberbullying behavior were text messages and exclusion from internet groups. Regarding traditional bullying, the prevalences were 35% (n=669) of whom 16,4% (n=313) victims only, 7,6% (n=145) perpetrators only and 11%(n=211) perpetrators/victims. Our study showed that traditional bullying was the main risk factor of cyberbullying.

**Conclusion:** Cyber bullying is a major issue among students in middle schools in Rabat. The main risk factor is the involvement in traditional bullying. Hence, preventive actions should be taken to help reduce and overcome violence in schools.

**Keywords:** Cyberbullying, Middle-schools, Adolescents, Prevalence, risk factors, Morocco.

## Introduction

Cyber bullying has emerged since the advent of information and communication technology (ICTs).

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It has grown to become a serious public health concern in many developed countries<sup>1</sup>. This phenomenon is still a major issue among researchers and educators given the severe effects and the strong negative influence among students<sup>2,3</sup>. There are several definitions of cyberbullying, but to date no consensus has been reached. Hinduja defines it as a willful and repeated harm inflicted through the use of computers, cell phones, and other electronic devices<sup>4</sup>. Other authors define it as an aggressive, intentional act or behavior carried out by an individual or group of individuals repeatedly, using electronic devices against a victim

who can not easily defend himself or herself<sup>5</sup>. This phenomenon is characterized by the anonymity of the perpetrator, the rapid diffusion of harmful messages and its persistence over time, the large size of the audience, and the disinhibiting character of the exchanges<sup>6</sup>.

As for the traditional Bullying, it's characterized by physical, verbal or relational and social aggressive behavior between peers. According to Olweus (2013), bullying is characterized by an aggressive and repeated behavior and an imbalance of power<sup>7</sup>.

The current study aims to investigate the prevalence of cyberbullying among middle-school students in Rabat and to identify risk factors among students' cyberbullying profiles.

## Material and Method

**Study Population:** This survey was conducted from November 1<sup>st</sup>, 2017 to January 30<sup>th</sup>, 2018. Data were collected from a sample of students attending middle-school in the urban areas of Rabat. The study was carried out on 1914 participants aged from 12 to 16 years old.

### Stages of the Research:

**1st Step:** The study protocol was approved by the Ethics Committee for Biomedical Research of Mohammed V University in Rabat (IORG0006594). The students were informed of the anonymous and confidential nature of the study. Besides, no investigation was done before getting students' verbal consent.

**2nd Step:** The study used a cyberbullying self-report questionnaire developed by Hinduja to which we added the item on using the cell phones. It also used the traditional bullying Olweus questionnaire<sup>7,8</sup>. Over all, the questionnaire consisted in 30 questions including socio-demographics traits, ICTs use and the length of connection time, eight items about cyberbullying and twelve items about traditional bullying (Alpha coefficients for this scale were respectively 0,78 for cyberbullying and 0,88 for traditional bullying). The participants were divided into two groups: those involved in cyberbullying and those who were not. The first group was classified into three profiles: victims only, perpetrators only and perpetrator/victim.

**Statistical Analysis:** The data were analyzed using SPSS software version 23.0. Quantitative variables distribution were reported in average and standard deviation and compared by "student t" test. The qualitative variables were described in percentage and compared by khi-deux test. The confidence interval of 95% was considered statistically significant at 5%. The multinomial logistic regression has been chosen to determine the risk factors.

## Results

**Socio-demographic characteristics and use of ICTs:** The study was carried out on 1914 participants of whom 51.8% were girls. The average age of the students was  $13.6 \pm 1.1$  years, of which 74.9% were between 12 and 14 and 25% were between 15 and 16. This study showed that 67.7% of the participants had a mobile phone and 77.8 among them had been using internet from smartphones. In addition, data showed that 30,4% of the participants have had access to internet several times a day. Moreover, almost the third of participants spent more than 32 hours per week online while half of participants spent more than 4 hours per week online. More than half of the participants were found out to be communicating with their friends (68.9%), searching for information (63.9%), online enjoyment (66%), and 64,1% using Facebook.

**Prevalence of cyberbullying and traditional bullying:** Prevalence of cyberbullying were 54,5% (n=1043). The participants were categorized into three profiles: victims only 18.8% (n=360), perpetrators only 11,7% (n=224), and perpetrator/victims 24,0% (n=459). There wasn't a significant difference in profile between genders. Considering cyberbullying acts, our study found that boys were more likely to send unpleasant messages, show embarrassing videos and photos of someone without his permission, and make unpleasant phone calls than girls (table 1). Also, participants between 12-14 years old (18,3%) were more likely to be victims only and those between 15-16 years old (35,4%) were more likely to be perpetrators/victims. Regarding traditional bullying the prevalence's were 35% (n=669) with 16,4% (n=313) were victims only, 7,6% (n=145) were perpetrators only and 11% (n=211) were perpetrators/victims.

**Table 1: Distribution of different acts of cyberbullying by gender.**

Behavior	Perpetration			Victimization		
	Boys n=384	Girls n=353	X <sup>2</sup> p <sup>a</sup> -value	Boys n=398	Girls n=421	X <sup>2</sup> p <sup>a</sup> -value
Send unpleasant text messages	42,2%	25,2%	24,97***	59,3%	54,6%	1,81
Show embarrassing videos and photos of someone without his permission	19,0%	10,5%	10,53**	15,2%	16,8%	0,40
Log in to someone’s IM account without his permission and pretend to be him	---	---	---	22,9%	29,5%	4,58*
Take someone’s personal mail without permission and publish it	14,6%	10,5%	2,80	20,9%	19,5%	0,24
Hack someone’s personal data	31,5%	28,6%	0,73	29,6%	34,4%	2,15
Insult someone online	33,6%	28,9%	1,88	32,2%	40,6%	6,31*
Block and exclude someone from the online group	54,7%	57,5%	10,37**	33,2%	39,2%	3,21
Connect to the IM account of a friend without his consent and claim to be him	31,3%	31,2%	0,59	---	---	---
Make unpleasant phone calls	25,5%	15,9%	0,001	24,6%	24,5%	0,003

Note: <sup>a</sup>P-value by X<sup>2</sup> test, \*\*\*p<0.001; \*\*p<0.01; \*p<0.05.

**Risk Factors of Cyberbullying:** Multinomial logistic regression showed that 12 of the fifteen predictors effectively predicted perpetrator/victim profile. The latter was correctly identified in 62 % of instances while victims only were identified in 8,9 % of instances only. The pseudo-r<sup>2</sup> (Nagelkerke) was 0, 32 indicating a moderate fit between the model and the data.

The main cyberperpetrators/cybervictims risk factors were being traditional bully/victim OR 9,85 p<

à 0,001, duration spent online a week more than 32 hour OR= 9,63 p< 0,05, talking about cyber bullying OR 3,41 p< 0,001, parental conflict OR 2,59, p<0,001. Regarding victims only the main risk factors were: talking about cyber bullying OR 3,03 p<0,001, being a traditional bully/victim OR 2,91 p< 0,001 and parental conflict OR 2,16 p<0,001. Duration spent online a week was also a main risk factor OR 8,06, but it was statistically insignificant (table 2).

**Table 2: Multinomial regression analysis of risks of cyberbullying**

Variables	Adjusted OR CI 95% (n=1914, Nagelkerke R <sup>2</sup> = 0,32, p< 0.001)		
	Victim only	Perpetrator only	Perpetrator/victim
<b>Sociodemographic characteristics</b>			
Age 12-14 (yes)	0,77(0,55-1,06)	0,73(0,50-1,06)	0,52***(0,38-0,72)
Private school (yes)	0,56**(0,37-0,85)	0,39***(0,23-0,64)	0,41***(0,26-0,63)
<b>Traditional bullying</b>			
victim	1,85**(1,26-2,72)	1,44(0,89-2,32)	3,88***(2,68-5,64)
bully	1,62(0,94-2,80)	1,97*(1,08-3,58)	3,03***(1,81-5,06)
Bully/victms	2,91***(1,68-5,03)	3,31***(1,81-6,07)	9,85***(6,01-16,15)
<b>Technology use</b>			
Have a computer (yes)	0,98(0,71-1,34)	1,31(0,92-1,98)	1,57**(1,15-2,14)
<b>Duration spent online per week</b>			
>32 hour	8,06(0,99-65,65)	4,44(0,53-36,66)	9,63*(1,08-85,90)
17-32 hour	6,02(0,73-49,29)	3,53(0,42-29,36)	7,46(0,83-66,94)

Variables	Adjusted OR CI 95% (n=1914, Nagelkerke R <sup>2</sup> = 0,32, p< 0.001)		
	Victim only	Perpetrator only	Perpetrator/victim
4-16 hour	3,66(0,45-29,37)	2,31(0,28-18,70)	3,18(0,36-28,07)
searching for information(yes)	0,59**(0,44-0,79)	0,59**(0,42-0,84)	0,41*** (0,30-0,55)
Publish blogs (yes)	1,30(0,94-1,79)	1,04(0,71-1,52)	1,75**(1,27-2,40)
Snapshat use (yes)	0,86(0,59-1,26)	1,61*(1,07-2,42)	0,99(0,68-1,45)
Facebook use (yes)	1,10(0,81-1,49)	1,29(0,89-1,87)	1,67**(1,20-2,33)
<b>Family</b>			
Parental Conflict (yes)	2,16*** (1,59-2,94)	1,35(0,92-1,98)	2,59*** (1,90-3,54)
Students' reaction to cyberbullying			
Talking about cyberbullying (yes)	3,03*** (2,22-4,14)	1,88** (1,28-2,74)	3,41*** (2,49-4,68)
Communicating with their friends (yes)	1,51*(1,08-2,11)	1,61*(1,08-2,40)	1,45*(1,03-2,05)

The reference group was the group of participants who were not involved of cyberbullying. ote: \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ .

## Discussion

This study showed that the prevalence of cyberbullying was considerably important; more than half of the participants were involved in cyberbullying. There is a lack of data about cyberbullying in middle school in our country. However, worldwide the prevalence of cyberbullying varies from one author to the other. Some reported high prevalence as chu (74.6%) and Ghiomisi (62.2 %) <sup>9,10</sup>. Whereas others less prevalence as lee (34,5%) and Kowalski (11%) <sup>11,15</sup>. This variability may be influenced by the difference in measurement tools, definitions used, the duration of the study, age, cultural context or internet access in each country <sup>12,13</sup>.

Our results indicated also that gender was not significantly associated with different profiles of cyberbullying. These data were in line with the previous studies. For some studies there were no gender differences <sup>14</sup>. For others, cyberbullying has a gender and profile dimension. Some authors suggested that girls were more often victims <sup>15</sup>, while others suggested they were more often perpetrator/victims <sup>16</sup>. Furthermore Boys were more likely than girls to be perpetrators <sup>17,18</sup>. By sharp contrast, this survey documented that the predominant cyberperpetration behavior experienced by boys was sending unpleasant text messages and excluding the other from the group online. The most frequent act of cybervictimization received by both boys and girls was receiving unpleasant text messages online. These results were consistent with the previous studies <sup>19</sup>. These text messages that are privileged by the adolescents could be seen as a means of liberation

allows them to let out their aggressive behavior.

Considering risk factors of cyberbullying, this study showed that the main one was being involved in traditional bullying as bully/victim. This finding mirrors the results of previous studies <sup>19,20</sup>. The perpetration of aggressive acting online seems to be a more acquired behavior. In fact, it may be an extension of traditional school bullying.

Our results showed that prevalence of cyberperpetrators/victims was higher than traditional bully/victim. This finding was different from those of the previous studies <sup>21</sup>. This conflicting result should take into account the Moroccan context. Perhaps the adolescents in our country use cyberbullying more than the traditional bullying to take revenge hiding behind the screen.

Our results revealed that spending more time online and talking frequently about cyberbullying increase the odds of being perpetrators/victims. This finding was in line with previous researches <sup>19,20</sup>. This result showed that the adolescents must have knowledge of the risk of using ICTs. High internet use increases probability of becoming involved in cyberbullying. Moreover, the more talking about it the more usual it becomes. Perhaps those involved in cyberbullying are encouraged by wrong crowd. Consequently, adolescents should be sensitized of the risks of using ICTs.

In addition, parents' conflict was associated with the risk of cyberbullying. This is consistent with previous studies. The family conflict has a major impact on adolescents' behavior. Indeed, in Morocco, Boughima

et al in 2017 showed that 74.8% of women experienced violence at home. Adolescent witnessed violence on their mothers in 93% of cases and were beaten with their mothers in 66.5% of cases. Such violence may be transmitted to youths and expressed through cyberbullying. The adolescents prioritize parental tyranny and become tyrant themselves. That's why parents should care more about the stability of the couple and its consequences on the future behavior of their child<sup>22,23</sup>.

Although the sample was larger, this study has a limitation: The prevalence was limited only to the region of Rabat. Therefore, we cannot generalize the results to all Morocco. More extensive researches across the country are needed to assess other risk factors and to identify students at risk early and determine the impact of Cyberbullying

### Conclusion

To sum up, cyber bullying is a real social phenomenon in middle-schools. More than half of the participants were involved. The most important risk factors were: traditional bullying, time spent on internet, family conflicts, or talking about cyberbullying. Hence, parents, educators and health professionals should be aware of these risk factors. Information and prevention programs should be taken to help reduce and overcome violence in schools.

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**Ethical Approval:** The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Center for Doctoral Studies, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco. This procedure was examined and approved by the Committee.

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# The Correlation of Dental Caries with Parents Education Science Level at Ar-Rahmah Islamic Elementary School Tamalanrea Makassar, South Sulawesi

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## Abstract

**Introduction:** Common dental diseases or disorders are dental caries. The initial cause of dental caries is plaque. Plaque is a soft layer composed by a group of microorganisms that multiply in a matrix that is formed and attached to the surface of the uncleaned tooth. The problem of dental caries in Indonesia is still a problem that needs attention. The results of research that have been done, obtained almost 80% of the population in Indonesia suffer dental caries and children who suffer caries is about 90%. Childhood is the beginning of behavior formation. Not surprisingly, they are quite susceptible to experience in health status changes, including dental health. Therefore, dental health maintenance in children should involve the interaction of various parties, in which case the child itself, parents, and doctors. The knowledge, attitudes, and behavior of all these components affect the dental health status of the child. In children, the influence of parents is very strong. Attitudes and behavior of parents, especially mothers, in dental care gives a significant effect on the attitudes and behavior of children.

**Objectives:** To see the relationship between prevalence of dental caries at SDIT Ar-Rahmah Tamalanrea with parents education level.

**Research Method:** A total of 301 students of SDIT Ar-Rahmah were involved in this study with sampling method, by total sampling.

**Result:** The percentage of dental caries cases by children's age are at 11 years old is 2.71%, the largest percentage of children's dental caries cases by gender are female of 0.73%, the largest percentage of dental caries cases based on the parents occupation are in children whose their parents work as imam mosque and others of 100%, the largest percentage of dental caries cases based on the parents education level is in children whose their parents had non-bachelor education level of 1.92%.

**Conclusion:** The magnitude of correlation between prevalence of children dental caries with parent education level at SDIT Ar-Rahmah Tamalanrea is 0,046 with significance about 0,358. This shows that there is no correlation between prevalence of children dental caries with parental education level.

**Keywords:** *Prevalence, dental caries, parents education level*

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## Introduction

Common dental diseases or disorders are dental caries. The initial cause of dental caries is plaque. Plaque is a soft layer composed by a group of microorganisms that multiply in a matrix that is formed and attached to the surface of the uncleaned tooth. The results of

research that have been done, obtained almost 80% of the population in Indonesia suffer dental caries and children who suffer caries is about 90%. Generally, school-age children like to consume sweet foods and beverages that generally contain sucrose sugar type, which is one of the factors that cause dental caries.<sup>1</sup>

Dental caries is an infectious disease that damages tooth structure. These diseases cause tooth cavities Dental caries is spread around the world, where the disease can not be healed by itself. Dental caries can be inhibited only by good filling. The structure of tooth elements and the factors that affect the occurrence of caries teeth should be known, if we want to know how the process of dental caries. Dental caries can be experienced by everyone and can occur on one or more teeth surfaces and may extend to the deeper parts of the tooth, for example from enamel to dentin or to the pulp.<sup>2,3,4</sup>

In addition to the four factors associated with caries above, there are also external risk factors such as age, gender, education level, economic level, environment, attitudes and behaviors related to dental health. In the field of dental health many theories prove that behavioral science is often ignored and that is a mistake.<sup>5,6</sup>

Childhood is the beginning of behavior formation. Not surprisingly, they are quite susceptible to experience in health status changes, including dental health. Therefore, dental health maintenance in children should involve the interaction of various parties, in which case the child itself, parents, and doctors. The knowledge, attitudes, and behavior of all these components affect the dental health status of the child.<sup>7,8</sup>

In modern humans that living in industrialized societies, caries is common but caries frequency differs in each country and among individu within the country itself. The prevalence of caries in children in developing countries is increasing rapidly.<sup>9,10</sup>

Dental caries of Indonesian children, especially toddlers, is very apprehensive. Nearly nine out of ten children suffered caries with seven of the 20 damaged teeth. The result of SKRT which states dental caries in children is a serious problem in oral health in Indonesia with prevalence up to 90,05%, especially at school

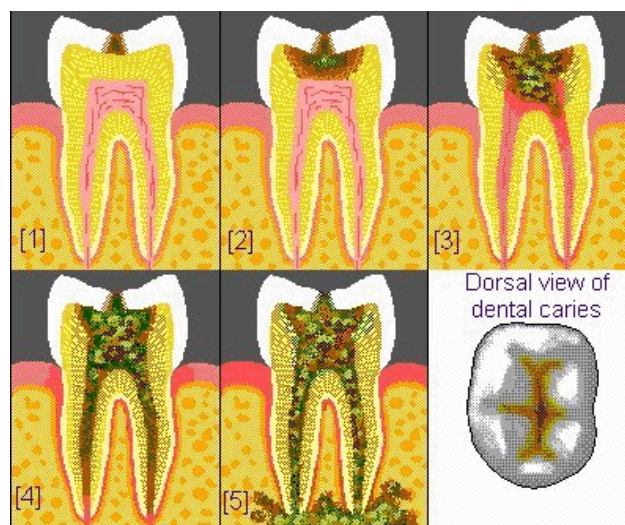
age. This is also a proof of the lack of public behavior awareness to maintain oral health.<sup>11,12,13</sup>

At least 90% of children have experienced dental caries problems since the age of five due to bottle-feeding behavior in late childhood, food consumed, and the wrong brushing technique. As many as 90% of Indonesian children (ages 0-16 years) suffer from dental caries. Children who experience dental caries easily experience abnormal tooth growth, for example, protruded teeth. Not only that, dental caries can also make teeth easy to fall out prematurely.<sup>15,14</sup>

The tooth cavity is the place where millions of bacteria enter the blood vessels can cause the spread of bacteria and toxins that cause infections in other body parts such as the respiratory tract, heart, sepsis and brain.<sup>16</sup>

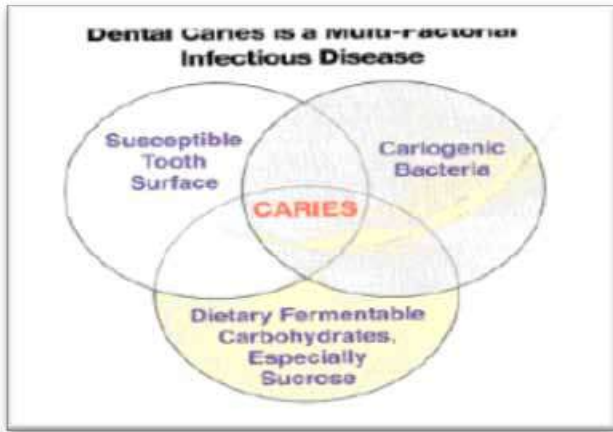
**Based on caries stage (Depth of Dental Caries)<sup>11</sup>**

- a. Superficialis Caries
- b. Media Caries
- c. Profunda Caries



**Figure 1: Caries Stadium: (1) superficial caries, (2) media caries, (3) Profunda caries stage I, (4) Profunda caries stage II, (5) caries profunda stage III. Source: Available from: halim87dentist.wordpress.com/.../. Accessed on: 30/10/2009.**

**Etiology of Caries:** The theory of caries etiology develops with the development of medical science.<sup>10</sup>



Source: Available from: [www.dentalgentlecare.com/images/cariesdentalcirc.gif](http://www.dentalgentlecare.com/images/cariesdentalcirc.gif) Accessed on: 30/10/2009.

Figure 2: Scheme of dental caries

**Individual awareness, attitudes and behavior to wards dental health:** Dental and oral health issues are closely related to social, psychological, cultural and economic factors. The character of the social structure and individual status in social status has a role to play as a symptom is shown and overcome. Since dental and oral problems are not a life-threatening problem, they are often ignored so it is important to provide a better understanding to the individual about how dental and oral health should be perceived.<sup>17,18</sup>

**The prevention and control of caries:** Prevention of dental caries from an early age is an absolute thing, which means must be aware of the initial symptoms, such the emergence of invisible small holes like the chalk on the surface of the tooth. Every time we eat, food remnants and bacteria form an acidic substance that can dissolve minerals in tooth enamel and form a small, invisible hole.<sup>19</sup>

**Parent Role:** Parents role in the supervision of brushing teeth and bringing the child for tooth

examination in dentist is still low. There are no relationship between the role of health officer and sport teacher with students' toothbrushing behavior. Parents role has a correlation with the dental caries experience status, periodontal status and students oral hygiene.<sup>21</sup>

**Objectives;** Based on explanation above, the authors are interested to conduct research about "The Relationship Between Prevalence of Children Dental Caries in SDIT Ar-Rahmah Tamalanrea with Parents Occupation and Education Level".

**Research Method**

This research type is observational analytic. The sample of this research is all students of SDIT Ar-Rahmah Tamalanrea Makassar about 300 students. First, socialization to the school concerned, principals and teachers about the intent and purpose of research conducted in the school. Take the names of all the students at SDIT Ar-Rahmah Tamalanrea. Calling the students one by one then record the full name, age, gender, parent's occupation, and fill the table containing the child's teeth status by performing dental examinations that have caries on all teeth of the child. After all data has been recorded, then process the data by calculating the total data from each type of data based on age, gender, type of parent's occupation, and parent education level.

**Results**

Based on the data of the research conducted on all the students of class I to VI in SDIT Ar-Rahmah Tamalanrea Makassar about 300 children, while n in the table is the number of children x the total number of teeth examined in each child, to know prevalence of dental caries in children, then the presentation of the data can be seen in the table and the following graph.

Table 1: Prevalence of Children Dental Caries Based on Student's Age

Age	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
6	14476	282	1.95	47	0.33	0	0	329	2.27	14147	97.73
7	20822	266	1.28	82	0.39	11	0.05	359	1.72	20463	98.28
8	11872	153	1.29	64	0.54	7	0.06	224	1.89	11648	98.11
9	12087	189	1.56	30	0.25	18	0.15	237	1.96	11850	98.04
10	10203	132	1.29	38	0.37	9	0.09	179	1.75	10024	98.25
11	3108	54	1.74	27	0.87	3	0.09	84	2.71	3024	97.29
<b>Total</b>	<b>72568</b>	<b>1076</b>	<b>1.48</b>	<b>288</b>	<b>0.39</b>	<b>48</b>	<b>0.07</b>	<b>1412</b>	<b>1.95</b>	<b>71156</b>	<b>98.05</b>

Based on the table above can be seen that DMF-T in children examined about 300 children by age then there were 44 children aged 6 years (2.27%), 58 children aged 7 years (1.72%), 53 children aged 8 years (1.89%), 51 children aged 9 years (1.96%), 57 children aged 10

years (1.75%), 37 children aged 11 years (2.71%). While normal aged 6 year (97.73%), aged 7 years (98.28%), aged 8 years old (98.11%), aged 9 years (98.04%), aged 10 years (98.25%), aged 11 years (97.29%).

**Table 2: Prevalence of Dental Caries by Gender**

Gender	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
Male	125999	604	0.48	149	0.12	20	0.02	773	0.61	125226	99.39
Female	87680	472	0.54	139	0.16	29	0.03	640	0.73	87040	99.27
Total	213679	1076	0.51	288	0.14	49	0.02	1413	0.66	212266	99.34

Based on the table above can be seen that DMF-T in children examined about 300 children by gender then there were 163 children with male gender (0.61%)

and 137 children with female gender (0.73%). While in normal, boys were (99,39%) and girls were (99.27%).

**Table 3: Prevalence of Dental Caries by Occupation Type of Parents**

Code	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
1	219438	752	0.34	208	0.09	42	0.02	1002	0.46	218436	99.54
2	3875	100	2.58	16	0.41	9	0.23	125	3.23	3750	96.77
3	9600	192	2	46	0.48	2	0.02	240	2.5	9360	97.5
4	150	20	13.33	10	6.67	0	0	30	20	120	80
5	100	12	12	8	8	0	0	20	20	80	80
Total	233163	1076	0.46	288	0.13	53	0.02	1417	0.61	231746	99.39

**Information:**

- Civil Servants:** Lecturers, teachers, government officials, doctors.
- Private:** Private employees.
- Self-Employed:** Merchants, entrepreneurs, bricklayers, construction workers.
- Police:** Police
- TNI:** Army/TNI

Based on the table above can be seen that DMF-T in children examined about 300 children based on the occupation type of parents then there were 219 children (0.46%), private were 31 children (3.23%), self-employed were 40 children (2.5 %), police were 5 children (20%), soldiers were 5 children (20%). While in normal children who work as civil servants were 99.54%, private were 96.77%, self-employed were 97.50%, police were 80%, soldiers were 80%. It can be seen in the following graph.

**Table 4: Prevalence of Dental Caries Based on Parents Education Level**

Parents Education Level	n	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
Bachelor	287928	871	0.31	242	0.08	48	0.02	1161	0.41	286767	99.59
Non-Bachelor	13312	205	1.54	46	0.35	5	0.04	256	1.92	13056	98.08
Total	301240	1076	0.36	288	0.09	53	0.02	1417	0.47	299823	99.53

In the prevalence of children’s dental caries by parents education level, then the lowest percentage in 248 children with bachelor education level was 0.41%, which decay 0.31%, missing 0.08%, and filling 0.02%. The largest percentage of the 52 children with non-

bachelor education level was 1.92%, where the decay is 1.54%, missing 0.35% and filling 0.04%. This indicates that the higher the educational level like bachelor the lower percentage of dental caries in the school. It can be seen in the following graph.

**Table 5: Relationship between Prevalence of Dental Caries Based on Parents Education Level**

Correlations			
		Prevalence of Dental caries	Level of Parent Education
Prevalence of Dental caries	Pearson Correlation	1,000	.048
	Sig. (2-tailed)		.410
	N	300,000	300
Level of Parent Education	Pearson Correlation	.048	1,000
	Sig. (2-tailed)	.410	
	N	300	300,000

From the correlation test conducted between the prevalence of dental caries with parents’ education level at SDIT Ar-Rahmah Tamalanrea we obtained value of 0.048 with significance of 0.410. These values indicate that there is no correlation between the prevalence of dental caries and parents’ education level.

**Conclusion**

From the results of conducted research on all students of SDIT Ar-Rahmah Tamalanrea Makassar from class I to VI as many as 300 students can be concluded hat:

1. The largest percentage of children’s dental caries cases based on age are at age 11 years of 2,71% or 37 children.
2. The largest percentage of children’s dental caries based on gender is in girls of 0.73% or 137 children, whereas in boys of 0.61% or 163 children.
3. The largest percentage of children’s dental caries based on parents occupation are in children whose parents work as private employees is 3.23% or 31 children whereas in children whose employment as a civil servant is 0.46% or 219 children.
4. The largest percentage of dental caries cases based on the parent’s education level is in children whose parents education level of non-bachelor is 1.92% or 52 children whereas in children with bachelor education level is 0.41% or 248 children.
5. Correlation magnitude between the prevalence of

dental caries in children with parent’s education level on SDIT Ar-Rahmah Tamalanrea is 0,048 with significance of 0.410. This shows that there is no correlation between prevalence of children’s dental caries with parental education level.

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# Prevalence of Diabetes Mellitus among Stroke patients in King Fahad Specialist Hospital, Buraidah, 2018

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## Abstract

**Background:** Globally there is a paradigm shift is started from increasing non communicable diseases trend,of which diabetes mellitus is increasing and it acts as a background for shoot up of stroke cases in the society. Stroke is having significant impact on mortality, morbidity, also leads to physically and economically making the person as handicapped.

**Objectives:** To estimate the prevalence, glycaemic control and risk factors of the diabetes mellitus among the stroke patients.

**Methodology:** This was a institutional based cross sectional study carried out in the King Fahad Specialist Hospital (KFSH), Buraidah. Sample size of 134 among the stroke patients during the period of June 2018 to June 2019. Data was entered in SPSS version 21.0 and necessary statistical tests like simple proportions, chi square test and logistic regression analysis were applied.

**Results:** prevalence of Diabetes mellitus among the stroke patients was 33.6%. Of all the stroke patients, about 85.1% were having any limb (upper limb or lower limb) weakness or paralysis. Approximately 68.2% were having Hb A1 C level > 7% among the diabetes with stroke patients and near to 80.6% patients were from ischaemic stroke. Hypertension was significantly associated with diabetes among the stroke patients (P<0.01).

**Conclusions:** Based on the study results,prevalence of diabetes among stroke patient was relatively little high, two thirds of diabetic patients were having poor glycaemic control. In addition to diabetes, we found high prevalence of hypertension, dyslipidaemia among the stroke patients.

**Keywords:** Age, sex, Diabetes, hypertension, lipid status, Stroke, BMI.

## Introduction

Stroke is an abrupt onset of neurological deficit that is attributed to a vascular cause.<sup>1</sup> It is diagnosed clinically and any laboratory diagnosis only helps in supporting the initial diagnosis.<sup>2</sup> In 2017, WHO classified stroke

as the second leading cause of death worldwide after cardiovascular disease.<sup>3</sup> Locally, a study that published from King Khalid university, Abha shown the prevalence of stroke in Buraidah 64/100000 per year.<sup>4</sup>

In general, cardiovascular diseases (CVD), including stroke, are major healthcare issues in both developing and developed countries with deleterious effects at individual, family and societal levels. Between 2010 and 2030, the estimated total direct medical costs would escalate from \$273–\$818 billion in the United States alone.<sup>5</sup> Diabetes mellitus is known as a major risk factor for stroke, apart from hypertension, ischemic

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heart disease, alcoholism, smoking, family history and hyperlipidemia.<sup>6</sup> Saudi Arabia has high prevalence of diabetes mellitus according to the statistics mentioned in the Saudi Health Information Survey Handbook 2013 diabetes mellitus prevalence was estimated to be 13.4% among adults.<sup>7</sup>

As you all know Diabetes Mellitus prevalence is increasing all over the world due to environmental and life style modifications acting combine to increase the disease. As a result of Diabetes incidence and prevalence, indirectly stroke patients are increasing. Need self care, adoption of preventive strategies and strict adherence of medication helpful for minimizing the disease associated complications. In view of huge morbidity and mortality patterns associated with Diabetes mellitus and economic burden on the families, there were many studies conducted to know the prevalence of Diabetes among community and hospitals in our kingdom and other countries. But, there is less available information about prevalence of diabetes mellitus among stroke patients.

In view of the above situations, and due to the importance of the prevalence of diabetes mellitus among stroke patients and lack of much published information in our region. We planned to conduct this study in Buraydah in tertiary care center - King Fahad Specialist Hospital (KFSH) to find the clinical profile of the stroke patients.

### **Objectives:**

1. To estimate the prevalence of diabetes mellitus among stroke patients in King Fahad Specialist Hospital.
2. To find the socio demographic characteristics, glycaemic control and other risk factors of Diabetes among the stroke patients.

### **Patients and Method**

**Description of the Study Area and Location:** King Fahad Specialist Hospital: Big tertiary health care centre for the Al qassim province having 385 bedding capacity and catering specialist services and sub speciality.

**Target Population:** All stroke patients in the represented areas of King Fahad Specialist Hospital.

**Study Design and Setting:** This was a institutional based cross sectional study carried out in the Stroke unit area of King Fahad Specialist Hospital (KFSH), Buraidah. New Stroke patients that admitted in medical

department in King Fahad Specialist Hospital, Buraidah. An interview based questionnaire was designed and information collected from the patients who were conscious. Those who were seriously ill, comatose patients, information taken from the close relatives of the patients.

**Study Period:** This study was conducted from June 2018 to June 2019.

**Sample Size:** 135 Participants. Sample size was calculated using WHO software for sample size determination . At 95% confidence level, 7% precision and an expected prevalence of 22% of diabetes among stroke patients.

**Sampling method:** It will be sample of all the stroke cases in KFSH will be taken for the research.

**Inclusion Criteria:** All stroke patients admitted in King Fahad Specialist hospital whose age above 20 years of age.

**Exclusion Criteria:** Transient ischaemic patients, brain tumour patients

**Method of Data Collection:** An interview questionnaire was prepared in consultation with the experts in the Family medicine department, Internal Medicine and neurologist working in the King Fahad specialist hospital and supervisor of the research project. All the study subjects were explained in detail about the purpose, importance and confidentiality about the disease.

**Random blood glucose and HbA1C:** In case of newly detected diabetes individuals, random Blood sugar more than 200mg/dl and HbA1C more than 6.5% considered by the hospital clinicians and also in my study as a criteria and lab values were taken from the records. For the glycaemic control among the diabetic patients as therapy, cut of point of less than 7% taken as good control and more than 7% taken as uncontrolled glycaemic status<sup>8,9</sup>.

**Ethical Clearance:** Institutional ethical committee certificate was received from Regional Ethics committee, Buraidah, Qassim province, registered at National Bio & medical ethics committee, registration No: H-04-Q-001.

**Data Analysis:** Statistical analysis was done by using the statistical software spss -21 version. To find out the association of diabetes mellitus among stroke

patients with the above factors, simple proportions, Chi-square test and binary logistic regression analysis was done. The statistical significance was evaluated at 95% confidence level and P value is <0.05.

**Results**

In the study population, total of 134 patients were participated in the present survey, we identified 45 patients were diabetes mellitus patients among all stroke patients admitted during the study period in King Fahad Specialist Hospital, Buraidah. The prevalence of the Diabetes mellitus among the study stroke patients was 33.6%. Among the stroke patients, about 59.7% were in > 60 years of age group, males were 67.2%.

In the study population, approximately 73.1 % were having slurred speech, 40.3% were having facial palsy and 85.1% were having any limb (upper limb or lower limb) weakness or paralysis. Among the stroke patients, about 20.9% (28/134) were having dyslipidaemia. Among the dyslipidaemic patients, approximately 41.7% were having more than 10 years duration.

**Table 1: Shows Demographic characteristics among Stroke patients of study population**

Demographic parameters	Number	Percentage
Age (n-134) 20-30	2	1.5
31-40	8	6.0
41-50	16	11.9
51-60	28	20.9
>60	80	59.7
<b>Sex (n-134)</b>		
Male	90	67.2
Female	44	32.8
<b>Occupation (n-134)</b>		
Employee	30	22.4
non employee	104	77.6
<b>Marital status (n-134)</b>		
Yes	128	95.5
No	6	4.5
<b>Number of children (n-122)</b>		
< or = 2	8	6.0
3-5 members	42	31.3
>5 members	72	53.7
<b>Income (n-134)</b>		
< 3000 SR	84	62.7
>3000 SR	50	37.3

Out of 134 stroke patients, 48 patients were

hypertension with stroke. About 47 (35%) patients were given response about duration of hypertension. Of which, approximately 51.1% were having more than 10 years of hypertension duration. About 34.3% (46) were given hypertension compliance history, of which 52.2% (24/46) were having hypertension compliance.

Among all the stroke patients, about 4.5% (6/134) were given quitting of smoking history given. Of which, 50% (2/4) were smoked more than 20 cigars /day and also all the ex smokers given more than 20 years of smoking duration history. In the study stroke patients, about 67.1% (90/134) patients were having BMI more than 25 and only 32.9% (44/134) were having BMI < 25.

**Table 2: Report of type of stroke and past stroke history among the stroke patients:**

Type of stroke (n-134)	Number	Percentage
Ischaemic	108	80.6
Haemorrhagic	26	19.4
Total	134	100.0
<b>Past stroke history (n-134)</b>		
Yes	26	19.4
No	108	80.6
Total	134	100.0

Table: 2 stated that near to 80.6% were from ischaemic stroke and only 19.4% of the patients from haemorrhagic stroke origin.

**Table 3: Diabetes duration, compliance and Hb A1 C status among the study stroke patients:**

Diabetes Duration (n-44)	Number	Percentage
< or = 5 yrs	2	4.5
>5 yrs - 10 yrs	12	27.3
> 10 yrs	30	68.2
Total	44	100
<b>Diabetes compliance (n-43)</b>		
Yes	21	48.8
No	22	51.2
Total	43	100
<b>Hb A1 C (n-44)</b>	Number of Diabetics with stroke	Percentage
< or = 7	14	31.8
> 7	30	68.2
Total	44	100.0

Table 3 revealed that 45 patients were diabetes with

stroke. About 44 (32.8%) patients were given response about duration of Diabetes. Of which, approximately 68.2% were having more than 10 years of Diabetes duration.

**Table 4: Hypertension in relation to Diabetes status among the stroke patients:**

Hypertension	Stroke with Diabetes	Stroke without Diabetes	Odd's Ratio	Confidence interval
Present	24 (53.3%)	24 (26.9%)	3.095	1.462 to 6.551
Absent	21 (46.7%)	65 (73.1%)		
Total	45 (33.6%)	89 (66.4%)		

$\chi^2 - 9.03, 1 \text{ df}, P - 0.003$ , Statistically significant association was found between hypertension and stroke with Diabetes.

**Table 5 - Smoking status, frequency and its duration among the stroke patients:**

Smoking (n-134)	Number	Percentage
Yes	24	17.9
No	108	80.6
Not available	2	1.5
Total	134	100
Frequency (n-24)		
<20 cigars/day	12	50%
= or >20 cigars/day	12	50%
Total	24	100
Duration (n-22)		
<15 yrs	4	18.2
> 15 yrs	18	81.8
Total	22	100

**Table 6: Logistic regression analysis of factors associated with Diabetes Mellitus among the stroke patients:**

Variables	Odd's ratio	95% confidence interval		P value
Occupation	.985	.233	4.154	.983
Age	1.503	.501	4.505	.467
Body mass index	.800	.325	1.969	.627
Exercise	.876	.273	2.804	.823
Smoking	1.716	.524	5.616	.372
Hypertension	.267	.119	.599	.001
Dyslipidaemia	.584	.231	1.477	.256

Table 6 stated that hypertension was significantly associated with diabetes mellitus among the stroke patients ( $P < 0.001$ ).

### Discussion

In the Kingdom of Saudi Arabia, stroke is a rapidly growing problem and a major cause of illness and death.

This increasing incidence is due to the changing life style in the country and high prevalence of diabetes mellitus, obesity, dyslipidaemia, and hypertension, all considered as important risk factors <sup>10</sup>.

In the present study, the mean age was observed as  $65.73 \pm 16.69$ . The study conducted in Saudi Arabia, Arar internal medicine department showed that, the age of elderly ranges from 50-92 years with a mean age 60 years, male to female ratio was 47.8 to 52.2 <sup>12</sup>. In southwest Saudi Arabia by Al-Modeer et al <sup>12</sup>, the age of elderly ranges from 60-104 years with a mean of 77.2 years. In Al Rajeh et al., in a hospital that exclusively treated the Saudi Arabian National Guard hospital, the mean age of the patients was 63 years <sup>13</sup>. In the present study, 67.2% were males and 32.8% were females. Another study conducted in Dubai, cerebrovascular accident affected 38.8% of the studied elderly, more prevalent in males than females <sup>14</sup>.

In the current study denoted that the mean body mass index observed as  $27.19 \pm 3.97$  and about 67.1% (90/134) patients were having BMI more than 25. Almost similar observation of body mass index of more than 25 among the stroke patients was 66.7% in their study <sup>11</sup>.

In the present study, the prevalence of the Diabetes mellitus among the study stroke patients was 33.6%. Singh et al <sup>15</sup> conducted study in India, revealed the prevalence of 24% and another study conducted in Hyderabad, India showed the Prevalence of Diabetes among the stroke patients was 55% and he stated that diabetes is the one of the important risk factor for getting the stroke <sup>8</sup>. Estimates suggest that patients with diabetes have twice the risk of stroke compared to non-diabetics. Few mechanisms that have described the effects of high blood sugar level leads to impaired auto regulation of cerebral blood flow and hyperglycaemia tends to develop cerebral oedema.

In the present study population, about the type of the stroke, near to 80.6% were identified from the Computerized Tomography (CT) scan and clinical expert opinion as ischaemic stroke and 19.4% patients were from haemorrhagic stroke. The incidence of ischaemic stroke was 2.5-and 3.6-times greater higher among diabetic men and women, respectively, in the Framingham study<sup>16</sup>.

Among the Diabetes with stroke patients, about 68.2% were having Hb A1 C level > 7%, that reflects majority of the diabetics among the stroke patients were not having good glycaemic control and it tends to act as a risk factor for getting stroke. The Hjalmarsson et al study done in Indonesia and discovered that pre stroke glycemic control disorder or baseline HbA1c is an independent risk factor for poor survival and an unwelcome functional outcome after suffering from an ischemic stroke<sup>17</sup>.

Among the total diabetes with stroke patients, about 53.3% were having hypertension. Hypertension was significantly associated with Diabetes among the stroke patients (P<0.01). Study conducted in Qatar by Khan FY et al revealed that prevalence of hypertension range among the diabetes with stroke patients was 32-40% and denoted that hypertension is recognized as a one of the risk factor for the stroke<sup>18</sup>.

In the study patients, about 20.9% were having dyslipidaemia. Study conducted by Turkey AM et al done at Tikrit teaching hospital and another study done by Yesilot N, Koyuncu BA et al at Istanbul medical school in the year 2011 revealed that dyslipidaemia was from 18% to 46%<sup>19,20</sup>.

Out of 134 stroke patients in the present study, about 17.9% patients were having smoking habit. study done by McLachlan RS et al in United Arab Emirates shown that range of smoking habit from 13% to 44.4% among stroke patients<sup>20</sup>. One of the limitation of the study, those patients were in coma, data collection from the relatives bit difficulty faced. As a result, we missed some information from the patients.

### **Conclusion**

Overall prevalence of Diabetes mellitus among the stroke patients was 33.6%. Majority of the diabetes patients were un controlled status and half of the Diabetes individuals were not having good compliance of diabetes. Almost one third of the patients were having

hypertension in the study population. Approximately one fifth of the patients were having dyslipidaemia and smoking habit.

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# Risk Factors and the Pattern of Injuries of Road Traffic Accidents in Holy City of Karbala/Iraq

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## Abstract

**Background:** Road traffic injuries (RTIs) are an important cause of morbidity and mortality. Iraq, is one of the countries with higher rates of RTIs

**Objectives:** To identify Risk factors and pattern of injuries of Road Traffic injuries in Holy city of Karbala/ Iraq.

**Method:** A Hospital-based cross sectional study conducted at Imam Hussein medical city in Karbala during the period March, 1<sup>st</sup> to May 30<sup>th</sup> 2019 included 400 patients with different Road traffic injuries who were present at the emergency department or admitted to the surgical wards after initial management in the emergency department

**Results:** The mean age of the subjects was (26.35 ± 15.42). Almost (27.5%) of victims aged 11-20 years and (85.5%) of cases were males and almost (48%) had low level of education. Head injuries were more frequent, accounted for (35.1%), lower and upper limbs were injuries in (32.3% and 10.5% respectively). Fractures accounted for about 30% of cases. Almost (31%) the cases needed admission to the wards. The case fatality rate was 2.5%.

**Conclusion:** Road traffic injuries are the most common among young people, especially motorbike drivers, and Teenager are the most vulnerable. The Head is the most exposed part to injuries and the fractures are the most frequent type. A large proportion of cases require medical attention within the hospital and head injuries are the most common cause of death.

**Keywords:** Road traffic Injuries, RTIs, Risk factors; injury pattern; road traffic accidents

## Introduction

Globally, one crucial reason to morbidity and mortality is Road Traffic Injuries (RTIs) and this usually happens in poor and middle-income countries. According to Disability Adjusted Life Years (DALY) lost, RTIs

is one of the leading disease burdens and it is ranked as number 9 worldwide among other harmful causes.<sup>1</sup> RTAs can be transpired due to a collision between vehicles, vehicles and pedestrian, vehicles and animals or between vehicles and fixed objects. Almost, about 20 - 50 million people remain in serious injuries because of road traffic collisions<sup>2</sup>. The available data on RTIs and death cases in some Arab and regional countries show some differences. For instance, moderate to high fatality rates were reported in the UAE, Saudi Arabia and Kuwait<sup>2-4</sup>. Generally, in Middle East the harmful circumstances of road traffic accidents are alarming and require an immediate response to control its disastrous outcomes. In Iraq, most of the Iraqis live in urban places (almost

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70%). Since many years the RTAs occurrence and its extensive negative impact has endangered the lives of many people and there is a rise in Iraqi fatalities<sup>2,5,6</sup> Base on WHO data, age adjusted death rate in Iraq ranked as number 4 in the world regarding the RTIs fatalities<sup>2,5</sup>. In Iraq, during 2011, RTIs is about four times bigger than the loss as a result from terrorism. Consequently, the decade of action for road safety 2011-2010 was pledged to control and reduce the level of traffic road loss by year 2020. This attention was considered due to the need to design appropriate interventions which aim to prevent or minimize RTAs in Iraq<sup>2,5,7</sup>. Locally, in spite of the increase in traffic accidents in holy city of Karbala, but there are not enough studies on this subject, which led us to conduct this study to shed light on risk factors and pattern of injuries resulting from road traffic accidents in Karbala.

### Patients and Method

This was a descriptive cross-sectional study conducted in Imam Hussein medical city in holy Karbala, during the period from 1 March to 30 May 2019. A total of 400 patients with different RTIs of both genders who were admitted to the emergency department or the surgical wards of the hospital were included regardless their age. Patient was excluded if he / she refused to participate, or uncooperative patient, victim of accidents from other provinces or Unconscious patients without accompanying person or the accompanying person have no information about the accident or injury. Data collected using a pre-constructed data collection sheet included personal data, Accident related data, risk factors, clinical data, type and site of injury, and primary and progressive management and intervention. All questionnaires were reviewed and checked for errors or inconsistency. Data analysis, performed using the statistical package for social sciences version 25, appropriate statistical tests were applied accordingly. hit pedestrian, rollover and sideways were the most frequent mechanism of accident, contributed for 23.5%, 22.3% and 21.5%, respectively. Regarding the cause of accident, negligent cycling, road crossing or driving was the main cause of accidents, represented 44.3% of all causes, followed by high speed (14%), bad road (12.5%) and overcrowded road (11.5%), other causes are less frequent summarized in the same (Table 2)

**Finding:** Demographic characteristics of the 400 RTIs victims and road users categories are shown in (Table 1), Table 2 demonstrated the accident's related

characteristics including the type of vehicle, mechanism and cause of accident; 2-wheel motorcycle and car were the most involved vehicle in the accidents, contributed for 55% and 51.8%, respectively.

Regarding the use of safety measures, only 4 out of 207 motorcycle and bicycle users were wearing a helmet during the accident. Among the 77 car drivers and passengers, only 6 were setting the seat belt during the accident. Regarding the time of accident, the least frequent accidents, (7.8%), occurred during the 12:01 to 6:00 am, and the more frequent accidents, (39%), at 6:01 pm to 12:00 am. Among the 400 victims, 40.5% reached the hospital by an ambulance, 38.0% by private car while the remaining victims transported by taxi, other vehicle, carried by peoples, or police car and in 5 victims the mean of transport was unknown., (Table 3).

Table 4, summarizes the site and types of RTIs of the 400 victims, where 41.8% had head injuries, 51.3% lower limb, 21.3% upper limb while back or chest and other sites were less frequent, 6.8% and 2% respectively. Fractures reported in 30%, contusion and/or ecchymosis, abrasion and laceration in 20.5%, 19% and 13.8%, respectively, while vascular injuries and multiple superficial wound, vascular and soft tissue injury reported in 7%, 6.3% and 3.5%, respectively.

The outcome of the victims revealed 10 mortalities giving a case fatality of 2.5% while 97.5% survived, (Figure 1).

**Table 1: Age, gender and road user categories of 400 RTIs victims**

Variable		No.	%
Age (year)	1 - 10	58	14.5
	11 - 20	110	27.5
	21 - 30	96	24.0
	31 - 40	73	18.3
	41 - 60	29	7.3
	> 60	34	8.5
Gender	Male	342	85.5
	Female	58	14.5
Road users	Motorcyclist	205	51.3
	Pedestrian	116	29
	Passenger	51	12.8
	Driver	26	6.5
	Pedal cyclist	2	0.5

**Table 2: Accidents related characteristics (N=400)**

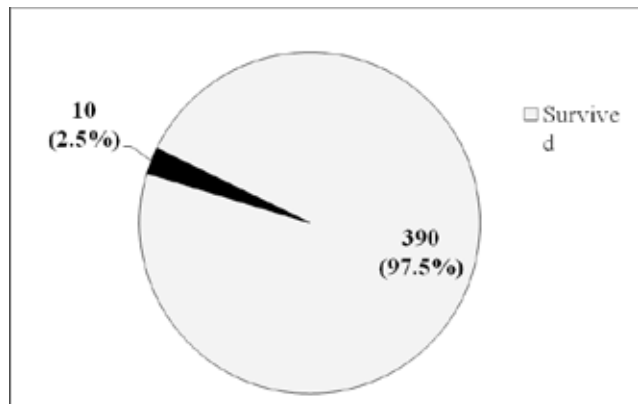
Variable	No.	%
<b>Type of Vehicle</b>		
2-WheelMotorcycle	220	55.0
3-WheelMotorcycle	53	13.3
Car	207	51.8
Light motor vehicles	34	8.5
Bicycle	2	0.5
<b>Mechanism of accident</b>		
Rollover	94	23.5
Hit pedestrian	89	22.3
Sideway	86	21.5
Head on	47	11.8
Hit and run	29	7.3
Rear end	25	6.3
Hit object on the road	25	6.3
Not established	5	1.3
<b>Cause of accident</b>		
Negligent (cycling, road crossing, driving)	177	44.3
High speed	56	14.0
Bad road	50	12.5
Overcrowded road	46	11.5
Mobile use	23	5.7
Playing on road	21	5.3
Poor vision	15	3.7
Mechanical fault of vehicle and other	12	3.0

**Table 3: Accident and victims related factors of 400 RTIs victims**

Variable	No.	%
<b>Using safety measures</b>		
Wearing a helmet*	4	1.9
Set a seatbelt **	6	7.8
<b>Time of accident</b>		
12.01am-06.00am	31	7.8
06.01am-12.00pm	94	23.5
12.01pm-06.00pm	119	29.8
06.01pm-12.00am	156	39.0
<b>Mean of transported to hospital</b>		
Ambulance	162	40.5
Private car	152	38.0
Taxi/other vehicle	38	9.5
Carried by people	25	4.5
Police vehicle	3	0.8
Not established	20	5
*motorcycle and bicycle users, n = 207, **passengers and drivers, n=77		

**Table 4: Sit and types of RTIs**

Variable	No.	%
<b>Site of injuries*</b>		
Head and face	167	41.8
Lower limb	205	51.3
Upper limb	85	21.3
Back /chest	27	6.8
Other sites*	8	2.0
<b>Type of injury</b>		
Fracture	120	30.0
Contusion and/or ecchymosis	82	20.5
Abrasion	76	19.0
Laceration	55	13.8
Multiple superficial wound	28	7.0
Vascular injury	25	6.3
Soft tissue injury	14	3.5
*Other sites: abdomen, neck, cervical spine, pelvis		



**Figure 1: Case fatality and survival rates of 400 RTIs cases**

**Discussion**

The present study found higher proportion of victims aged 11–40 years, this finding agreed a previous Iraqi study from Babylon<sup>8</sup>. And disagreed that reported in Korea and Pakistan<sup>9,10</sup>. Males were the dominant victims which might be due to the higher exposure to traffic in males compared to females this finding supported that reported in Yemen<sup>11</sup>. Motorcyclist were the more frequent, (51.3%), road users among the victims. The higher proportion of motorcycles reported in the current study was expected due to the increasing number of the imported motorcycles in Iraq which were widely used by Iraqi population particularly among the young adults. In Iraq, since 2003, there have been an increasing number of motorcycles in the streets<sup>12</sup>. These findings in line the Yemeni study<sup>11</sup>, while inconsistent with that



conducted in Kenya<sup>13</sup> and Pakistan<sup>14</sup> and the differences could be due to the variation in natures of different populations. Negligence was the major cause of RTIs which agreed with previous studies from Nigeria<sup>15</sup> and UAE<sup>16</sup>. Vast majority of motorcycle riders in our study did not wear the helmets and vast majority of drivers did not set a seatbelt on at the time of accidents. Using safety measures is very important protective factor can reduce the risk of RTIs<sup>17,18</sup>. In the current study, more frequent accidents, (39%), occurred at 06.01pm-12.00am, however, it had been documented that the more frequent accidents happen at day time<sup>7</sup>. In the present study the more frequent mean of transport was ambulance, contributed for 40.5%, and this indicates an improvement in the emergency health system in Karbala province, however, in the remaining 59.5% of cases the patients transported by private car, taxi, or other vehicle. In the present study, head and face injuries reported in 41.8%, lower limbs and upper limbs injuries in 51.3% and 21.3%, respectively, back and chest in 6.8% and other sites contributed for only 2%, This finding coincided with the finding of other previous Iraqi study conducted by Waleed et al.<sup>12</sup>. Previous reports referred that head and lower limb are the most common sites of injury and head injury carry the higher risk for morbidity and mortality in road traffic accidents<sup>19,20</sup>.

Fracture was the more frequent lesion among the cases of the present study, (30%), followed by contusion and/or ecchymosis (20.5%), abrasions (19%), laceration (13.8%) multiple superficial wound (7%), vascular injury (6.3%) and soft tissue injury reported in (3.5%) of the cases. However, different injuries could occur during an accident and different organs of the body could be affected. Ganveer et al. mentioned that fractures were the commonest injuries in RTAs<sup>21</sup>. Fortunately, majority of the cases survived and only 2.5% died, this rate was close to that previously reported in Karbala<sup>12</sup>, Tikrit<sup>22</sup> and in Najaf provinces of Iraq<sup>23</sup>. While the fatality rate in was lower than that reported in Saudi Arabia<sup>24</sup>.

### Conclusion

Majority of the road traffic injuries victims in Karbala were young adult male, unemployed or students. Most RTAs occurred inside the city or on a secondary roads. Motorcycles were the main vehicle involved and negligence was the most frequent cause of RTIs. Head and lower limbs were the commonest sites of injuries and the main cause of fatality. Fractures are the commonest type of lesions among the studied group.

Case Fatality rates due to RTA was close to that reported in previous Iraqi studies and lower than that reported in other countries.

**Ethical Clearance:** All ethical issues were approved by the authors and the data were collected according to the World medical Association Declaration of Helsinki.

**Conflict of Interest:** Authors declared: None.

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# Alpha-Fetoprotein for Prediction of Placenta Accreta in Women with Complete Placenta Previa Centralis: A Prospective Study

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## Abstract

**Background:** Placenta accreta (PA) is a major life-threatening obstetrical burden associated with high morbidity and mortality. This study aims to evaluate the ability of alpha-fetoprotein for prediction of placenta accreta in women with complete placenta previa centralis.

**Method:** This is a prospective study carried out at Minia Maternity University Hospital, Egypt during the period from October 2017 to March 2019. This study included a total of 100 pregnant women who are admitted to the hospital for CS between 28:38 weeks of gestation. They were classified into 2 groups (50 women per each), group (I) Diffuse PA: include women with diffuse placenta accreta and group (II) Control group: include women with normally implanted placenta.

**Results:** Both groups were comparable regarding age, residence and parity however, diffuse PA group had significantly higher number of cases with  $\geq 4$  previous CSs and positive history of placenta previa. Group (I) had lower postoperative hemoglobin and platelet count ( $p < 0.01$ ). Serum alpha-fetoprotein concentration was significantly higher in PA group compared to control ( $1.33 \pm 0.38$  vs.  $0.66 \pm 0.22$  MoM,  $p < 0.01$ ). Also, group (I) had higher amount of blood transfused units and longer duration of hospital stay compared to control group (all  $p < 0.01$ ). Incidence of complications was obviously higher in PA group (41 cases, 82%,  $p < 0.01$ ). The results of the predictive value of serum alpha-fetoprotein for placenta accrete revealed that the area under curve (AUC) was 0.958 and the best cutoff was  $> 0.84$  MoM with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% ( $p < 0.01$ ).

**Conclusion:** In conclusion, the results indicate a significant association between elevated serum alpha-fetoprotein level and placenta accreta. Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa centralis.

**Keywords:** Alpha-fetoprotein, Prediction, Placenta accreta, Placenta previa, Prospective Study

## Introduction

Abnormal placental adherence is associated with major pregnancy complications, it could be presented in three conditions; placenta accreta, increta and percreta [1]. Placenta accreta is the complete or partial attachment or penetration of the placenta to the myometrium or related organs that obstruct normal separation at delivery, this case results in significant hemorrhage that threatens both mother and neonate life [2]. Additionally,

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placenta accreta is associated with high morbidity that includes hysterectomy, blood transfusion, infection and ICU admission, etc.. [3]. Numerous risk factors have been associated with placenta accreta, placenta previa is one of them [4]. Placenta accreta was reported to occur in approximately 15% of cases with placenta previa and in about 67% of cases where placenta previa occurs in cases with previous cesarean delivery for placenta previa [5]. The antenatal diagnosis of placenta accreta is pivotal, because it allows both the medical team and the patient to be prepared for the suspected complications during delivery [6].

Alpha-fetoprotein (AFP) is a serum glycoprotein that was discovered early in human fetal serum by Bergstrand and Czar in 1956 [7-8]. It is the chief mammalian tumor-associated fetal protein found in adult's blood (by a small amount of 10-20 ng/ml) [9]. Maternal serum alpha-fetoprotein is elevated in some pregnancy complications such as spontaneous abortion, pre-eclampsia, gestational hypertension, preterm delivery and premature rupture of membranes (PROM) [10,11]. Also, poor maternal and fetal outcome is strongly related to the elevation of maternal AFP (probably as a result of placental injury) [12]. In addition, a significant association was found between increasing maternal AFP and the greater likelihood of persistent placenta previa [13]. Furthermore, the risk for abnormal placental adherence was increased in women with an elevated maternal serum AFP level, especially in the presence of a placenta previa [14]. The objective of this study is to evaluate alpha-fetoprotein as a predictor of placenta accreta in women with complete placenta previa centralis.

### Patients and Method

This is a prospective study that was carried out at Minia Maternity University Hospital, Egypt during the period from October 2017 to March 2019 (18 months). The study was approved by the research ethics committee of the Department of Obstetrics and Gynaecology, Faculty of Medicine, Minia University. All patients had signed a written informed consent after they have been made aware of the purpose of the study, interventions, outcome and possible complications. The study included a total of 100 pregnant women with previous CS who are admitted to the hospital for CS between 28:38 weeks of gestation. They were classified to 2 groups (50 women per each) as follow:

**Group (I) Diffuse PA:** include women with diffuse placenta accreta.

**Group (II) Control group:** include women with normally implanted placenta.

Women with placenta previa centralis who were delivered by CS had history of prior CS and gestational age of 28:38 weeks were included. Exclusion criteria were; recurrent pregnancy loss, IUFD, IUGR, multiple pregnancy, fetal chromosomal anomaly, prior cervical or uterine surgery other than CS and curettage, any known systemic disease eg. diabetes mellitus, hypertension, etc., pregnancy achieved by ART, placental abnormality other than placenta previa and congenital fetal malformation such as neural tube defect, abdominal wall defect gastrointestinal and skeletal abnormality.

Full history was taken. General and abdominal examinations, basic laboratory investigations and detailed US examination were done for all included cases. The diagnosis of placenta previa was based on the presence of placental tissue covering the internal cervical os. Placenta accreta was diagnosed by ultrasound. Maternal serum alpha-fetoprotein was measured by automated equipment (IMMULITE 2000, Siemens Healthcare Diagnostics, Los Angeles, CA, USA) solid-phase competitive hemiluminescent enzyme immunoassay system as per the manufacturer's instructions. Multiple of the median (MoM) values were calculated for serum alpha-fetoprotein. Pre and post-operative complete blood count (CBC) were determined by Automated cell counter Sysmex, NE (TAO, Medical Incorporation, Ono, Japan). Given blood units for each case was recorded. Postoperatively, patients who were admitted to ICU were subjected to close daily follow-up. Postoperative complications and hospital stay duration were recorded.

**Statistical Analysis:** SPSS program (Statistical Package for Social Sciences, version 20, IBM, NY, USA) was used for statistical analysis. Numerical data were presented as mean  $\pm$  standard deviation (SD), while categorical data were presented as number and percentage. For comparisons of quantitative data, independent and paired sample T-test were used, however, for qualitative data, Chi-square test or Fisher exact were used. Probability values (P. V.) were considered significant if less than 0.05 and highly significant if less than 0.01.

**Results**

Incidence of complications was obviously higher in PA group (41 cases, 82%, p<0.01) of these, 19 cases with post-partum hemorrhage and 14 cases with bladder injury. Regarding surgical interference in group (I), 35 cases (70%) had hysterectomy, 11 cases (22%) had leaving placenta in situ and 4 cases were managed conservatively. However, 4 cases (8%) only in control

group were managed conservatively (3 cases by bilateral uterine artery ligation and 1 case by ballon tamponade) (Table 1). The results of the predictive value of serum alpha-fetoprotein for placenta accrete revealed that the area under curve (AUC) was 0.958 and the best cutoff was > 0.84 MoM with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% (p<0.01) (Table, 2 and Figure 1).

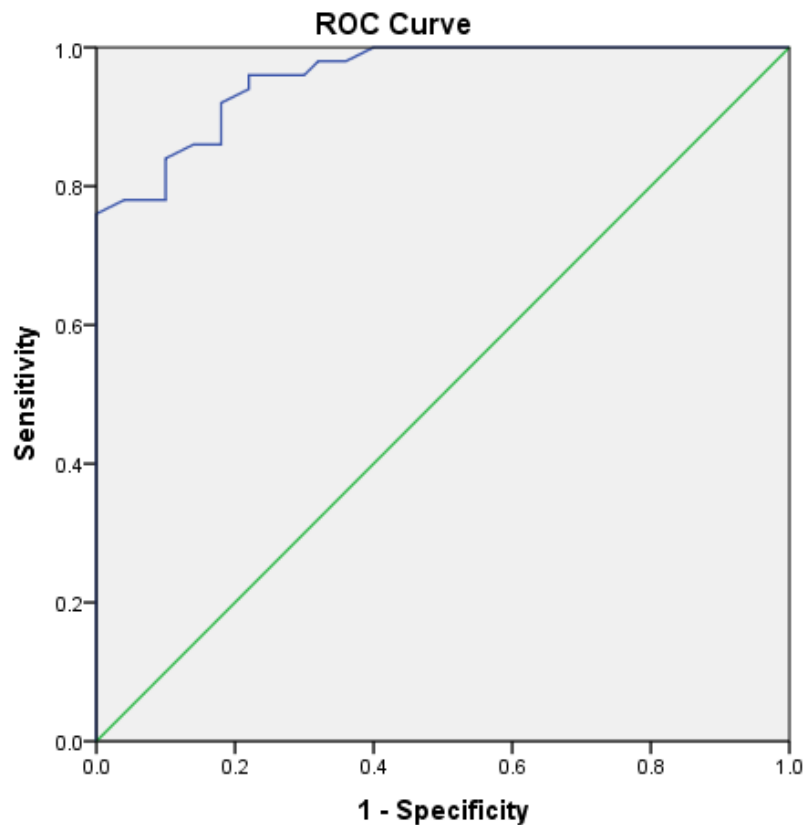
**Table 1: Laboratory investigations, clinical finding and surgical interference between groups.**

Variable		Groups		P. value (Sig.)
		Group (I) Diffuse PA (n=50)	Group (II) Control (n=50)	
Heamoglobin (g/dl)	Preoperative	11.2 ± 1.7	11.3 ± 1.3	0.74 <sup>NS</sup>
	Postoperative	8.6 ± 1.3	9.8 ± 1.3	<0.01 <sup>**</sup>
Platelet count (10 <sup>3</sup> )	Preoperative	245.3 ± 29.2	252.9 ± 31.5	0.21 <sup>NS</sup>
	Postoperative	155.2 ± 23.7	195.4 ± 26.8	<0.01 <sup>**</sup>
Serum alpha-fetoprotein	ng/ml	124.7 ± 35.8	61.7 ± 20.9	<0.01 <sup>**</sup>
	MOM	1.33 ± 0.38	0.66 ± 0.22	<0.01 <sup>**</sup>
Blood transfusion (units)		4.74 ± 1.95	0.2 ± 0.4	<0.01 <sup>**</sup>
Duration of hospital stay (days)		7.1 ± 3.9	1.3 ± 0.7	<0.01 <sup>**</sup>
Complications	No	9 (18.0%)	46 (92.0%)	<0.01 <sup>**</sup>
	Bladder injury	14 (28.0%)	2 (4.0%)	
	ICU admission	8 (16.0%)	1 (2.0%)	
	Post-partum hemorrhage	19 (38.0%)	1 (2.0%)	
	Delayed hysterectomy	0	0	
<b>Surgical interference</b>				
Hysterectomy		35 (70.0%)	0	<0.01 <sup>**</sup>
Leaving placenta in situ	Partial	1 (2.0%)	0	0.31 <sup>NS</sup>
	Complete	10 (20.0%)	0	<0.01 <sup>**</sup>
Conservative management	Bilateral uterine artery ligation	0	3 (6.0%)	0.08 <sup>NS</sup>
	Cervical tamponade	2 (4.0%)	0	0.15 <sup>NS</sup>
	Ballon tamponade	2 (4.0%)	1 (2.0%)	0.56 <sup>NS</sup>

Chi-square and T tests were used to compare between groups. NS Not significant. \*\* Significant (P≤ 0.01)

**Table 2: Alpha-fetoprotein for prediction of placenta accreta.**

Parameter	AUC	Cutoff	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagn. Accuracy
AFP (MoM)	0.958	> 0.84	92.0	82.0	83.0	87.2	85.0



Diagonal segments are produced by ties.

**Figure (1): ROC curve analysis of serum AFP for prediction of placenta accreta.**

## Discussion

Currently, alpha-fetoprotein is used for the prediction of the fetus's quality, its elevation in amniotic fluid may indicate the likelihood of neural tube defects [15]. Furthermore, the sudden upregulation of maternal serum AFP (up to 380-500 ng/mL) was associated with the presence of incipient abortion or stillborn fetus [16].

The results of our study revealed that maternal serum alpha-fetoprotein was significantly elevated in placenta accreta group ( $1.33 \pm 0.38$  MoM) compared to control group ( $0.66 \pm 0.22$  MoM). Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa with cutoff  $> 0.84$  MoM, area under curve of 0.958, with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% ( $p < 0.01$ ). Our results are consistent with the previous studies indicating that elevated maternal serum AFP levels are strongly associated with MAP among women with placenta previa. Hung et al. [17] reported a strong significant association between elevated AFP and placenta accreta in women with

placenta praevia (AFP levels ranged between 0.5 and 2.5 MoM in 89% of accreta patients). In addition, Zelop et al. [18] reported that there is a strong correlation between the extent of invasion and the elevation of serum AFP. Also, Lyell et al. [19] studied the relationship between maternal serum markers and morbidly adherent placenta in women with placenta previa ( $n=736$ ). They found that maternal serum alpha-fetoprotein ( $>1.79$  MoM) was associated with a nearly 3-fold increased risk for placenta accreta. Also, similar to our study, they found that the risk for MAP was increased by 23-36 fold in women with previa that had elevated AFP in addition to high previous CSs.

Similar to our findings, Dreux et al. [20] studied maternal serum markers and placenta accreta, they found that AFP concentration was 1.23 MoM in placenta accreta group ( $n=69$ ) versus 0.99 MoM in control group ( $n=552$ ), ( $p < 0.01$ ). In a recent study by Verma et al. [21], they found that AFP level was higher in 93.3% of cases with placenta previa with placental adherence. Also, they found a significant surgical intervention (80%) and

increased maternal morbidity (68.8%). They concluded that maternal serum AFP is an important biomarker for prognostication of placental adherence. Oztas et al. [22] studied the ability of serum AFP in the prediction of morbidly adherent placenta that requiring hysterectomy among women with placenta previa totalis. They found that according to the ROC analysis, the area under the curve was 0.742, the best AFP cut-off value was 1.25 MoM with 85.9% sensitivity and 71.4% specificity ( $p=0.036$ ).

### Conclusions

In conclusion, the results indicate a significant association between elevated serum alpha-fetoprotein level and placenta accreta. Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa centralis. Further prospective studies are warranted to confirm our findings.

**Ethical Considerations:** The study protocol was approved by the ethical committee of the Obstetrics & Gynecology dept. at faculty of medicine, Minia University. All Participants had signed a written informed consent after they have been made aware of the purpose of the study, interventions, outcome and possible complications.

**Source of Funding:** This project was locally funded from El-Minia University.

**Conflict of Interest:** None.

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# Health Promoting School in Surabaya, Indonesia: The Six Elements Implementation

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## Abstract

**Context:** School health program has been developed by WHO through comprehensive approach in promotion efforts and health education in the schools, called health promoting school. Indonesia Ministry of Health translated HPS as Sekolah Berwawasan Kesehatan. There are six elements of HPS developed by WHO-SEARO are adopted by IMoH. Six elements of HPS will be easy to be implemented when school health program also adopts them. However, UKSs Indonesia school health program, only implements three elements called Trias UKS. This study aims to explore the potency faced by school in implementing the elements of HPS. A qualitative study was conducted to explore three state elementary school potencies to implement it. Totally 40 informants were involved in this study conducted with in-depth interview and focus group discussion. Results shows that there are slightly difference among three school in the potency to implement HPS, even they had differ characteristics. One school been coaching by Education Office-City of Surabaya, has implemented three elements well and has always been a champion of school health competition in Surabaya. Even though, the last two school have potency too. Need more advocate and socialization about the HPS implementation among school at Surabaya to gain the comprehensive approach in health and education sectors in Indonesia.

**Keywords:** Health promoting schools, state elementary school, qualitative, Surabaya.

## Introduction

Globally, school health program has been developed by WHO and other international agencies since 1950 through comprehensive approach in promotion efforts and health education in the schools<sup>1</sup>. However, its implementation in each country varies greatly<sup>1</sup>. The schools should organize through holistic

and comprehensive approach, called health promoting school (HPS). Health promotion efforts in the schools in the form of HPS has been identified effectively for enhancing health status of students in the schools<sup>2,3,4,5,6</sup>.

HPS program endorsed by WHO has been adopted by Indonesias Ministry of Health<sup>7</sup>. There are six elements of HPS developed by WHO<sup>8</sup> are adopted by Pusat Promkes (Health Promotion Center) (2011)<sup>7</sup>. Six elements of HPS are easy to be implemented when UKS or school health program as technical implementing unit, also adopts them. However, in implementing program, UKS only implements three elements called Trias UKS (three elements of HPS). These include health education, health services in school, and health environmentally school, as well<sup>9</sup>. Others elements are not written clearly in the document of UKS and they have not yet been implemented well by UKS program.

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These are the first element about engagement of health and education staff, teacher, parent, community leader in health promotion effort, the fifth element about school policy implementation, and the sixth element about effort of overall public health enhancement.

HPS and UKS program have the same objective, enhancing health status of school children by involving school community. Inter-sector optimization and coordination of both programs may help the achievement of health status optimally in school age students. The engagement of various sectors internally and externally will strengthen the implementation of HPS elements<sup>10,11,12</sup>. Moreover, it emphasizes that health promotion program in school comprehensively will be work when there are collaborations inter sectors. School policy, intersector engagement, and effort of overall public health enhancement constitute three elements of HPS. These have not yet been implemented in UKS program. This study was aimed to explore the potency faced by school in implementing the six elements of HPS.

### Method

A qualitative research was applied to explore processes and activities of the schools<sup>13</sup>. Three State Elementary Schools (SESs) located in Kelurahan of Tanah Kalikedinding, Subdistrict Kenjeran, City of Surabaya were selected. Selection of location was based on accessibility and engagement in previous study. It was assumed that three SESs selected meet the standard of UKS for all SESs in Surabaya, although have relatively different characteristics. One of three schools has been coached by Education Office-City of Surabaya (EOCoS) during health school competition based on decree of Head of EOCoS number. 188/2638/436.6.4/2016. The rests have not yet been coached by this institution.

In-depth-interview was performed to totally 40 informants that included School Masters, teachers who coordinated UKS, representatives of teacher who taught students, school clerks, and chairperson of School Committee in each school. Secretary of UKS officer in Subdistrict of Kenjeran, UKS coordinator, EOCoS in the level of Subdistrict, Head of Public Health Center (PHC), UKS management in PHC of Tanah Kalikedinding, Subdistrict of Kenjeran was an informant too.

Valid data were obtained by interviewing the informants more than once, depending on their openness in expressing their opinions.

### Results

The results describe potency of schools in Surabaya to implement six elements of HPS. These elements are written as main themes. These themes are described in several subthemes that describe challenges to implement each element or theme.

#### Main theme 1: Element 1 of HPS

The following paragraph shows that three schools have various implementation related to engagement of education and health staff, teachers, parents and community leaders in health promotion in school. Moreover, SES 1 often receive coaching program from EOCoS to join health school competition. They had been relatively implementing the element of across sector engagement. The challenges faced by UKS in implementation of element 1 as follows.

#### Subtheme 1: Depending on governmental institution (PHC) and EOCoS

Schools have routinely performed activities that are related to health with local PHC such as PHC Tanah Kalikedinding. But all activities depend on PHC program. They have not yet initiated to design program. There are various activities including routine scouting young physician in school.

*“eee...clearly (its program) from PHC okay, there must be that activity. It is mandatory we follow (that program)” (School Master 2)*

#### Subtheme 2: Cooperation is to be done in conjunction to school accreditation

**1. Cooperation for school accreditation and competition participation:** SES 1 often make documentation in every cooperation to be held with out-school parties. According to informant, this documentation is used to meet the requirement for school accreditation. It is also used for preparing healthy school competition:

*“...according to accreditation instrument, school is better to organize cooperation with related several institutions with industry as well as governmental institution. Mainly police, then PHC, eee kelurahan (the kind of village in urban area), subdistrict. There is a kind of mutual benefit” (teacher 1, SES 1).*

**2. Incidentally cooperation with private parties, not sustainable:** SES 1 is the most frequent to receive

and perform cooperation with private parties for engaging in healthy activities. The most frequent activity is student health competition accompanied by company products marketing. Moreover, few of non governmental organization (NGO) also has ever given training to students, but it is not sustainable due to limited funding.

Because of the unusual activity from private parties, school decides selectively. There has to be recommendation from EOCoS before private parties offer cooperation to schools.

### **Subtheme 3: Limited resources**

- 1. Limitation of funding and man power:** Cooperation with out-school parties and unsustainable activities due to resource limitation, both funding and man power, particularly companion teacher.
- 2. Engagement of teacher limited to school hour:** In each school as subject of research, every teacher efforts to engage in enhancing student health. Minimum and the most frequent activity is reminding, accompanying and examining personal hygiene of student such as nail, hair and tooth cleanliness. That activity is limited to suggestion, there is no written regulation with sanction.

**Subtheme 4: School Committee not yet optimal:** School committee in SES 1 is relatively more active compared to other schools under study. School committee is frequently engaged in routine meeting for enrolling student, examination preparation and student graduation. School committee also participates in planning and implementing activities in school, particularly that is related to student activities directly. However, according to informant of school committee, its engagement is limited to school request, committee initiative is not possible, and it is difficult to expect liveline of committee member.

*“The caretakers of committee are nine (person). Really that is very difficult. The works are overload, Mam(they are difficult to leave their jobs). Thus, really it is social matter, I can not force, even to find a substitute, no one wants. I am myself fooled. Eventhough I also work hehehe. That is okay.. that’s fine, I am sincere. “(School committee 3).*

**Main theme 2: Elements 2, 3, and 4 (Trias UKS):** Elements 2, 3, and 4 of HPS, known as Trias UKS. The challenges of Trias UKS as school health program

in Indonesia can be considered as the challenges in implementing elements 2, 3, and 4 of HPS. The following subtheme is identified as challenges in implementing those elements.

**Subtheme 1: Optimal implementation just for competition purpose:** SES 1 is more optimal in implementing Trias UKS because it gets accompaniment from EOCoS in conjunction to health school competition. Almost every year SES 1 always represents Subdistrict to compete in health school competition in the level of City of Surabaya. This privilege did not be obtained by two other schools. Informants in SES 2 and SES 3 state that UKS has not yet be implemented optimally because of school conditions, in which they are renovated physically, and administration policy from EOCoS.

**Subtheme 2: School still prefers physical environment to social environment:** Three schools show different condition related to elements about healthful school living achievement. SES 1 has relatively achieved healthful school living, while two other schools have not yet achieved it optimally. School environment that has not yet been clean optimally, according to informant is resulted in many factors, including student habits at home.

Social environment surrounding school has not yet been main attention. However, even though a little, there is still attention from school to take care social environment of students when they are in school.

**Subtheme 3: Health education is more suggestion, not yet to be curriculum:** *“... Thus wherever I have opportunity I can speak with students, certainly about narcotics problem, alcoholic problem, smoking cigarette problem, promiscuity, that’s really the points. Besides from teacher, wherever I have opportunity to speak, I directly deliver it“(School Master 2).*

**Main theme 3: Element 5-implementation of school policy:**

**Subtheme 1: Policy issued by school depends on School Master:** Policy can be formulated by school, it is adapted to school condition and objective. This is the right of School Master to develop school by considering guidance from EOCoS. According to School Master of SES 3, that formulation is requested by EOCoS every year, then it is reviewed, decided and signed by Head of EOCoS to be implemented.

**Subtheme 2: School policy can not contradicting from EOCoS policy:** *“Its policy can’t discord far from decision that is ordered by EOCoS. Its policy must be inline with information of EOCoS ...including from PHC.... (School Master 2)*

**Subtheme 3: Policy issued by school has not yet implemented sanction, just only suggestion:** *“None (school sanction). Only suggestion, and basically from EOCoS there is order something like this, ... Besides disturbing student health, it (smoking around the school) is also followed by those our students, (it) has been delivered something like that ....” (School Master 2)*

**Main theme 4: Element 6-Effort to Enhance Public Health Comprehensively:** This element means that school participates in enhancing public health around the school.

**Subtheme 1: The effort has not yet engaged the community around the school, it is only limited to competition purposes:** According to an informant, there is a component of evaluation of competition that states contribution school cadre to people around the school. Its contribution includes posyandu (integrated services post) visits, observation of healthy housing. But, unfortunately those good activities are only for competition purposes. It is only three months continuously before and after competition. It is not routinely implemented, because of limited resources, mainly students in charge and teacher as companion.

## Discussion

The principle of the element 1 of HPS is a school engages across sectors in effort for enhancing health of school community. The concept of HPS gives organization context that the maximum impact of health promotion effort can be achieved through policy and coordination of program, particularly cooperation between health and education sectors<sup>15,16</sup>. The results show that engagement of across programs, across sectors and across private companies is still limited to competition purposes, completing accreditation documents and supporting fulfillment of certain institution target, such as sponsorship of private companies.

The results showed that School Master has been requested to organize cooperation with stakeholders actively. These include mainly alumni, private and industrial sectors as well. The request is difficult to realize by school when there is no clear regulation. The

proactive School Master is strongly needed to make networking with stakeholders.

In implementing element one, the engagement of school committee is still low. The findings indicate that school committee as representatives of parents is really willing to be engaged in financing student activity. The reason of transparency and leadership of school master is the reinforcer to be willing to engage in it.

The achievement of element 2 of HPS, varies among three schools under study. The variation of physical environment may be due many factors although it has been decided as achievement indicator. The findings show that in general, physical building condition of SES in Surabaya is relatively good. According to informant, renovation can be done because Mayor budgets physical renovation for all SESs in Surabaya.

Three schools under study has not yet touched psycho-social environment. The findings show that environmental condition around school gives impact on psychosocial condition of school community. Two schools are located in crowded and busy areas. According to informant, this condition gives impact on particularly student interaction.

The teacher limitation in giving literacy of healthy environment is probably as challenge of second element implementation. This is in accordance with the results of study that teacher role minimumly in implementing school health promotion effort, because teacher has responsibility to teach based on curriculum and lacks of health training as well<sup>16</sup>. The importance of literacy and healthy behavior habituation is emphasized in the results of this study.

Guidelines for implementing UKS actually contain the importance of life skill development. This skill is used for behaving healthy and clean life for the students. Misunderstanding and bad policy of school contribute to non-optimal implementation. Enhancing literacy of holistic health concept<sup>17</sup> can be used for intervention effort. This literacy enhancement in the form of training, is not only for teacher but also for all school community including parent, has written as HPS indicator as well<sup>8</sup>.

Element for enhancing overall community health has not yet been implemented by school optimally and sustainably. Actually, school can involve Coaching Team in Subdistrict level to enhance public health around school. Coaching team, in which one of its members is

Camat (Head of Subdistrict) has authority in Subdistrict. This authority can be used for coordinating across sector efforts in implementing school health program.

Other efforts are focusing of public health problems in each area, and involving of parent and community participation. School has to participate in planning and implementing public health efforts surrounding, although not many and not yet sustainable.

### Conclusion

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**Conflict of Interest:** Nil

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# Evaluation Context and Input of National Health Insurance in Ternate City

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## Abstract

**Context:** Implementation of National Health Insurance (JKN) in several regions in Indonesia experiences differences in terms of expected outcomes. The recruitment of participants in business entities, especially the micro, small and medium segments, has also not been reported yet. The general objective of this research is to know the context and input in the implementation of national health insurance in Ternate City. The research method used is qualitative research. The informants in this study were the head of the Indonesian national health care insurance, the Head of the Health Service, the Head of Planning and Data, the Head of Health Financing, the Head of the Health Center, the Head of the Unit, the Director of the Dharma Ibu Hospital. Health insurance program policies in Ternate City are based on regulations issued by the Indonesian national health care insurance and Ternate Mayor Regulations. Inputs Health resources available at the health center and hospitals are mostly eligible, although there are still officers working health are not following their educational background. Payment of claims at the hospital is still experiencing delays while payments for capitation has proceeded according to the rules. Infrastructure facilities available at the health center and hospitals have fulfilled.

**Keywords:** Health insurance, context, input, evaluation

## Introductions

The implementation of national health insurance in several regions in Indonesia experienced differences in terms of expected outcomes. The recruitment of participants in business entities, especially the micro, small and medium segments, has also not been reported yet. In addition, the distribution of participants, especially in first-level health facilities, was also judged to be uneven. Another problem that also needs attention is the availability of benefit packages and the readiness of a fair and equitable supply for every level of society. The stipulation and standardization of care classes were also stated to still need improvement. so that in the future

it is expected that the health insurance benefit package will be pursued equally for all participants, both medical and non-medical benefits (care classes) both beneficiary participants and non-beneficiary<sup>(1)</sup>.

The implementation of national insurance in Indonesia is a very serious challenge due to its large population, uneven population distribution, and diverse geographical conditions. In remote areas often do not get the same and adequate services because of the lack of facilities and qualified health workers like in big cities. Following is data on coverage of national health insurance membership in Indonesia in 2015 in each province, the current condition of membership in Indonesia is still very small at 53% of 133,423. 653<sup>(2, 3)</sup>.

North Maluku officially became a Province after it was previously part of the Maluku Province. North Maluku is a group of islands with a land and water ratio of 24:76. It has 395 islands, 83% or around 331 islands that are uninhabited. Based on data in 2015, the total population of North Maluku Province registered as a participant in the national health insurance program was

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532,306 people, around 49.85% of the total population of 1,067,610. Most of the residents of North Maluku registered as participants of health insurance are recipients of assistance, of which there are around 328,965 people who are beneficiaries whose contributions are borne by the government<sup>(4)</sup>.

The fact that there are still many complaints from the public both directly and through the mass media, such as convoluted procedures, there is no certainty in the period of settlement, less transparent requirements, and the attitude of officers who are less responsive in providing services. Based on the description of the problem, the purpose of this study is to determine the evaluation context and input of National Health Insurance in Ternate City.

### Materials and Method

This research is a qualitative study. Research locations were carried out in several agencies related to the health insurance program consisting of the Indonesian national health care insurance, Ternate City Health Office, Darmalbu Hospital and health center of Kota Baru Ternate. This research was conducted in October-November 2019. The procedure for selecting informants used a purposive sampling method. Researchers are the main instrument of research. As the main instrument, researchers act as planners, implementers, data collectors, analysis, interpreters of data and ultimately become reporters of research results<sup>(5)</sup>. Data analysis techniques consist of processing and preparing data for analysis, reading the entire data, and analyzing in more detail by coding the data.

### Findings:

**Context:** The implementation of the Health Insurance program is a cross-sectoral collaboration in which the Ministry of Health acts to regulate regulations including a tiered system, INA-CBG package rates. Health facilities as health service providers and social ministries/social services regulate related grant recipients. Policies implemented at the health center level are based on policies issued by the Indonesian national health care insurance and are guided by the regulations of the Mayor of Ternate. The mayor's regulatory policies govern the services provided to health insurance participants as well as incentive payments to health workers.

*'Peraturanyang mengaturtentangpelayanananterhadappeserta BPJS, kemudianmenyangkutdenganinsen-*

*tifpetugasdihitungsesuaidenganperaturan yang disampaikankoleh peraturanwalikota yang adadisitu..'(GA, 49 tahun).*

Policies implemented at the Dharma ibu Hospital following policies issued by the health insurance provider. Dharma Ibu Hospital follows every development and change of regulations issued by the Indonesian national health care insurance, especially related to input or reporting using the INA-CBGS application that has been developed. Kota Baru Health Center and Dharma ibu Hospital and Ternate City Health Office have carried out their respective functions. Kota Baru Health Center and Dharma ibu Hospital have provided health services to health insurance participants following existing regulations.

### Input:

#### The Availability of Health Human Resources:

The availability of health human resources has largely been met, although there are still some health workers needed. Based on the results of interviews with health workers who worked at the health center, information was obtained that the officer worked not following his field. for example in the input code section of the diagnosis, health workers who input the data are still in the learning process. It is not following his competence.

*'Karena BPJS iniberhubungandengandiagnosa, kalausayakanbukanperawatdenganbidan, bu-kandibagianitutih, jadikalasayadidiagnosaagak-sulit Tapi tong belajartarada, kalaudibilangtidak-bisa tong maubagaimana, jadibelajardengansendirinya, jadi Tanya tohindiagnosanya, boleh tong belajar, tapiitupasienakanmenunggu lama karena tong haruscaridiagnosanya...'(SF, 52 Tahun).*

The general administration section said that health human resources have been fulfilled but after further observation still found health workers who are not following their fields. Other health workers such as doctors, nurses and midwives have been fulfilled, but for the person in the input, the code section is still not appropriate.

**Funds Availability:** Funds were given by the Indonesian national health care insurance to the health center and hospitals have different payment systems.

*'Itudihitungdarijumlahperkapita. Dalamartibahwapresentatif BPJS iniadaberjumlahsekitar orang, kitahitungperkapita. Perkapita 6 ribu. Itupundihitung 6 ribukalaukitamemangmemenuhi target dari yang tigakerjas*

amatadiadakontak komunikasi..”(SF, 52 Tahun).

While the Dharma Ibu Hospital receives funds with a claim system. The capitation calculation is based on the number of residents registered in the national health insurance.

“...Merekamenggunakan INA CBGS, Pembayaran nyaberdasarkanpaket, semuadidalannyaterdapatperawatan, lab, lalukemudiandibulannyakitamengklaim...”(SR, 56 Tahun)

In the Kotabaru Health Center the number of residents who have been accommodated by the national health insurance is 5000 participants from 31,268 total population. The capitation fund payment is paid through the Kota Baru Health Center account and is controlled by the Health Office of Ternate. All forms of expenditure and disbursement of funds through health center accounts must be known by the Ternate City Health Office. When the Kota Baru Health Center wants to buy drugs or equipment it must make a plan of needs that will then be submitted to the national health insurance manager to be signed and then the funds from the account can be disbursed. This is consistent with what was revealed by the kotabaru health center and Ternate City Health Office.

“Haruskonsultasiduluharusditandatangani oleh pihakdinas kesehatan” (SF, 52 Tahun).

The ongoing disbursement process is felt to hamper the performance of the Kota Baru Health Center in terms of health services. Because every purchase of goods must be known by the Health Officer, the health center should have been able to disburse their funds and be able to submit proof of purchase thereafter.

“...MungkinkendalanyatiapbulanlaporannyamasukkeDinasKesehatanwalaupunRekening punya puskesmas, tapijikaakanpencairan/pembelianbarang dan obatharusmemintadaripihakDinasKesehatan. Prosesnyaagak lama..”(GA, 49 tahun)

### Facilities and Infrastructure:

**Health Center:** Facilities and infrastructure available at Kota Baru Health Center are mostly available. Seen from the availability of chairs in the patient waiting room which is located in front of the patient registration counters, patient examination rooms, pharmacies, and laboratory support facilities. The condition of the Kota Baru Health Center looks neat and also clean. The service room is arranged in front of the

building and the administration room is located at the back of the health center building.

“Untukpasien BPJS sendiri. Sarana dan prasarana yang kita punya disinimulaidaripelayanan,yangadalo ket, pelayanansampaikeLaboratorium, kemudianpengambilanobat dan adapemeriksaandululewatdokteruntukmenanganipasien BPJS...”(SF, 52 Tahun).

The health services provided by the Kota Baru Health Center are not only given to sick people but also healthy people. This is a form of preventive health services. As a form of control, Kota Baru Health Center conducts data collection on each household, to see the number of household members and conduct health checks on them, such as blood pressure checks.

“Kalaupundiasehatdicektekanandarahnya, ituapanamanya. Baikkepalakeluargasampai anak. Orang belumsakidicegahuntuktidaksakit. Jaditugaspuskesmasitupekerjaannyaberatkarenaharusturununtukmencegah orang untuktidaksakit. Jadikitapenyuluhan. Jadikitajal anketiaprumahataukalauadaposyandu”(SF, 52 Tahun).

Based on interviews with several patients visiting the health center, information was obtained that most of the facilities and infrastructure available at the Kota baru health center were available, such as the availability of patient waiting rooms and comfortable chairs to wait. Besides health workers in charge of providing friendly service and serve patients well. Most of the facilities and infrastructure are available at the Kota Baru Health Center. However, there are no USG facilities for pregnant women.

**Hospital:** Facilities and Infrastructure at the Dharma Ibu Hospital are available, visible from the presence of the emergency department, patient waiting room, administration and information department, several polyclinics, operating room, infant and toddler examination especially for immunization, elderly health examination, Rontgen, laboratory, CT scan, treatment room with various levels. The condition of the hospital looks neat, clean and floored. Hospital lifts consist of two where the first is a lift for patients and the other is used for visitors/patients' families. One of the highlights of the hospital is a beautiful view that can be enjoyed by patients and patients' families located just behind the hospital building. In this hospital, there is also a canteen which is neatly arranged and clean.

“Semuapelayanan lengkap, igd, laboratorium, fotorontgen, CT Scan”(SF, 52 tahun)

In addition to the facilities and infrastructure at



Dharma Ibu Hospital, it is also supported by an adequate number of health workers. Dharma Ibu Hospital has 4 general practitioners and 17 specialist doctors. If added together, the total number of employees working at the Dharma Ibu Hospital is around 100 people. This was conveyed from the results of the interviews conducted.

“Kami disinidokterumumnya 4, dokterspesialis 17, Total keseluruhanpegawaikuranglebih 100 orang”(SF, 52 tahun)

Based on the results of interviews conducted with the Kota Baru Health Center and the Dharma Ibu Hospital, information was obtained that most of the facilities and infrastructure were available. In its service, there are several types of services that are not funded.

## Discussion

**Context Evaluation:** The evaluation includes an analysis of problems related to the program environment or objective conditions to be carried out. It contains an analysis of the strengths and weaknesses of certain objects. Stuffle beam states context evaluation as an institutional focus by identifying opportunities and assessing needs (1983). One need is defined as a gap (discrepancy view) of real conditions (reality) with the expected conditions (ideality). In other words, context evaluation is related to the analysis of the strengths and weaknesses of a particular object that is going to or is going on.

In Ternate, the policy or regulation related to the implementation of Health Insurance refers to the regulations issued by the Indonesian national health care insurance and the Mayor's regulations. Policies implemented at the health center level are based on policies issued by the health insurance provider body and are guided by the regulations of the Mayor of Ternate. The guardian policy regulates related services provided to health insurance participants as well as incentive payments to health workers.

### Input Evaluation:

**Availability of Human Resources:** The availability of human resources in the implementation of health services plays an important role, especially in the current era of National Health Insurance. The national health insurance program began to be implemented in Indonesia in 2014 <sup>(6)</sup>. With the existence of a national health insurance program, there will certainly be changes

in various ways. From the aspect of health providers, for example, they must provide services that are increasing due to an increase in demand for health services.

First level health facilities are the spearhead of health services in the community and have the function as the first contact of national health insurance participants so that they have a major impact on improving the health status of the community. According to the Republic of Indonesia's Presidential Regulation Number 32 of 2014 that what is meant by First Level Health Facilities hereinafter abbreviated as FKTP is a health facility that carries out non-individual health services specialist for observation, diagnosis, treatment, treatment, and/or other health services<sup>(7)</sup>The majority of Human Resources for Health at Kota Baru Health Center and Dharma Ibu Hospital have been fulfilled. Human Resources is a very important element and influences the improvement of all aspects of the health service system for all levels of society. Implementing health insurance policies are health service units, starting from the basic level to the advanced level. Human resources implementing health services in the National Health Insurance are doctors/specialists, dentists, nurses, and midwives <sup>(8)</sup>. The results of research conducted by Lestari <sup>(9)</sup> showed that the lack of health workers compared to the existing health center makes the workload of health workers higher and incompatible with their duties and educational background.

**Availability of Funds:** The health insurance provider must issue an official report on the completion of the claim file no later than 10 days after the claim was submitted by an advanced referral health facility and accepted by the health insurance provider body. (4) In the event that a claim submitted by an advanced referral health facility as referred to in paragraph (1) does not fulfill the completeness of the claim file, the Health insurance organizing body returns all claim files to the advanced referral health facility and issues the minutes of returning the claim file.

Claim costs at the Dharma Ibu hospital experience delays (5) In the event that the national health insurance does not issue an official report on the completion of the claim file within 10 (ten) days as referred to in paragraph (3), the claim file is declared complete. (6) The 10 (ten) days as referred to in paragraph (4) shall be counted starting from the day of filing an advanced referral health facility claim which is marked by the issuance of proof of receipt of the claim<sup>(10)</sup>.

Claims for the Dharma Ibu Hospital experienced delays in claim payment. This is in line with research often experiencing delays for one month. This happens when the health insurance provider will pay the hospital claim fee, but it turns out the patient file in this case the medical record has not been completed, as a result, it will experience delays in inputting because the files have accumulated which will affect the payment of claims for the hospital that is, it will be pending, and the claim fee will be paid one month in the future <sup>(11)</sup>.

### Conclusion

Health insurance program policies in Ternate City are based on regulations issued by the Indonesian national health care insurance and Ternate Mayor Regulations. Inputs Health resources available at the health center and hospitals are mostly eligible, although there are still officers working health are not following their educational background. Payment of claims at the hospital is still experiencing delays while payments for capitation has proceeded according to the rules.

**Conflict of Interest:** The authors declare there is no conflict of interest.

**Source of Funding:** Budget Implementation Entry List Health Polytechnic of Ternate 2019.

**Ethical Clearance:** Taken from Health Research Ethics Committee Health Polytechnic Of Ternate Number LB.02.04/2.3/162/2019

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# The Effectiveness Comparison of Type of Treatments in Decreasing of Total Dissolved Solid (TDS) and Total Suspended Solid (TSS) in Household Wastewater

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## Abstract

**Context:** In Indonesia, the biggest source of wastewater producers comes from household activities. phytoremediation and biofiltration are some method that can handle domestic wastewater pollution. This study aims to determine the effectiveness comparison of the type of treatments in decreasing of TDS and TSS in Household Wastewater. The research method used in this research is pure experiment. The sample selection is based on the level of pollution that occurs in the ternate city area due to wastewater and has a high population density so that it is taken a sample in the eastern Makassar district. Media selection is based on its ability to reduce pollutant parameters of TDS and TSS as has been stated in several journals with biofiltration and phytoremediation approaches. The total sample used was 15 liters of domestic wastewater. This research was conducted for 4 weeks and all parameter was tested 4 times, the first test was at the first week, the second test was after treatment second weeks, the third test was after treatment 3rd week, the fourth test was after treatment 4th week. All tested parameter tests by using the gravimetry method. Phytoremediation by using water hyacinth is more effective in reducing levels of TDS and TSS in domestic waste than biofiltration by using banana stems.

**Keywords:** *Phytoremediation, biofiltration, total dissolved solid, total suspended solid.*

## Introduction

World Health Organization estimates, that up to 80% of illnesses and infections in the world result from inadequate treatment of sewage and thus insufficient amount of clean water. WHO also reports that more than 3.4 million people die annually due to the activity of pathogens living in the aquatic environment<sup>(1)</sup>. It can be said that water is a key component of socio-economic development and keeps the environment in good condition<sup>(2)</sup>.

A modern WWTP must fulfill several basic tasks. Besides the effective removal of contaminants from the influent sewage, the reduction of greenhouse gasses emission, energy-saving and the ability to reuse the part of resources such as the agricultural use of sewage sludge, must also be taken into account<sup>(3)</sup>. The untreated or insufficiently treated wastewater is a direct threat to the environment. Moreover, a discharge of untreated sewage into the receiving water body causes severe contamination resulting in eutrophication and intoxication of the aquatic organisms, as well as the chemical and biochemical transformations of pollutants causing the release of harmful gases disturbing the functioning of the ecosystems. All these factors cause a change in the biotic conditions and the physicochemical composition of wastewater receiver<sup>(4-7)</sup>.

The problem of environmental pollution, especially water pollution in Indonesia, has shown quite serious symptoms. One of the causes of water pollution comes from factory industrial discharges or other activities that

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simply dispose of wastewater without prior treatment into the river or the sea<sup>(8)</sup>. The amount of water pollution in North Maluku increased by 370 percent, compared to 2014. Analysis of the Domestic Wastewater Risk Index in Ternate City in 4 sub-districts, shows that the existing Domestic Wastewater needs serious attention considering the insecure septic tank coverage of >60%, the scope of pollution due to disposal of contents Unsafe Septic Tanks are in the range of 21.4-65.9% and Pollution coverage due to SPAL is >50% except for strata 0 of 12.5%. This will harm the quality of the surrounding environment, especially Clean Water Sources<sup>(9)</sup>.

Phytoremediation involves the use of plants to remove, transfer, stabilize and/or degrade contaminants in soil, sediment, and water. This plant-based technology has gained acceptance in the past ten years as a cheap, efficient and environmentally friendly technology especially for removing toxic metals<sup>(10)</sup>. Biofiltration is a process in which an otherwise conventional granular filter is designed to remove not only fine particulates but also dissolved organic compounds through microbial degradation. Technologies that can be used to remove pollutants include flocculation, adsorption, (bio) filtration, ion exchange, (advanced) oxidation processes and membrane filtration<sup>(11)</sup>.

This study aims to determine the effectiveness comparison of the type of treatments in decreasing of TDS and TSS in Household Wastewater.

### Material and Method

Laundry wastewater sampling by taking a combined sample of time (morning, afternoon and evening) and place (5 places in RT 01) by taking samples of 1000 ml per one take. For instance, the sample was 15000 ml of wastewater. The method of measuring TDS and TSS uses the gravimetric method in which Gravimetry is one of the quantitative analysis method of a substance or component that has been known by measuring the weight of the component in a pure state after going through a separation process. The biggest part of the gravimetric analysis involves the transformation of elements or radicals into pure stable compounds that can be immediately converted into meticulously weighed forms<sup>(12)</sup>.

TDS calculation

$$TDS = 1000/V \times (F-B) \times 1000 = \dots \text{mg/L}$$

### Information:

B = weight of the Vaporizer Cup(g)

F = weight of the Vaporizer Cup+dissolved residue(g)

TSS Calculation

$$TSS = 1000/V \times \{G \times (C+D)\} \times 1000 = \dots \text{mg/L}$$

Information:

C = weight of the Vaporizer Cup(g)

D = Filter Paper weight(g)

G = weight of the Vaporizer Cup + filter paper filter(g)

The sample selection is based on the level of pollution that occurs in the ternate city area due to wastewater and has a high population density so that it is taken a sample in the eastern Makassar district. Media selection is based on its ability to reduce pollutant parameters of TDS and TSS as has been stated in several journals with biofiltration and phytoremediation approaches.

The number of samples taken is adjusted to the needs of research where the number of samples taken based on the place and the combined time can be accumulated as much as 15000 ml. Number of places x amount of time x liters per take  $5 \times 3 \times 1000 \text{ ml} = 15000 \text{ ml}$ . The research was carried out for 4 weeks by looking at the effectiveness of bioreactors made by conducting tests on the first week to the fourth day. The research method used in this research is pure experiment. The total sample used was 15 liters of domestic wastewater. This research was conducted for 4 weeks and all parameter was tested 4 times.

Phytoremediation processes rely on the ability of plants to take up and/or metabolize pollutants to less toxic substances<sup>(13)</sup>. The main purpose of the biofilter is to remove the dissolved organics, the suspended particles are removed in conventional filter before subjecting the wastewater<sup>(14)</sup>.

### Findings:

Based on the results of research conducted in the Chemical Laboratory, Environmental Health department, Health Polytechnic of Ternate can be seen in the following table 1.

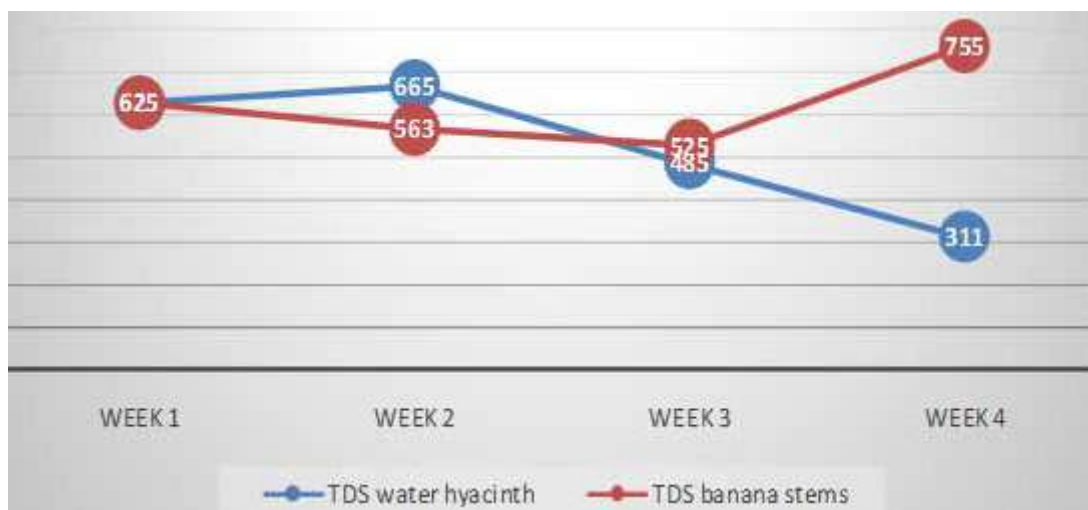
**Table 1: The result of TDS and TSS tests on two media in 4 weeks**

TDS	TSS	Unit	Week	Treatments
625	475	Mg/l	1	Phytoremediation
665	563	Mg/l	2	Phytoremediation
485	450	Mg/l	3	Phytoremediation
311	417	Mg/l	4	Phytoremediation
625	475	Mg/l	1	Biofiltration
563	418	Mg/l	2	Biofiltration
525	480	Mg/l	3	Biofiltration
755	417	Mg/l	4	Biofiltration

**Information:** TDS= Total Dissolved Solid, TSS= Total Suspended Solid

### Discussions

Based on the results of the treatment for 4 weeks the results obtained are the first examination on the sample of wastewater before treatment with water hyacinth (*Eichhornia*) and banana stems (*Musa SP*) there are two different values where the value of TDS 625 mg/L and TSS 475 mg/L. Based on the Kementrian Lingkungan Hidup <sup>(15)</sup> concerning Water Pollution Control Procedures, the results obtained are categorized as high, this is because the intermediate limit of TDS in domestic wastewater under the regulation is 500 mg/L. Meanwhile, the results obtained from the TSS Test are 475 mg/L, based on Kementrian Lingkungan Hidup <sup>(15)</sup> No. 01 of 2010 concerning Water Pollution Control Procedures, this result has exceeded the threshold because the highest standard for TSS quality in domestic wastewater is 350 mg/L.



**Figure 1: The comparison of TDS number by using water hyacinth and banana stem on wastewater for 4 weeks**

In the results of treatment using water hyacinth for 2 weeks, the results obtained TDS values increased to 655 mg/L compared to before treatment but it dropped dramatically on the 3<sup>rd</sup> week and 21 ie 485 mg/L and 311 mg/L. TDS value increase on 2<sup>nd</sup> week with treatment using water hyacinth because on the 2<sup>nd</sup> week the water hyacinth plants do the absorption process through the roots. this is because the process of photosynthesis allows the release of oxygen by water hyacinth increasing TDS. While the value of TDS on 3<sup>rd</sup> week decreased to 485 mg/L. the decrease TDS value on the 3<sup>rd</sup> week is due to water hyacinth being able to grow well so water hyacinth can reduce levels of water pollutants.

aquatic plants such as water hyacinth can be developed as a cleaning pollutant levels in liquid waste where water hyacinth can absorb various water pollutants, including Lead, cadmium, which may be dissolved in water so that water hyacinth can reduce TDS levels<sup>(16)</sup>.

The TDS value 4<sup>th</sup> week was further decreased by 311 mg/L. According to Magar, Khan <sup>(17)</sup> this is due the roots of Water hyacinths naturally absorb pollutants including lead, mercury, and some organic compounds which are carcinogenic and have concentrations of approximately 10,000 times that is present as in generically found water because water hyacinth can adapt well until the

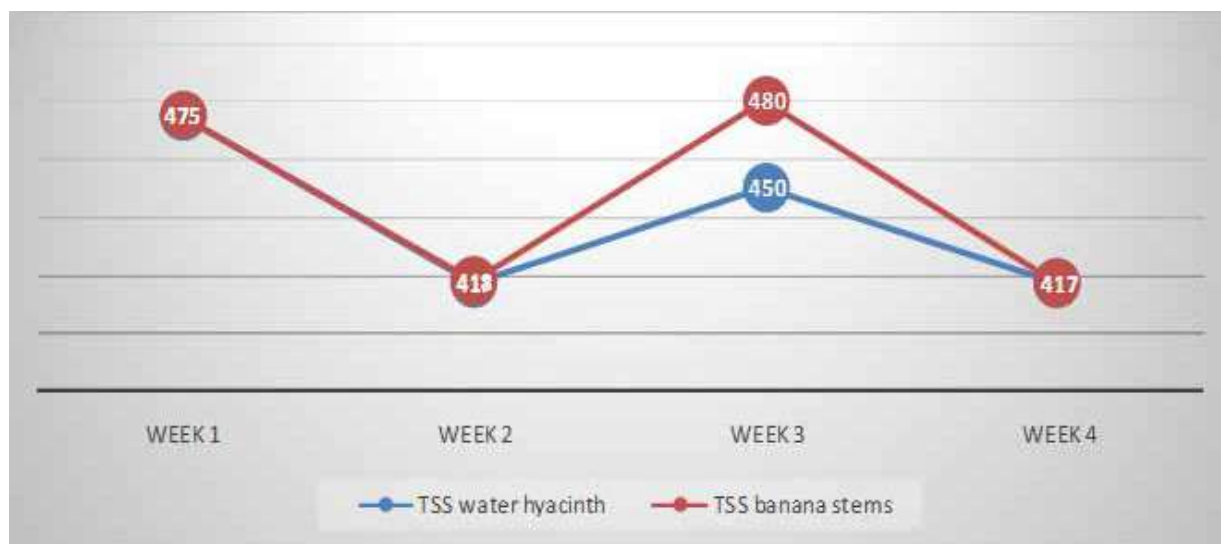
4<sup>th</sup> week on wastewater so that this makes the reduction in TDS values more significant. This is in line with research conducted by Moyo, Chapungu <sup>(18)</sup> stated that water hyacinth was remediating the river as noted by the significant reduction of electrical conductivity (25% decrease), total dissolved solids (26%), sulfates (45%), phosphates (33%) and total hardness (37%) between the sample points SR1 and SR3.

According to Kementrian Lingkungan Hidup <sup>(15)</sup> concerning Water Pollution Control Procedures and TDS quality standards allowed for domestic wastewater, the TDS value 4<sup>th</sup> week has been in the low category on the results of the treatment using banana stems, the TDS value on the 2<sup>nd</sup> week after treatment was reduced to 563 mg/L, on the 3<sup>rd</sup> week it also decreased to 525 mg/L but increased dramatically on the 4<sup>th</sup> week to 775 mg/L. The decrease in TDS 2<sup>nd</sup> week is due to the fact that the biofiltration method using banana stems is useful to inhibit the growth of some pathogenic bacteria and filter out solid material in the waste so that the biofiltration method can reduce levels of solid pollutants. Decreasing

levels of pollutants after the process biofiltration occurs significantly day 6 to 97.23% compared with control <sup>(19)</sup>.

Decreased TDS on the 3<sup>rd</sup> week because banana stems have carbon content and this content serves to filter dissolved particles through biofiltration method so that the banana stems can reduce TDS. Meanwhile, on the 3<sup>rd</sup> week the TDS increases dramatically because the banana stems have organic properties if left exposed to water for more than 2 weeks, the banana stems will rot and affect the biofiltration process so the results obtained are not homogeneous. This happens because the banana stems occur eutrophication process so that this decay affects the value of TDS and TSS <sup>(20)</sup>.

According to Kementrian Lingkungan Hidup <sup>(15)</sup> concerning water pollution control procedures and TDS quality standards allowed for domestic wastewater, the TDS value on the 4<sup>th</sup> week has been in the medium category.



**Figure 2: The comparison of TSS number by using water hyacinth and banana stem on wastewater for 4 weeks**

The value of the TSS in treatment using water hyacinth for 2 weeks decreased to 417 mg/L compared to before treatment, but on the 3<sup>rd</sup> week TSS increased to 450 mg/L and suddenly decreased dramatically on the 4<sup>th</sup> week to 417 mg/L. The decreasing value of TSS on the 2<sup>nd</sup> week is because water hyacinth can clarify liquid waste and reduce solid particles contained in wastewater.

These results are following research conducted by Ruhmawati, Sukandar <sup>(21)</sup> stated that the reduction in TSS levels, the average percentage decrease in TSS levels for contact time 2 days 47.43%, for contact time 4 days 74.85%, and for contact time 6 days by 80.63%. the decrease in TSS is due to the function of water hyacinth weeds in purifying liquid waste and absorbing solid

particles so that it will create good conditions for the phytoremediation process.

The decreasing value of TSS by using water hyacinth on 4<sup>th</sup> week because phytoremediation by using water hyacinth is able to absorb solid particles contained in wastewater. Phytoremediation processes rely on the ability of plants to take up and/or metabolize pollutants to less toxic substances. The uptake, accumulation, and degradation of contaminants vary from plant to plant. The plants used in phytoremediation are generally selected on the basis of their growth rate and biomass, their ability to tolerate and accumulate contaminants, the depth of their root zone, and their potential to transpire groundwater. The plants used in phytoremediation should not only accumulate, degrade or volatilize the contaminants but should also grow quickly in a wide range of different conditions<sup>(13)</sup>. The technology of Phytoremediation offers a viable solution to water pollution<sup>(22)</sup>.

According to Kementrian Lingkungan Hidup<sup>(15)</sup> No. 01 of 2010 concerning Water Pollution Control Procedures and TSS quality standards allowed for domestic wastewater, the TSS value on the 4<sup>th</sup> week still in the high category. This shows that although the TSS value has decreased, it still takes a long time to comply with the standards set by the environment ministry. Meanwhile, the TSS results obtained of the treatment using banana stems 2<sup>nd</sup> week after treatment reduced to 418 mg/L compared to before treatment and on 3<sup>rd</sup> week increased to 480 mg/L, but decreased dramatically on day 4<sup>th</sup> week to 417 mg/L. The decreasing value of TSS on 2<sup>nd</sup> week because biofiltration by using banana stems is able to filter out solid particles contained in wastewater. there is a high possibility for the effective application of biofilters for the removal of toxic heavy metals from contaminated water on a large scale. In short, the biofilters are having emerging applications for the treatment of heavy metals contaminated wastewater. It is very important to note that a good system to biofiltration provides the best condition for the microorganisms and, consequently, will achieve a high efficiency<sup>(14)</sup>.

The increasing value of TSS on 4<sup>th</sup> week because of the composition of banana stems that have organic properties so that bacteria will easily develop and make banana stems rot. banana stems that are too long exposed to water can interfere with the biofiltration process due to natural decay. This happens because the banana stems occur eutrophication process so that this decay affects the value of TDS and TSS<sup>(20)</sup>.

## Conclusions

Phytoremediation by using water hyacinth is more effective in reducing levels of TDS and TSS in domestic wastewater than biofiltration by using banana stems.

**Conflict of Interest:** The authors declare there is no conflict of interest.

**Source of Funding:** Budget Implementation Entry List Health Polytechnic of Ternate 2019.

**Ethical Clearance:** No Relevant. This research did not involve humans as subjects.

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# Environmental Health Risk Analysis of Carbon Monoxide Exposure among High Activity Communities Along “X” Street, Yogyakarta

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## Abstract

**Background:** The most exhaust-gas produced by motor vehicles consists of 71% carbon monoxide and it becomes an impact on air pollution and human health risk. This study aims to analyze the environmental health risk health of carbon monoxide exposure to high activity communities at X Street, Yogyakarta.

**Method:** This study was an observational study with Environmental Health Risk Analysis (EHRA) approach. This study was conducted in 2019 with 269 respondents. The respondents were chosen by using a purposive sampling method with the criteria; they had been work five years and a minimum age of nineteen years old. Besides, carbon monoxide measurement was conducted in three zones.

**Findings:** The average carbon monoxide concentration was 7,5035 mg/m<sup>3</sup>, Weight (Wb) median was 60 kg, Exposure time (tE) was 11 hours/day, Exposure duration (Dt) was 10 years, and Inhalation rate (R) was 0,83 m<sup>3</sup>/hour. Besides, the intake real-time value of non-carcinogen was 0,395 mg/kg/day with 0,329 of Risk Quotient (RQ) level. There were sixteen respondents with (RQ>1) value that might have the risk. Hence, risk management was needed by decreasing the concentration value and the inhalation rate.

**Conclusion:** The main risk of carbon monoxide exposure was a respiratory disorder in real-time and lifetime duration. The Technical Implementation Unit of Environmental Agency needed ISPU measurement by routinely to monitor the carbon monoxide at X Street and recommended to use the Personal Protective Equipment (PPE) or mask.

**Keywords:** Air pollution, Carbon Monoxide, EHRA, Risk management.

## Introduction

Air pollution can cause poor health effect. According to the Air Quality Index (IQAIR)<sup>1</sup> that Indonesia has first ranks in Southeast Asia and 11th ranks as the most polluted country in the world. The main source of air pollution are transportation, motor vehicles, almost 60% of the pollutants produced consist of carbon monoxide (CO)<sup>2</sup>. World Health Organization (WHO)<sup>3</sup> reported that air pollution causes the death of approximately 7 million people worldwide that 29% had lung cancer, 24% had a stroke, 25% had coronary heart disease, and 43% had lung disease.

Incomplete combustion of vehicles will produce CO gas. The inhalation path of CO gas into the human body through the respiratory and circulates throughout

the body sucked into the lungs and binds to blood hemoglobin in the form of COHb. This mechanism will lack of oxygen and it can cause symptoms of poisoning to the body<sup>4</sup>. Long-term exposure to CO can cause headaches, dizziness, nausea, vomiting, blood vessel dilation, blurred vision, chest pain, weakness, confusion, pulmonary edema, pulmonary arrest, cardiac arrest, seizures, and coma<sup>5</sup>.

Special Region of Yogyakarta especially X street that various vehicles crowded the road not only during rush hours but also even jammed because it is one of the tourist destinations, business or economic center<sup>6</sup>. Based on Environmental Agency<sup>7</sup> data that the quality of CO ambient air carried out in front of the Bringharjo market was 1,789.44 µg/Nm<sup>3</sup>. Central Statistics

Agency<sup>8</sup> reported that the number of motorized vehicles of Yogyakarta city reached 4,616,016 vehicles. The high volume of vehicles with the small and narrow area of highway causes a high amount of vehicle density, it is inversely proportional to the speed of vehicles passing through the road and increase the concentration of pollutants. The lower speed of vehicles will result in higher concentrations of pollutants that present on road<sup>9</sup>. The high concentration of CO can endanger human health<sup>10</sup>. The communities at high risk of CO poisoning to people who have high activity along the X street likely traders and Trans Jogja bus stops officers who work more than 8 hours per day.

The research objective is examining the magnitude of the environmental health risk of CO exposure as early detection of health risk in high-activity communities along X Street, Yogyakarta City.

### Material and Method

This study was using the Environmental Health Risk Analysis (EHRA) method to determine the magnitude

of health risks due to CO exposure to the high activity communities along X Street in Yogyakarta. This study was conducted in 2019. The subjects were high-activity communities along X Street and using purposive sampling technique.

Subjects were traders and Trans Jogja bus stop officers who taken based on the length of time at the research location more than 5 years of work period and over 19 years old. The total sample amount of 269 people. The object used as the ambient air of CO along X Street that taken in 3 zones. The variables including: CO concentration (C), inhalation rate (R), respondent's body weight (Wb), exposure time (tE), frequency of exposure (fE), duration of exposure (Dt), intake (I), health risk (RQ) value, and risk management.

### Results

The EHRA variable have median value i.e. body weight of 60 kg, exposure time of 11 hours/day, exposure frequency of 353 day/year, duration of exposure of 10 year. It is result complete shown in table 1.

**Table 1: The Distribution Frequency of EHRA Variables on Respondents**

Variable	High activity communities				Total	
	Traders		Bus Stop Officers			
	N	%	N	%	n	%
<b>Weight (Kg)</b>						
>60	117	43	5	2	122	45
≤60	143	54	4	1	147	55
Total	260	97	9	3	269	100
<b>Exposure Time (hours/day)</b>						
>11	129	48	0	0	129	48
≤11	131	49	9	3	140	52
Total	260	97	9	3	269	100
<b>Exposure Frequency (day/year)</b>						
>353	116	43	8	3	124	46
≤353	144	54	1	0	145	54
Total	260	97	9	3	269	100
<b>Duration of Exposure (year)</b>						
>10	115	43	5	2	120	45
≤10	145	54	4	1	149	55
<b>Total</b>	<b>260</b>	<b>97</b>	<b>9</b>	<b>3</b>	<b>269</b>	<b>100</b>

Source: Primary Data, 2019

The determination of intake rate in this study based on the default value (NAAQS) EPA<sup>11</sup> that is equal to 0,83 m<sup>3</sup>/hour and the RfC value used for CO risk agents is 1,24 mg/kg/day. The results of measurements of CO in ambient air along X Street conducted in one measurement in zone I:6.15 mg/m<sup>3</sup>,zone II:8,255 mg/m<sup>3</sup>,and zone III:8,334 mg/m<sup>3</sup>.With a mean value of 7,5035 mg/m<sup>3</sup>,a median of 8,255 mg/m<sup>3</sup>,a minimum of 6,15 mg/m<sup>3</sup>,a maximum of 8,343 mg/m<sup>3</sup>.

The table 1 showed that the majority respondents on traders have body weight ≤60 kg amount of 54%, exposure time ≤ 11 hours/day amount of 49%, exposure frequency ≤ 353 days/year amount of 54%, and duration of exposure ≤ 10 years amount of 54%. Based on the value of each variable in Table 1 showed that the median value of intake rate 0,395 mg/kg/day.

**Table 2: The Respondents Frequency Based on Intake Rate Value In Realtime and Lifetime Exposures**

Intake Rate (mg/kg/day)	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>0,395	131	49	259	96	3	1	9	3	134	50	268	99
≤0,395	129	48	1	1	6	2	0	0	135	50	1	1
Total	260	97	260	97	9	3	9	3	269	100	269	100

**Table 3: The Respondent Frequency Based on RQ Value in Realtime and Lifetime Exposures**

RQ Value	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>1	16	6	82	30	0	0	1	1	16	6	83	31
≤1	244	91	178	66	9	3	8	3	253	94	186	69
Total	260	97	260	96	9	3	9	4	269	100	269	100

Source: Primary Data, 2019

Based on table 3, it is known that respondents who work as traders in the realtime estimation with RQ value of >1 as much as 6% and the estimated lifetime duration with RQ value >1 amount of 30%, it means the traders is not safe for their health. The following table below is the calculation table for risk management.

**Table 4: Risk Management of CO Safe Concentration in Respondents**

Zone	Wb (Kg)	R (m <sup>3</sup> /hour)	fE (day/year)	Concentration in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	0,83	332,531	592,609259	296,304629	197,536420	148,152315	118,521852	98,768210
II	61,72	0,83	362,073	557,721626	278,860813	185,907209	139,430406	111,544325	92,953604
III	61	0,83	352,681	565,894508	282,947254	188,631503	141,473630	113,137902	94,315751

Source: Primary Data, 2019.

Table 4 showed that the concentration of safe inhalation of air containing CO gas with average body weight, intake rate and frequency of exposure of respondents will decrease until the duration of exposure of 30 years.

**Table 5: Risk Management of CO Gas Inhalation Rate in Respondents**

Zone	Wb (Kg)	C (mg/m <sup>3</sup> /hour)	fE(day/year)	Inhalation Rate in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	6,15	332,531	79,978253	39,989127	26,659418	19,994563	15,995651	13,329709
II	61,72	8,255	362,073	55,920128	27,960064	18,640043	13,980032	11,184026	9,320021
III	61	8,343	352,681	56.297811	28,148906	18,765937	14,074453	11,259562	9,382969

Source: Primary Data, 2019.

The table 5 shown that the higher concentration of CO in the air correlate with the decrease of inhalation rate which become safe for repondents to the health risk of noncarcinogenic diseases and the inhalation rate will decrease according to increases the duration of exposure.

**Discussions**

CO gas potentially as toxic from the presence of air pollution from vehicle exhaust fumes, especially those which using gasoline fuel. The air pollution will cause the decrease of air quality level and human health<sup>12</sup>. CO gas concentration compared with the CO quality standard according to Governor Decree<sup>13</sup> which amounted to 30000 µg/m<sup>3</sup> or 30,000 mg/m<sup>3</sup>, it means that CO concentration levels along X street were still below the predetermined quality standard. The different CO concentration in the ambient air obtained is due to several factors including temperature, humidity, wind speed and air pressure<sup>14</sup>.

The calculation of the intake value is influenced by the concentration of the risk agent in the air, the inhalation rate, exposure time, duration of exposure, and body weight. Based on the intake calculation it is known that the daily exposure time and annual exposure frequency is directly proportional to the intake value. It means that the annual frequency of exposure to the respondent caused by risk agent correlate with intake value that against health problems due to risk agent exposure<sup>15</sup>. Other factors that influence the amount of intake are age, working period, smoking habits and use of personal protective equipment (PPE)<sup>16</sup>.

RQ value is obtained from the comparison between the intake rate with RfC value<sup>21</sup> and it has a relationship that intake compared with the RfC value, becomes the risk characteristics value. The RfC value used in this study was 1,24 mg/kg/day. It is obtained from calculations using the intake formula with default values for each variable, which is the difference in the

concentration value. The concentration value is obtained from the RfC of CO in mg/m<sup>3</sup> which is the standard in NAAQS<sup>10</sup>.

CO compounds can be toxic to the human body because the reaction between CO and hemoglobin (Hb) in the blood. Hb in humans functions as a transport system to carry oxygen in the form of oxyhemoglobin from the lungs to the body’s cells and carry CO<sub>2</sub> in the form CO<sub>2</sub> Hb from the body’s cells to the lungs. Hb can form carboxyhemoglobin with the presence of CO. If the reaction occurs, the blood’s ability to transport oxygen is reduced. The affinity of CO to hemoglobin is 200 times higher than in affinity of oxygen to hemoglobin, as a result of CO and O<sub>2</sub> together in the air and is formed as COHb in the number of far more than the O<sub>2</sub>Hb<sup>11</sup>. The highest percentage of hemoglobin bound in the form of COHb is getting worse, the effect on human health<sup>17</sup>.

The first risk management is a decrease in CO concentrations so that all populations are safe from the health problems of CO exposure the concentrations must be reduced below the average concentration. To reduce the concentration of CO gas risk agents along X Street, it can reduce the capacity of the main pollutant source likely motor vehicles. Reducing the capacity of motorized vehicles can be done with the existence of a car-free day action weekly routine action along X Street, Yogyakarta City. This will affect the reduction of pollutants due to motorized vehicles. The previos study related to the reduction of CO concentration with the car-free day was conducted by other study<sup>18</sup> reported that air quality monitoring of CO generated from motor vehicle emissions has been decreased by car-free day action at the intersection of Semarang City. The subsequent reduction in ambient air concentration by planting trees or phytoremediation. Phytoremediation is a method by using forage plants to move, accumulate and change harmful contaminants into harmless substances. The yellow palm (*Chrysalidocarpus lutescens*) can be

planted, it is very effective for absorbing toxic gases into the stomata from vehicle fumes, besides plants that have broad hairy leaves and rough surfaces<sup>19</sup>.

The second risk management is reduction of inhalation by using PPE to minimize the possibility of exposure to inhaled CO gas from ambient air. This study in line with previous study<sup>20</sup> to reduce the amount of exposure to security guards and parking attendants at Campus X Yogyakarta can be done with preventive measures by using a PPE.

The high concentration of CO in the ambient air will affect a health risk to CO intake into the body. So, the higher concentration of CO positive correlates with a higher intake value and it can be prevented by using PPE such as masks. Previous studies reported that the average COHb levels of respondents who use masks are lower than respondents who do not use masks<sup>21</sup>.

The socialization was held by Technical Management Unit (UPT) in collaboration with the Department of Yogyakarta Tourism, the Environment Agency, and Academic Higher Education to educate the use of PPE and provide information related to health risks due to CO gas emissions. The socialization is expected to reduce the magnitude of risks arising from motor vehicle emissions, especially in CO gas, for high-activity communities along X Street, Yogyakarta City.

### Conclusion

CO exposure to high activity communities will impact their health because respondents have  $RQ > 1$ . Risk management through the reduction of concentration and decrease of the inhalation rate in high activity communities along X Street, Yogyakarta City.

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# The Effect of Work Satisfaction on the Quality of Health Services (Literature Review)

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## Abstract

**Introduction:** Job satisfaction is a crucial factor that affects the productivity of human resources. While the health service organizations have the primary goal of providing the best quality health services for patients. Therefore, it is important to review the published articles about the effect of job satisfaction on health service organizations to understand how job satisfaction determines the quality of health services.

**Method:** This study is a literature review. Articles were collected from Proquest, Google Scholar, PUBMED, Emarldisight, and Science Direct and other relevant journal portals. Inclusion criteria in the selection of articles are 1) articles written in English or Indonesian, 2) articles are the research or systematic review relevant to the keywords, 3) articles were published in the year 2000 to 2019.

**Result:** Of the 16 articles reviewed, 15 studies prove that job satisfaction has a significant effect on patient satisfaction, performance, patient safety, quality of service, and the motivation to quit the job. On the other hand, one study shows that job satisfaction is not significantly related to patient satisfaction.

**Conclusion:** Employee job satisfaction is an important variable that must be considered by health service organizations to achieve competitive & high-quality performance in providing health services for the patients.

**Keywords:** *Job satisfaction, Health services, Quality.*

## Introduction

Job satisfaction is defined as the degree to which people like or dislike their work(1). It is a crucial factor that affects the productivity of human resources. In any organization, human resources are considered as one of the most important assets that serve as an engine within the organization to provide a sustainable source of energy and service delivery<sup>(2)</sup>. There are several things

related to the importance of job satisfaction. First, that all people deserve to be treated fairly and with respect. Satisfaction is a reflection of good treatment, so it is considered as an indicator of emotional well-being or physiological health. Second, that job satisfaction can cause employee behavior that affects organizational functions. Furthermore, job satisfaction can be an indicator of the functioning of the organization<sup>(3)</sup>

The goal of a health service organization is to Providing a high quality of health services is required a committed and high-quality workforce. The presence of highly qualified and motivated staff is a key aspect of the healthsystemperformance. Many organizations recognize the importance of a potential relationship between job satisfaction and several expected organizational outputs, such as performance, absenteeism, staff turnover, and employee productivity<sup>(5)</sup>.

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The quality of health services is associated with satisfaction, loyalty, and productivity and the profitability of the patients<sup>(6)</sup>. The quality and continuity of the relationship between the patient and the doctor affect the quality of the medical services provided. The quality of interaction between doctor and patient depends on the attitude and personality of the doctor towards empathy, compassion and honesty and technical expertise to gain the patients' trust<sup>(7)</sup>.

It is important for health service organizations to understand the relationship between job satisfaction and customer satisfaction and the overall customer experience<sup>(8)</sup>. Therefore, this literature review's aim is

to collect and analyze research articles about job satisfaction in health service organization employees to understand how job satisfaction can affect quality of health services. This analysis is done by compressing, collecting, and focusing on the impact of job satisfaction on the quality of health services, both directly and indirectly.

## Method

Literature review were based on the Prisma method which consists of 5 stages. The first stage was the identification of articles based on inclusion and exclusion criteria. The inclusion criteria for selected articles were 2000 – 2019 publication time, focus on the effect or impact of job satisfaction. The exclusion categories are articles related to the keywords but not studying the case on health workers or health service organizations.

As for the search of secondary data, initial exploration was obtained in five publishers; Emeraldinsight, Proquest, Pubmed, Google Scholar, and Science Direct. The second stage was the screening by using specific keywords; job satisfaction, healthcare, and service quality. The total of literature found based on those keywords was 879 articles. Furthermore, the data was extracted using inclusion criteria, and 187 articles were obtained. Meanwhile, 102 articles were eliminated since they did not comply with the inclusion criteria.

The third stage was accessibility, of 60 articles that have been extracted (and 35 articles are eliminated), 25 articles were selected based on the titles and abstracts. These 25 articles were then extracted again by considering the inclusion category until 16 articles were determined to be reviewed. This is the included stage. Those 16 articles were then selected for further study. These are the articles:

1. Healthcare workers' satisfaction and patient satisfaction-where is the linkage? by Janicijevic I Et al. The Result is the effect of health care worker satisfaction on patient satisfaction has a relatively low level of significance<sup>(9)</sup>.
2. Interrelating employee satisfaction and customer satisfaction in the healthcare Industry Interrelating Employee Satisfaction & Customer Satisfaction in Healthcare Industry by Anand Shobhit Et al. The result is a high correlation between employees and customer satisfaction<sup>(10)</sup>
3. Effect of Job Satisfaction on the Turnover Intention of Employees in Indonesia by Pawesti Ristia. The result is job satisfaction has a significant and negative effect on the turnover intentions of the employee <sup>(11)</sup>
4. Job satisfaction and organizational commitment for nurses by Al-Aameri Ahmed S. The result is a strong and positive correlation between job satisfaction and organizational commitment. <sup>(12)</sup>
5. Congruent Satisfaction: Is There Geographic Correlation Between Patient and Physician Satisfaction by Jennifer DeVoe et al. The result is the job satisfaction of doctors is strongly correlated with patient health satisfaction <sup>(13)</sup>
6. The effects of health worker motivation and job satisfaction on turnover intention in Ghana: a cross-sectional study by Marc Bonenberger et al. The result is job satisfaction is significantly correlated to the motivation of the employee to quit the job <sup>(14)</sup>
7. Is the job satisfaction of primary care team members associated with patient satisfaction? By Joachim Szecsenyi et al. The result is patient satisfaction is positively correlated with general job satisfaction from non-physicians but no significant correlation was found for doctors' job satisfaction and patients' satisfaction. <sup>(15)</sup>
8. Impact of Job Satisfaction on Quality of Care Among Nurses on the Public Hospital of Lahore, Pakistan by Asima farman et al. The result is job satisfaction of the nurses and the quality of healthcare services are positively correlated<sup>(16)</sup>
9. Relationship Between Job Satisfaction Among Frontline Staff And Patient Satisfaction: Evidence From Community Health Centers In South Carolina by Ashley Lynn Barnes. The result is there is no significant relationship between patient satisfaction



and the job satisfaction of the Front Line Service (FLS) staff.<sup>(17)</sup>

10. Job Satisfaction of Nursing Staff and Patients' Perception of Quality care in a Tertiary Teaching Hospital, Odisha by Dharitri Swain. The result is patients' perceptions about the overall quality of healthcare are positively related to the job satisfaction of the nursing staff.<sup>(18)</sup>
11. A study of the relationship between job satisfaction, organizational commitment and turnover intention among hospital employees by Ali Mohammad Mosadeghrad et al. The result is employee job satisfaction and organizational commitment are closely interrelated and correlated with turnover intention.<sup>(19)</sup>
12. The Relationship Between Nurse Job Satisfaction and Patient Safety by Sherrie B. Lee. The result is a strong and positive correlation was found between nurse job satisfaction and patient safety.<sup>(20)</sup>
13. Is the Professional Satisfaction of General Internists Associated with Patient Satisfaction? By Jennifer S Haas et al. The result is doctors whose job satisfaction levels are higher can support the satisfaction of the patients compared to patients of doctors whose job satisfaction levels are lower.<sup>(21)</sup>
14. The relation between job satisfaction and job performance in healthcare services by Ch. Platis et al. The result is a strong correlation between nurse job satisfaction with job performance.<sup>(22)</sup>
15. The relationship between nurses' job satisfaction and inpatient satisfaction: An exploratory study in a Taiwan teaching hospital by Tzeng Huey Ming et al. The result is the job satisfaction of nurses is significantly correlated with the satisfaction of the inpatients<sup>(23)</sup>
16. An investigation of job satisfaction, organizational commitment and role conflict and ambiguity in a sample of Chinese undergraduate nursing students by Wu, L et al. The result is a positive relationship between job satisfaction and organizational commitment, and a negative relationship between job satisfaction and role conflict and ambiguity.<sup>(24)</sup>

## Results

Seven of the 16 articles investigated the effect or relationship between job satisfaction and patient satisfaction in health care organizations. In general, it

has been proven that job satisfaction had a significant effect on job satisfaction with a correlation coefficient of 0.882<sup>(10)</sup>, 0.628<sup>(13)</sup>, 0.73<sup>(21)</sup>, 0.765<sup>(23)</sup>. However, three of the seven articles stated an insignificant relationship between job satisfaction and patient satisfaction<sup>(17)</sup> and also had a low level of significance<sup>(9)(15)</sup>.

In addition, three of the 16 articles examined the relationship between job satisfaction and employee commitment to the organization<sup>(12)(19)(24)</sup>. Job satisfaction and organizational commitment were found to have a positive correlation. Correlation coefficients of 0.59<sup>(12)</sup>, 0.637<sup>(19)</sup>, and 0.464<sup>(24)</sup> showed a significant relationship between these 2 variables.

Three of the 16 articles examined the relationship between job satisfaction and the motivation to quit the job<sup>(11)(14)(19)</sup>. Job satisfaction and the motivation to quit the job were found to have a negative correlation, with high levels of coefficient of -0.832<sup>(11)</sup> and 0.56<sup>(14)</sup>. On the other hand, a negative correlation was also found with a low correlation coefficient of 0.452<sup>(19)</sup>.

Furthermore, two of the 16 articles investigated the relationship between job satisfaction and health service quality<sup>(18)(16)</sup>. A positive and significant correlation was found, with a correlation coefficient of 0.612<sup>(16)</sup> and 0.46<sup>(18)</sup>.

Finally, one study proved a positive and strong correlation between job satisfaction and patient safety with the correlation coefficient of 0.871<sup>(20)</sup>. However, one other study proved a positive and significant correlation between job satisfaction with the productivity and performance of the employee, with a correlation coefficient of 0.76<sup>(22)</sup>.

## Discussion

The findings of this literature review emphasized that job satisfaction of the employees in health service organizations is indeed strongly related to patient satisfaction. The job satisfaction of nurses is significantly and positively correlated with the inpatient satisfaction with pain management, this is related to four indicators of satisfaction with hospitalization, namely the explanation of care, treatment method, pain management, and direction on how to continue the self-care at home and follow-up care<sup>(23)</sup>.

One of the most influential aspects of patient satisfaction is the job satisfaction of the employee

with the time available to complete their works which affect the duration the patients spend with the doctor. It was explained that more satisfied doctors might be better able to answer patients' questions and problems. Doctors who are more satisfied with their professional lives can communicate better or empathize more with their patients<sup>(21)</sup>.

The most important job satisfaction factors affecting service quality are workload, staff scheduling, and work pressure. Work pressure is the factor that most determines the level of job satisfaction of nurses and the provision of quality care<sup>(16)</sup>. Desired outcomes also include attention to aspects of personal care, such as complaints and patient expectations, the patient's desire to be respected, and patient participation in decision making<sup>(26)</sup>.

Job satisfaction also affects employee commitment to the organization that is characterized by three factors, including 1) acceptance of organizational values, 2) willingness to work hard on behalf of the organization, and 3) motivation to remain an employee of the organization<sup>(12)</sup>. The results of this study are consistent with other studies<sup>(19)</sup>, but in this study, organizational commitment is seen from 3 aspects; affective, sustainability, and normative commitment. Affective commitment is defined as a psychological bond with the organization, ongoing commitment as a cost associated with leaving the organization, and normative commitment as a perceived obligation to remain with the organization<sup>(19)</sup>. The organization will be strong if its staff shows commitment and dedication to the organization and acts for the benefit of the organization. When employees fail to carry out the tasks assigned voluntarily, the quality of the services provided by the organization will be under the expectation<sup>(4)</sup>.

Job satisfaction has also been proven to have a significant effect on the motivation to quit the job<sup>(11)</sup> <sup>(14)</sup><sup>(19)</sup>. The factors that most influence the employees' motivation to quit the job are low organizational commitment (especially affective commitment), lack of job satisfaction and dimensions (especially organizational policy), lack of job security and management, and supervision<sup>(19)</sup>.

Patient safety in this study was defined as a condition where patients were not disadvantaged by limited nursing resources, ineffective communication, or lack of administrative support. The elements of patient

safety reviewed are the area or work unit, supervision, communication, frequency of adverse events reporting and facilities<sup>(20)</sup>.

## Conclusion

In the service sector, especially in the health service organization, the service quality is strongly affected by the employees' behavior in serving the patients and deals directly with customers. Job satisfaction has a significant effect on the service quality of health service organizations, both directly and indirectly. The direct effect is related to customer satisfaction, patient safety, performance, and customer perceptions of the quality of service delivery. In addition, the indirect effect occurs in the association with organizational commitment, productivity, and the motivation to quit the job.

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# Respiratory Symptoms of Housewives Exposed to SO<sub>2</sub> From Steel Industry in West Cikarang, Indonesia

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## Abstract

**Context:** The steel industry is one of the industries that use coal for the production process to produce various pollutants, one of which is sulfur dioxide (SO<sub>2</sub>). Exposure to SO<sub>2</sub> can irritate the respiratory tract and trigger symptoms such as cough, phlegm, shortness of breath, and wheeze. This article aims to determine the effects of SO<sub>2</sub> exposure based on the amount of intake on respiratory symptoms in housewives living around the steel industry.

This cross-sectional study was conducted on housewives who lived in Sukadanau Village, West Cikarang Sub-district, Bekasi Regency, West Java. In assessing the effects of SO<sub>2</sub> exposure, the amount of intake of SO<sub>2</sub> is used.

Respiratory symptoms experienced by housewives who live around the steel industry are cough (30.7%), phlegm (16.7%), shortness of breath (13.2%), and wheeze (4.4%). A significant relationship between intake of SO<sub>2</sub> and respiratory symptoms was found only in shortness of breath (OR 36.65, 95% CI 2.95 - 455.18).

Housewives who live around the steel industry experience respiratory symptoms such as cough, phlegm, shortness of breath, and wheeze due to intake of SO<sub>2</sub>. Where intake of SO<sub>2</sub> is significantly associated with shortness of breath. Further studies are needed by using concentrations that can describe each region.

**Keyword:** Sulfur dioxide, respiratory symptoms, steel industry

## Introduction

Industrial development plays an important role in terms of a country's economic development through its contribution to employment<sup>1</sup>. However, industrial activities also have a negative impact which acts as a contributor to air pollution by producing pollutants from production processes that use various energy sources such as coal, crude oil, and natural gas which can produce various types of pollutants such as SO<sub>2</sub>, NO<sub>2</sub>, CO, HC, and PM<sup>2</sup>.

Sulfur dioxide (SO<sub>2</sub>) is one of the pollutants that is mostly generated from the use of coal and petroleum energy by industrial activities such as petroleum refining, sulfuric acid industry, steel industry, etc<sup>3,4</sup>. Studies in steel industry in China show that SO<sub>2</sub> can be emitted from the pelletizing, sintering, and the melting process in the furnace<sup>5</sup>. SO<sub>2</sub> is a colorless gas, has a pungent odor, and dissolves easily in water so it can cause acid rain<sup>6</sup>. SO<sub>2</sub> exposure can irritate the respiratory tract and trigger symptoms such as cough, phlegm, shortness of breath, and wheeze<sup>4,7,8</sup>.

People who live in industrial areas will be more often exposed to SO<sub>2</sub> and experience health impacts. Studies conducted in the petrochemical and steel industry areas show that people who live near the industry with a distance of ≤5 km have a lower average FEV<sub>1</sub> compared to those who are >10 km<sup>9</sup>. As the health effects of SO<sub>2</sub> exposure are mentioned, respiratory inflammation due to

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SO<sub>2</sub> exposure can continuously encourage cough, mucus secretion, and aggravating asthma that makes sufferers more vulnerable to respiratory infections<sup>10</sup>. Another study related to the steel industry showed that SO<sub>2</sub> exposure in the industrial space ranged from 0.19 - 18.69 mg/m<sup>3</sup> and found that 42.36% of smelting workers had COPD<sup>11</sup>. Also, studies conducted around the steel industry show that people who live near the industry with a distance of 3.3 km and 8.8 km experience respiratory inflammation that is assessed through higher levels of FeNO compared to those at a distance of 27.7 km<sup>12</sup>. Sukadanau is a village in West Cikarang District and is the location of steel industry operations. Housewives are one of the groups potentially exposed to SO<sub>2</sub> emitted by the steel industry. Because most housewife activities only at home or in the surrounding environment, so they are longer exposed to SO<sub>2</sub> emitted by the steel industry and have the potential to experience health effects in the form of respiratory symptoms. Based on research that estimates the risk of SO<sub>2</sub> around the power generation industry, housewives have an inhalation rate above the average compared to other groups  $\geq 10.98$  m<sup>3</sup>/day due to the length of time housewives around the location industry<sup>13</sup>. Therefore, the aim of this study was to determine the effect of SO<sub>2</sub> exposure based on the amount of intake on respiratory symptoms in housewives living around the steel industry.

### Material and Method

A cross-sectional study was conducted on housewives who lived in Sukadanau Village, West Cikarang Sub-district, Bekasi Regency, West Java. This village is the location where the steel industry operates and has a maximum distance of 2000 m from the industry. The population of housewives in Sukadanau Village is around 7083 which is spread over 13 residents. The sample size is obtained by estimating proportions<sup>14</sup>, then by using the Stratified Proportional Random Sampling technique, the sample is divided based on the distance of the house from the steel industry. The distance consists of <500 m (n = 30), 500-1000 m (n = 30), and >1000 m (n = 54), so that a sample of 114 housewives is obtained.

There are several criteria that must be met, namely housewives are predominantly in the home environment, have lived at least 1 year, do not use firewood as cooking fuel, do not have a history of asthma and tuberculosis. The questionnaire data collection was conducted in October - November 2019.

**Exposure Assessment:** SO<sub>2</sub> concentrations were obtained through air quality monitoring data conducted by the Bekasi Regency Environmental Department. Measurements were made at 13 points. One of the measurement points is the point adjacent to Sukadanau Village and the steel industry, which is called "Warung Bongkok T-junction" (Figure 1). This measurement was carried out in 2 periods, namely 14 days each period which was carried out sustainably during 2013 - 2015. The concentration of SO<sub>2</sub> obtained was used to calculate the intake of inhalation exposure using the formula in the Environmental Health Risk Assessment<sup>15,16</sup>:

$$I = \frac{C \left( \frac{mg}{m^3} \right) \times R \left( m^3/h \right) \times tE \left( \frac{h}{d} \right) \times fE \left( \frac{d}{yr} \right) \times Dt \left( yr \right)}{WB \left( kg \right) \times Tavg}$$

I = Intake of chemical agent (mg/kg bw/day)

C = Average concentration of SO<sub>2</sub> in ambient air over the exposure period (mg/m<sup>3</sup>)

R = Rate of intake (default for daily intake rate 20m<sup>3</sup> or equivalent 0,83m<sup>3</sup>/hour<sup>17</sup>)

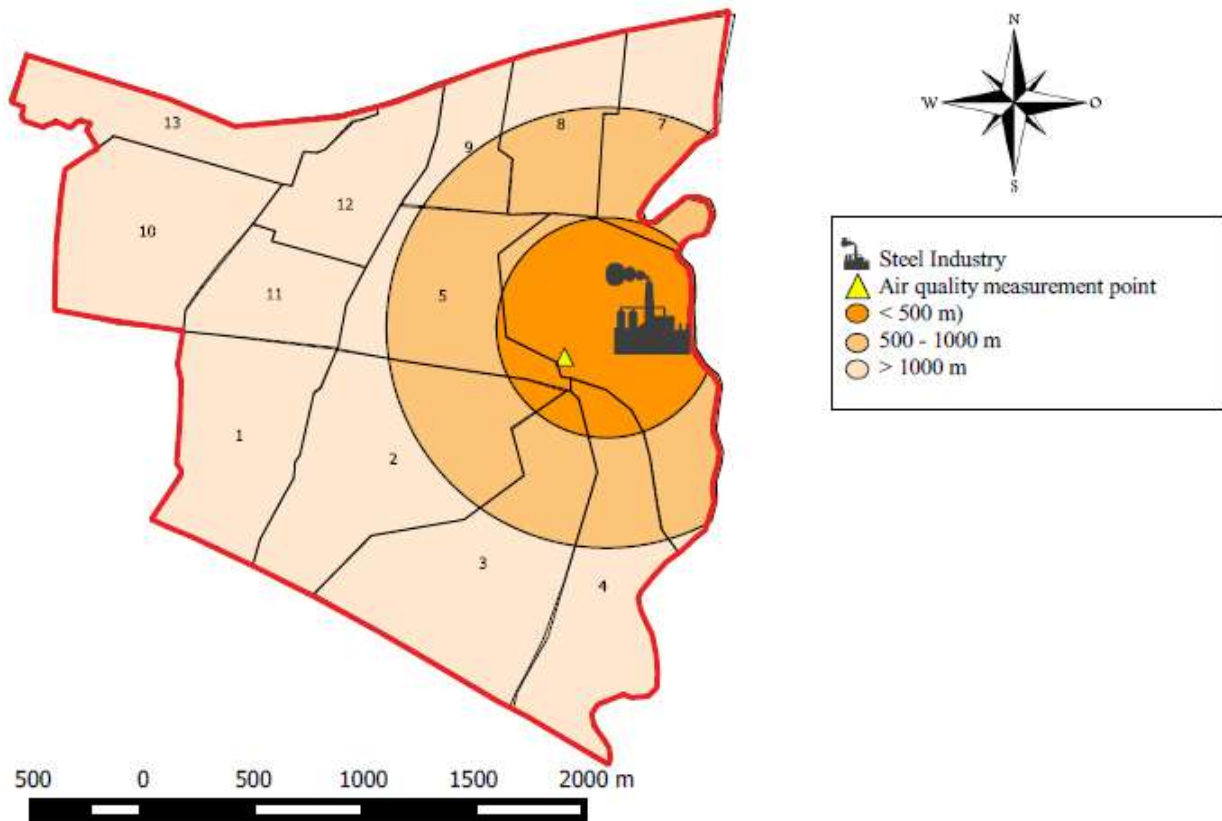
Te = Time of exposure (hour/day)

Fe = Frequency of exposure (day/year)

Dt = Duration of exposure (*real time*, year)

Wb = Weight (kg)

Tavg = Time of average period (Dt x 365 day/year for non-carcinogenic substances)



**Figure 1: The location of measurement points, the steel industry, and Sukadanau village were obtained from the analysis using Quantum GIS 2.8.1**

**Health Questionnaire:** Data collection using the American Thoracic Society Questionnaire for Symptom (ATS-DLD-78-Adult) questionnaire<sup>18</sup>. This questionnaire was modified following the needs of researchers that are only using questions related to respiratory symptoms that can be caused by SO<sub>2</sub>, namely cough, phlegm, shortness of breath, and wheeze. And weight measurements were taken to calculate the amount of intake for each subject.

**Statistical Analysis:** Bivariate analysis in this study used the Chi-square test. Then, the multivariate analysis in this study uses a multivariable logistic regression test. There are two models used in the analysis. The first model looked at the effect of intake on respiratory symptoms by controlling age, length of stay, and passive smoking. While the second model controls age, length of stay, passive smoking, body weight, insufficient ventilation, and interactions between intake and weight. The interaction between these variables is considered because weight is used in calculating the amount of intake.

**Result**

**Table 1: Characteristics of housewives and home environmental conditions**

Characteristics (n = 114)	N	%
<b>Intake of SO<sub>2</sub></b>		
> 0.0077 mg/kg/day	58	50.9
≤ 0.0077 mg/kg/day	56	49.1
<b>Age</b>		
> 30year	51	44.7
≤ 30year	63	55.3
<b>Length of stay</b>		
> 10 year	58	50.9
≤ 10year	56	49.1
<b>Passive smoking</b>		
Yes	67	58.8
No	47	41.2
<b>Ventilation</b>		
Insufficient	75	65.8
Sufficient	39	34.2

Table 1 shows that 50.9% of housewives had an intake of SO<sub>2</sub> per day > 0.0077. Most of them aged

≤ 30 years (55.3%), lived > 10 years in Sukadanau Village (50.9%), passive smoking at home (58.8%), and insufficient home ventilation (65.8%).

The most common respiratory symptoms were cough (30.7%) followed by phlegm (16.7%), shortness of breath (13.2%), and wheeze (4.4%). Table 2 shows the differences in respiratory symptoms experienced by

housewives based on the intake of SO<sub>2</sub>. It was seen that symptoms of phlegm and wheeze were more experienced by those who had a higher intake of SO<sub>2</sub> (>0.0077 mg/kg/day) than those who had lower intakes. There was a significant association between intake of SO<sub>2</sub> with phlegm (OR 1.08, 95% CI 0.40 - 2.91) and wheeze (OR 1.47, 95% CI 0.23 - 9.16).

**Table 2: Respiratory symptoms based on the intake of SO<sub>2</sub> in housewives**

Intake of SO <sub>2</sub> (mg/m <sup>3</sup> )	Respiratory Symptoms		Total n (%)	P-Value	OR (95% CI)
	(Cough)				
	Yes n (%)	No n (%)			
> 0.0077	20 (34.5)	38 (65.5)	58 (100)	0.473	1.43 (0.64 – 3.2)
≤ 0.0077	15 (26.8)	41 (73.2)	56 (100)		
	(Phlegm)				
> 0.0077	10 (17.2)	48 (82.8)	58 (100)	0.0005*	1.08 (0.40 – 2.91)
≤ 0.0077	9 (16.1)	47 (83.9)	56 (100)		
	(Shortness of breath)				
> 0.0077	12 (20.7)	46 (79.3)	58 (100)	4.597	4.60 (1.22 – 17.34)
≤ 0.0077	3 (5.4)	53 (94.6)	56 (100)		
	(Wheeze)				
> 0.0077	3 (5.2)	55 (94.8)	58 (100)	0.0005*	1.47 (0.23 – 9.16)
≤ 0.0077	2 (3.6)	54 (96.4)	56 (100)		

\*Sig. P < 0.05

Table 3 shows that the odds ratio for all symptoms were elevated after controlling for age, length of stay, and passive smoking in the first model. However, only shortness of breath was statistically significant (OR 4.62, 95% CI 1.21-17.66). In the second model, also only the odds ratio of shortness of breath was elevated and statistically significant (OR 36.65, 95% CI 2.95 - 455.18).

**Table 3: Association between intake of SO<sub>2</sub> and respiratory symptoms experienced by housewives**

	Cough OR (95% CI)	Phlegm OR (95% CI)	Shortness of breath OR (95% CI)	Wheeze OR (95% CI)
Intake of SO <sub>2</sub> <sup>a</sup> (0.0077 mg/m <sup>3</sup> /day)	1.38 (0.61 – 3.12)	1.12 (0.41 – 3.03)	4.62 (1.21 – 17.66)*	1.24 (0.19 – 8.00)
Intake SO <sub>2</sub> <sup>b</sup> (0.0077 mg/m <sup>3</sup> /day)	1.22 (0.38 – 3.84)	0.53 (0.13 – 2.10)	36.65 (2.95 – 455.18)*	0.38 (0.03 – 4.34)

<sup>a</sup>Adjusted for age, length of stay, passive smoking

<sup>b</sup>Adjusted for age, length of stay, passive smoking, weight, ventilation insufficient, interaction intake and weight

\*Sig. P < 0.05

### Discussion

The steel industry is one industry that uses coal in its production process. About 75% of coal is used in blast furnaces and 25% is used in the process of sintering and coking<sup>19,20</sup>. The production process using coal will

produce one of the pollutants, namely sulfur dioxide (SO<sub>2</sub>)<sup>21</sup>. Because, coal contains about 1.04-5.25% sulfur in America, and 1.04-5.25% in East Kalimantan, Indonesia<sup>22,23</sup>. Therefore, people who live around the steel industry can be exposed to SO<sub>2</sub> produced from

the steel industry and can gradually experience health impacts. This can be seen from the amount of intake received each day.

In this study, the amount of intake is used to see its effect on respiratory symptoms. The average concentration of SO<sub>2</sub> was 0.026 mg/m<sup>3</sup>. Intake data obtained were not normally distributed, so that the median value used as intake of SO<sub>2</sub> in housewives was 0.0077 mg/kg/day. From the results obtained intake of SO<sub>2</sub> > 0.0077 mg/kg/day and ≤ 0.0077 mg/kg/day is not so much different. This is because the concentration used in the calculation is only based on measurements at the same point for all housewives in 13 resident of Sukadanau Village. While the intake of each person will be different, this is influenced by the concentration of chemical agents as the formula used<sup>15,16</sup>. As the study by Sunarsih et al (2019), the amount of SO<sub>2</sub> intake was higher than NO<sub>2</sub> in their study due to higher SO<sub>2</sub> concentrations<sup>24</sup>. The amount of intake is also influenced by other factors such as body weight and activities<sup>17,25</sup>. Thus, the use of concentration values also causes subjects not to be compared based on distance from industry, statically (p > 0.05).

Even though, the results obtained that phlegm and wheeze were more experienced in those who had a higher intake of SO<sub>2</sub> (> 0.0077). So, housewives who have intake > 0.0077 mg/kg/day 1.08 times to experience phlegm and 1.47 times to experience wheeze compared to housewives who have intake ≤ 0.0077 mg/kg/day. There are no studies that directly address the intake of SO<sub>2</sub> in communities around the steel industry. However, other studies around the petrochemical industry that also emitted SO<sub>2</sub> show that those who are around the industry have higher phlegm more than those who do not live around the industry (p < 0.05)<sup>26</sup>. Other related studies also show that for each increase of 10 µg/m<sup>3</sup> SO<sub>2</sub>, wheeze also increases with OR = 1.02<sup>27</sup>. However, after controlling for confounding factors both in models 1 and 2, only shortness of breath was statistically significant. In line with other studies in industrial areas which show that shortness of breath is significantly related to SO<sub>2</sub> exposure<sup>28</sup>.

### Conclusion

Regardless of the limitations of this study. Housewives who live around the steel industry experience respiratory symptoms such as cough, phlegm, shortness of breath, and wheeze due to intake of SO<sub>2</sub>.

Although only shortness of breath is significantly related. However, the overall intake of SO<sub>2</sub> can cause respiratory symptoms. Further studies using concentrations that can describe each region are needed to understand the effect of intake of SO<sub>2</sub> on respiratory symptoms.

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# Efficacy of Endoscopic Transantral Versus Transorbital Surgical Approaches in the Repair of Orbital Blow-Out Fractures (Randomized Clinical Trial)

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## Abstract

**Objective:** to assess the efficacy of endoscopic transantral surgical approach versus traditional transorbital surgical approach (control group) in orbital blow out fractures in terms of postoperative clinical and digital radiographical assessments

**Design:** Blind, randomized, controlled clinical trial.

**Patients:** From January 2017 to January 2019, 12 patients with unilateral/bilateral pure orbital blow out fractures were equally assigned to study endoscopic transantral and control transorbital groups.

**Intervention:** In the study group, fractures were repaired with the endoscopic transantral approach while the control group, fractures were repaired via the transconjunctival surgical approach.

**Outcomes Measures:** The patients (subjective assessment) were followed up on a monthly basis for 6 months following surgery for the evaluation of the eye movement, double vision resolution, enophthalmos correction, and esthetics.

**Results:** A significantly better outcome, regarding enophthalmos and diplopia improvement, was found in the endoscopically controlled group. Endoscopically controlled reconstruction of orbital floor fractures seems to be a more accurate and successful treatment.

**Keywords:** Orbital blow-out, endoscopic transantral, transorbital/ transconjunctival, diplopia resolution

## Introduction

Orbital floor fracture is one of the most common facial skeleton fractures after mid facial trauma, accounting for up to 40% of cranio-facial injuries.

Patients may complain of ocular symptoms, aberration of aesthetic appearance, and dysesthesia around the damaged cheek. <sup>1</sup>

The indication for repair of orbital wall fractures is based on the clinical symptoms, exophthalmometry and computed tomography (CT). The timing of treatment, surgical technique and type of reconstruction material used is debated. Some advocate following the post trauma course for the development of diplopia or enophthalmos before starting treatment. <sup>2</sup>

Although a variety of approaches to orbital floor fractures have been proposed, satisfactory postoperative results have not been obtained in all cases. The key to

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successful surgical repair of these injuries is adequate exposure, visualization of the posterior bone shelf, and anatomical reconstruction of the entire defect. The traditional approach exposes the orbital floor, but it is difficult to see the posterior edge of the fracture and the condition of the herniated tissue before and after reduction of the orbital contents. Posterior dissection is the most difficult maneuver and is a common reason for failure of orbital floor repair.<sup>3</sup>

Transmaxillary endoscopic visualization of the orbital floor offers an excellent view of the entire defect and the surgical reconstruction.<sup>4</sup>

The presented study is to assess the efficacy of endoscopic transantral surgical approach versus traditional transorbital surgical approach (control group) in orbital blow out fractures in terms of postoperative clinical and digital radiographical assessments

### Material and Method

The trial was planned as a randomized, prospective, blinded controlled clinical trial. The sample size was calculated in accordance with Hundepool (2012)<sup>5</sup> and Kim (2015)<sup>6</sup> indicated that the probability of diplopia resolution among controls is 0.33. If the true probability among cases is 0.77, we will need to study 6 patients in each group to be able to reject the null hypothesis that the exposure rates for case and controls are equal with probability (power) 0.8. The sample size was calculated using the PS program (Power and Sample Size Calculation software version 3.1.2; Vanderbilt University, Nashville, Tennessee).

The Research Ethics Committee of Oral and Dental Faculty, Cairo University, approved the study on January 23, 2017. The trial was registered on ClinicalTrials.gov (ClinicalTrials.gov identifier: NCT03011047)

From January 2017 to January 2019, 12 patients were accepted for randomization with pure unilateral/bilateral orbital blowout fractures and were planned for repair. The procedure, its risks, and possible postoperative complications were thoroughly explained to all patients, and they were asked to sign an informed consent form.

All the surgeries were performed at Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Cairo University. The 12 patients were randomly assigned into 2 identical groups using a special website called Researcher Randomizer (<https://www.randomizer.org/>).

**(Group A):** six patients managed with transantral endoscopic approach. **(Group B):** six patients managed with transconjunctival approach.

The randomization codes were enclosed in a sequentially numbered, identical, opaque, and sealed envelope. The patient's guardians were asked to select one envelope. The investigator was aware of the randomization process for the specific group and treated accordingly. Outcome assessors, data collectors, and statistical analysts were blinded throughout the study.

### Preoperative Preparation:

- A clearance from the ophthalmology Department, Faculty of Medicine, Cairo University after examination of papillary reflexes, motility restriction, measurement of the visual acuity, and confirmation of the presence of preoperative diplopia on upward gaze.
- Clinical preoperative photos were taken to ensure restricted eye elevation due to muscle entrapment in orbital floor fracture site.
- Preoperative orbital CT SCAN.

### Operative Details:

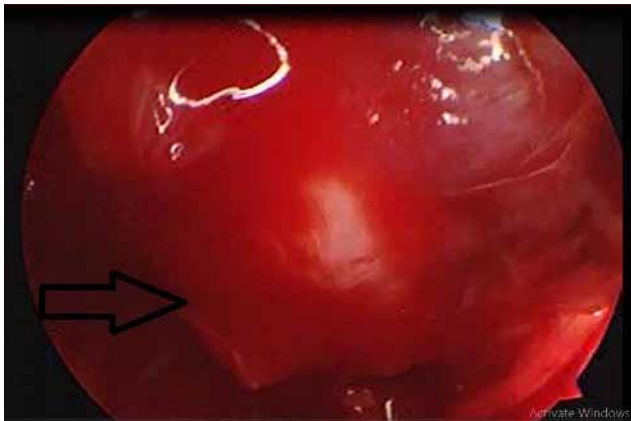
1. With the patient in a supine position, general anesthesia was induced. An uncuffed, nasal right angle endotracheal tube (RAE) was placed and taped to the midline to the forehead.
2. Forced duction test to confirm the presence of the inferior rectus muscle herniation into the maxillary sinus.

### Surgical Step (Study Group):

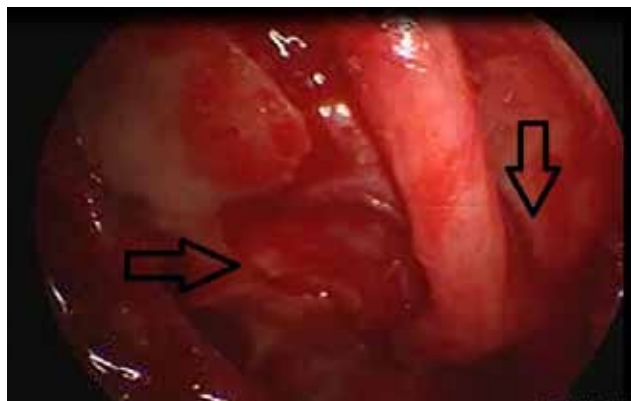
1. Local anesthesia was injected into the upper gingivobuccal sulcus above the canine area.
2. A 4-5 cm horizontal incision was made just superior to the sulcus extending from the lateral incisor to the first molar area
3. The periosteum and overlying soft tissue were gently elevated from the underlying maxillary bone, not reaching to the level of the infraorbital foramen using a periosteal elevator (to avoid the vessels injury).
4. 2 holes (wide enough to house the sinus scope; one for the sinus scope and for the suction tube while the other one of the used instruments.) were made into the anterior maxillary wall with an electric fissure

bur, care should be taken to avoid injury to dental roots, infraorbital vessels or the nasal aperture

5. The maxillary sinus and prolapsed orbital contents were visualized employing a 30-degree endoscope 3 (sinus scope 4 mm, 30 degrees short one 17 cm) (Storz: <https://www.karlstorz.com/eg/ar/index.htm> GERMANY.)
6. Removal of all the sinus membrane using a curved hemostat
7. Confirmation of forced duction test via endoscopic view.
8. The herniated orbital contents were reduced by digital manipulation or by using surgical instruments (curved Freer elevator), without removing the mucosa with periosteal orbital preservation, checked with pulse test (The test is performed by applying gentle pressure on the globe while visualizing the transmitted movement of the orbital floor from below pressure on the eyeball through the maxillary sinus)

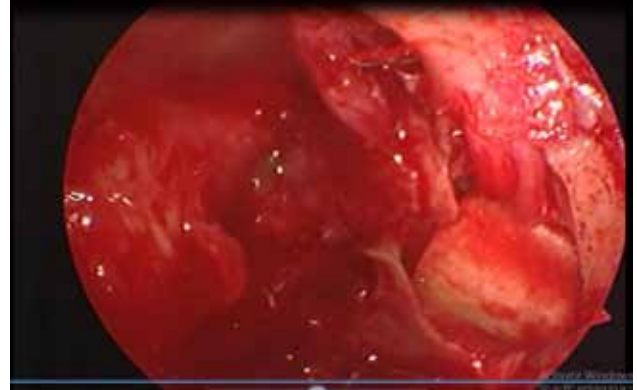


Intra-operative endoscopic view of the left maxillary sinus of an orbital floor fracture, through the antral window. The orbital floor was fractured, and periorbital soft tissue was herniated into the maxillary sinus (arrow).



Intra-operative endoscopic view of the fractured bony margins after reduction (arrows).

1. A reinforced collagen membrane<sup>4</sup> was cut larger than the defect size and inserted sub-periosteally below the fracture margins, then it stabilization tested by pulse



Intra-operative endoscopic view of the left maxillary sinus of the reconstructed orbital floor fracture with collagen membrane, through the antral window. (Arrow)

2. A forced duction test was performed to confirm correct positioning of the orbital floor and to avoid entrapment of the orbital contents before closing
3. Transconjunctival with lateral canthotomy incision was used in all cases.
4. The transconjunctival incision will be sutured in 3 layers, periosteal and subcutaneous layers will be closed with a 6/0 Vicryl interrupted, then the skin for the lateral canthotomy was sutured with 6/0 Prolene<sup>8</sup> interrupted sutures.

#### Postoperative Period and Follow-Up:

1. All patients were discharged from the hospital at the surgery day.
2. An oral antibiotic (endoscopic group) and I.V antibiotic (for transorbital group) was prescribed for 5 postoperative days.
3. Sutures were removed on the sixth postoperative day (transorbital group).
4. All complications presenting as infection, wound dehiscence, or hypertrophic scarring were recorded.
5. Patients were scheduled for the following follow up visits:-
  - **First visit:** At 2nd day after surgery for clinical

and radiographic assessment.

- **Second visit:** At 15th day postoperative to assess gradual diplopia resolution and enophthalmus correction.
- **Third visit:** Final evaluation for the presence of diplopia and the degree of enophthalmos was performed 3 months after surgery.
- **Fourth visit:** At 6 months postoperative to assess the patient radiographically with CT CSAN.

**Statistical Method:** Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version. 25.18

Numerical data were summarized using means, standard deviations, median and ranges. Categorical data were summarized as percentages. Data were explored for normality by checking the data distribution and using Kolmogorov-Smirnov and Shapiro-Wilk tests. Comparisons between the 2 groups with respect to normally distributed numeric variables were done using the t-test and Mann Whitney for not normally distributed variables. For categorical variables, differences were analyzed with Chi square or Fisher exact test as appropriate. Enophthalmous Incidence from before to after was assessed by McNemar test. All p-values are two-sided. P-values  $\leq 0.05$  were considered significant.

**Group A (endoscopic):**



(A)



(B)

Clinical photo showing (A) Preoperative left limited elevation due to muscle entrapment in left orbital floor fracture site. (B) Postoperative photo after left orbital floor reconstruction.

**Result**

**Ophthalmic Symptoms:** Diplopia and enophthalmos measurements of the day before surgery and three months after surgery were compared to evaluate the outcome.

1. **Diplopia Improvement:** Twelve patients reported diplopia before surgery, of which postoperative improvement was seen in 7 patients. In three patients, diplopia persisted at the extreme upper gaze post-surgery, but improved within the 3-month follow-up period.

In Group Endoscopic; 4 patients out of 6 (66.7%) of the patients had complete improvement the other hand, 3 patients out of 6 (50%) of the control group had complete improvement. This was statistically not significant,  $p=0.788$

Frequencies (n), percentages and results of fisherexact test for Diplopia Improvement for the tested groups.

Endoscopic Group				Control Group		P value
		Count	%	Count	%	
Diplopia Improvement	Complete	4	66.7	3	50.0	0.788
	Partial	1	16.7	2	33.3	
	Residual	1	16.7	1	16.7	

$P \leq 0.05$  is significant

**2. Enophthalmous correction:**

**Enophthalmos resolved postoperatively in eight of ten patients.**

Enophthalmous Incidence	Before Surgery	After Surgery	P Value
Endoscopic Transantr	4	0	0.0056
Trans conjunctival	6	2	

\*(P > 0.05).

**Frequencies (n) and results of Mcnemar test for Enophthalmous:**

**3. EOM (Extra-ocular muscles) limitation:** Three out of 12 patients had improved extra-ocular muscle limitation postoperatively (20%).

**Postoperative Complication:**

1. No significant intra-operative or post-operative complications were found in both groups.
2. Mild orbital pain and hypoesthesia of the infra-orbital nerve occurred in both groups and improved with time.
3. Periorbital postoperative edema was significant in the control group.
4. In the endoscopic group, four patients complained of numbness of the alveolar ridge where the gingivobuccal incision was made; due to numbness of the infra-orbital nerve, which recovered in time.
5. One patient from endoscopic group developed maxillary sinusitis at 4 weeks post-surgery, with symptoms of cheek pain, swelling, and nasal discharge. The sinusitis symptoms resolved later on after consultation with an ENT specialist.
6. None of the patients reported any subjective changes in facial appearance secondary to the antrostomy
7. The total surgery time in the present two groups depended on the fracture size and difficulty. The extra surgery time was 45 min, on average, for the transorbital approach; may be due to time for mesh adjustment and fixation and layered suturing of the incision.

**Discussion**

The management of orbital blowout fractures and the ideal timing for fracture repair has been controversial. The time to operation (time lapse) was considered as the period of time from the day of injury

to the day of surgical repair. In general, this was targeted at two weeks, commensurate with a resolution of edema/hematoma. The mean time lapse of study patients in Group (Endoscopic) was 8.3±9.4days and range (2-27) while in Group (Control) was 10.6±11.1days and range (2-29) (P value 0.809 which is statically nonsignificant). Old traumatized patients were more likely to have residual post-operative diplopia. Surgical repair of blowout fractures within two weeks of trauma decreases the incidence of residual diplopia (to avoid muscles fibrosis; this explain the 20% of EOM limitation). This was proved by Hosal and Beatty 2002<sup>7</sup>; their study concluded that diplopia improved faster in patients who had surgery within 7 days of trauma than in patients who had surgery after 14 days. However, Egbert et al. 2002<sup>2</sup> found that the incidence of diplopia was not significant in patients having surgery within one month of injury.

Resolution of significant diplopia was achieved in 7 patients out of 12 cases in the 3rd month postoperative follow up. Three patients continued to have diplopia at 6 months postoperative follow up, however less than the pre-operative diplopia. No case had diplopia worsened by surgery. In endoscopic group 4 patients out of 6 (66.7%) of the patients had complete improvement the other hand, 3 patients out of 6 (50%) of the control group had complete improvement. This was statistically not significant, p=0.788. Other studies comparable to ours have reported a similar incidence at 66% and 70%.<sup>[8-11]</sup> Only one study to date has demonstrated a significantly lower incidence (20.2%) of diplopia resolution.<sup>12</sup>

Failure of diplopia to improve after adequate repositioning of orbital tissue is not an infrequent outcome after surgery for BOF, as we found in our study. There are a few explanations for residual diplopia even after adequate surgery. The first possible explanation is that entrapment, contusion, or hematoma of ocular muscle by fractured bony fragments may influence muscle function even after adequate repositioning. Second, there may be an undetected, persistent palsy of the oculomotor nerve. Third, altered orbit position may occur<sup>(13-17)</sup>

**Conclusions**

**Within the limitations of the present study, it could be concluded that:** In general, it can be concluded that traditional surgical approaches provide difficult visualization of the posterior part of the orbital floor. Endoscopically controlled reconstruction provides,

besides improved visualization, confirmation of correct implant placement, and reduction of herniated orbital tissues. Video projection for teaching purposes and documentation is possible.

### Recommendations

Further studies are recommended to be done on of patients with pure orbital blowout:

1. Prospective, randomized studies are warranted to study this new technique further.
2. Endo-nasal endoscopic approach for medial orbital walls' fractures.
3. A larger sample size.

**Funding:** The study was self-funded

**Competing Interests:** No conflict of interest

**Ethical Approval:** The Ethics and research committee, Faculty of Dentistry, Cairo University approved the study and patients' consent was obtained.

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# Relationships of Workloads, Working Conditions and Dual Role Conflict with Nursing Stress

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## Abstract

**Context:** Jobs in the health sector such as nurses are often assumed to be jobs that have a high risk of stress. This study aims to determine the relationship between workload, working conditions and dual role conflict with nurses' work stress. The study was conducted at the Abepura Regional Mental Hospital in October 2016 using a cross-sectional design. The research sample was nurses in Abepura Regional Mental Hospital, amounting to 62 people who were selected using a simple random sampling technique. Bivariate analysis was performed to show the relationship between the dependent and independent variables used the chi-square test with a significance level of  $p < 0.05$ . The results showed that the majority of respondents experienced heavy work stress (90.3%), heavy workloads (88.7%), non-conducive working conditions (54.8%) and severe dual role conflict (85.5%). Workload ( $p = 0.016$ ), work environment ( $p = 0.022$ ) and dual role conflict ( $p = 0.024$ ) related to nurses' work stress. It is necessary to re-arrange the workload and shift adjusted to the nurse's ability, to create conditions that are conducive and comfortable and provide communication space to discuss the role conflict felt by the nurse.

**Keywords:** Job stress, workload, dual role conflicts, work conditions, nurses

## Introduction

The hospital is one form of a health facility that is organized both by the government and the private sector. Hospitals in carrying out their functions are expected to pay attention to social functions in providing health services to the community. The success of hospitals in carrying out their functions is characterized by the quality of service quality by the hospital. Hospital quality is highly influenced by several factors, including the most dominant is human resources (HR) <sup>(1)</sup>.

Hospital management will not be separated from the existing human resources. Human resource management is essentially an integral part of overall hospital management and human resources are the most important

capital and wealth of all activities carried out in the hospital. The success of this hospital is also influenced by knowledge, skills, creativity, and motivation of staff and employees in this case nurses for 24 hours (divided into 3 shifts, namely morning shifts, evening shifts, and night shifts) that deal directly with patients <sup>(2)</sup>.

Jobs certainly bring workers to certain situations that expose them to demands or excessive workloads that make them experience work stress. Job stress is a process of perception that is individualized. In general, employees experience work stress due to stressors coming from individuals, groups, organizations, and non-work, this work stress will have an impact on the behavior, cognitive, and physiological workers<sup>(3)</sup>.

Jobs in the health sector such as nurses are often assumed to be jobs that have a high risk of stress. This can be understood from at least three things, namely the workload that must be supported, the influence of patients being served and working conditions<sup>(4)</sup>. Excessive workloads such as caring for too many patients, nurses will have difficulty in maintaining high nursing standards can cause stress and working conditions because nurses

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feel unable to provide the support needed by co-workers and face the problem of labor limitations <sup>(5)</sup>.

The resulted of a preliminary study conducted on 2 female nurses showed that conflict is more pronounced during morning shifts and night shifts. This is also supported by the distance of their residence away from the workplace. So they often feel tired after work but have to do more household chores. Sometimes nurses feel stressed and can cause anxiety. Nurses in the room always brought their children who were under five to go to work. The reason for the nurse is because no one is looking after her child at home. The impact of taking the child to the hospital also makes the nurse worried.

This study aimed to determine the relationship between workload, working conditions and dual role conflict with nurses’ work stress.

**Material and Method**

The study was conducted at the Abepura Regional Mental Hospital in October 2016 using a cross-sectional design. Sample was nurses in Abepura Regional Mental Hospital, amounting to 62 people who were selected using a simple random sampling. Samples recruited in the study were nurses aged 20-50 years, working in one hospital with a shift system and willing to be respondents as evidenced by having signed informed consent. Data collection was carried out using a questionnaire. Characteristics of sample are age, sex, education, length of work and position. The research variables consist of dependent variables (work stress) and independent variables (workload, working conditions, and dual role conflict). Bivariate analysis to measure the relationship between the independent and dependent variable with  $\alpha = 0.05$ .

**Findings:**

**Characteristics of Respondents:** Table 1 showed that the age of respondents was mostly in the productive age, which is aged 20 - 35 years, amounting to 51 people (82.3%). Most respondents were female nurses, as many as 54 people (87.1%). 56 people (90.3%) nurses graduated from Diploma in Nursing. The working period of nurses mostly has worked for <5-10 years, namely 57 people (91.9%).

Relationship between workload, working conditions and dual role conflict with work stress

Table 2 showed that respondents who had light

workload tended to experience mild stress as many as 3 people (42.9%) higher than respondents who had heavy workloads who experienced mild stress. Respondents who experienced light workloads with heavy stress amounted to 4 people (57.1%) lower than respondents who experienced heavy workloads and experienced heavy stress as many as 52 people (94.5%). Statistical test resulted using chi-square obtained P-value = 0.016. There is a relationship between workload and the level of work stress.

**Table 1: Characteristics of respondents**

Characteristics	n	%
<b>Age (Year)</b>		
20 – 35	51	82.3
36 – 45	11	17.7
<b>Sex</b>		
Man	8	12.9
Female	54	87.1
<b>Education</b>		
School of Health Nurses	1	1.6
Diploma	56	90.3
Bachelor	5	8.1
<b>Length of working (Year)</b>		
< 5 – 10	57	91.9
11 – 15	5	8.1
<b>Position</b>		
Functional Nurse	4	6.5
Managing Nurse	31	50.0
Head of Room	2	3.2
Contract Nurse	25	40.3
Total	62	100

**Table 2: Relationship between workload, working conditions and dual role conflict with work stress**

Variable	Work stress				Total		P-value
	Light		Weight		n	%	
	n	%	n	%			
<b>Workload</b>							
Light	3	42,9	4	57,1	7	100	0.016
Weight	3	5,5	52	94,5	55	100	
<b>Working conditions</b>							
Conducive	0	0	28	100	28	100	0.022
Not conducive	6	17,6	28	82,4	34	100	
<b>Dual role conflict</b>							
Light	3	37,5	5	62,5	8	100	0.024
Weight	3	5,6	51	94,4	54	100	

Table 2 showed respondents who stated that conducive working conditions tended to experience stress with more severe levels than those who experienced mild stress levels, amounting to 28 people (100%). Respondents who stated that the working conditions were less conducive that could cause nurses in mild stress conditions amounted to 6 people (17.6%) lower than respondents who stated the working conditions were less conducive and experienced severe stress as many as 28 people (82, 4%). Statistical test resulted using chi-square obtained P-value = 0.022. There is a relationship between working conditions and the level of work stress.

Table 2 showed the respondents who experienced mild levels of dual role conflict and experienced less stress with a total of 3 people (37.5%). Respondents who felt severe dual role conflict and experienced lower levels of mild stress were 3 people (5.6%), respondents who experienced dual role conflict with mild levels with heavy stress levels were 5 people (62.5%) more low compared to respondents who experienced severe double role conflict with heavy work stress as many as 51 people (94.4%). Statistical test resulted using chi-square obtained P-value = 0.024. There is a relationship between dual role conflict with the level of work stress.

## Discussion

**1. Workload:** The result showed that respondents' statements about high workload were 55 people and low was 7 people. This showed that the workload felt by nurses in carrying out their duties is felt high. The result of the study are no different from Haryanti, Aini (6) that the workload perceived by nurses is high because the patients served are emergency patients, thus requiring speed, accuracy and consistent time at work, making nurses workloads high. Respondents who stated that the workload was high, was caused by the fact that in their work the leaders had many demands on the work that had to be done, so they had to be demanded to provide quality services and deal with patients with various characteristics. According to Haryanti, Aini (6) factors that influence nurses' workloads are patient conditions that are always changing, the average number of hours of care needed to provide direct services to patients exceeds a person's ability, the desire to achieve work, high job demands and care documentation nursing.

Respondents who stated the low workload of 7

people could be caused by external factors from the nurse itself, that is, the responsibility given to him was not much, so he did not feel burdened with his work. The workload felt by nurses is highest at productive ages (20 to 35 year). This is likely due to the physical condition of the nurse in dealing with work done. This is the following research by Ratri and Parmitasari<sup>(2)</sup>, that nurses aged 31-39 years experience a high workload caused by physical deterioration, so they are easily tired and feel the work done is not following their bodily capabilities. This is due to the demands of ability from the level of education they have. The same thing found by Mubin (7) that the high workload felt in higher education is due to the moral burden they bear with the education they have, so they have to work better than nurses with lower education below.

Nurses who felt a high workload on nurses who worked <5 years to 10 years were 51 people. This can be caused by the routine he does so that it causes boredom. This is the following research conducted by Haryanti, Aini (6), that nurses who feel a high workload are caused by the boredom of routine work done in connection with fast and responsive actions to patients in critical condition.

**2. Working Conditions:** The result obtained that the majority of respondents stated that the working conditions were not conducive as many as 53 people and conducive as many as 9 people. Respondents stated that the working conditions were not conducive because nurses had to deal with the patient's family, where the patient's family had an increased anxiety level after one of his family was treated in the intensive care unit. Also, nurses stated that the work conditions that are not conducive due to outdated equipment are still being used which is feared to experience sudden damage and will certainly affect the services provided to patients. As a result of problems arising from working conditions in hospitals that cover the work environment both physically and socially, for example, relationships with anxious patients' families and conditions of work equipment cause nurses to feel uncomfortable at work.

Nurses who state conditions are conducive to work because nurses have adapted to working conditions experienced, including dealing with family anxiety and working equipment conditions. Judging from the nurse's tenure that nurses who feel the conditions

of work are not conducive to nurses with ten years of service, this is due to the tenure they have, the nurse knows the deficiencies that exist in care in the hospital. A similar sentiment was expressed by Mubin (7) that nurses with long working years are more aware of their working conditions including lack of equipment and facilities and infrastructure needed in carrying out nursing care, in addition to the condition of patients who need serious attention supported by adequate equipment.

The resulted of the study were no different with Ahsan, Noviyanti (8) that nurses who worked in the inpatient room stated that the working conditions were not pleasant. Due to the duty of nurses in receiving and caring for patients must be able to deal with at the same time calm the anxiety of patients and patients' families. Working conditions are seen as having an important role in the comfort, peace, and security of work. The creation of comfortable working conditions will help employees to work harder so that productivity and job satisfaction can be increased. Good working conditions are work conditions that are free from physical disturbances such as noise, lack of lighting, and pollution and are free from psychological or temporary disturbances such as the privacy of the employee and the setting of working hours<sup>(9)</sup>. But from the nurse's statement that the perceived working conditions are not conducive is facing the patient's family with increased anxiety caused by not being able to keep together with the patient, as well as outdated equipment. While the sound produced by the engine, air circulation, and lighting and room temperature are adequate and are felt not to be a problem at work.

3. **Dual Role Conflict:** The resulted of this study also indicate that there is a significant relationship between multiple role conflicts with work stress on nurses. This means that nurses who have a high role conflict, the level of work stress experienced by nurses are high. While nurses who have low dual role conflict, the level of work stress experienced by nurses is low. The resulted of this study are supported by research by Lambert, Hogan (10) found that there is a positive and significant relationship between dual role conflict with work stress.

Also, research conducted by Nasir and Nusi (11) found that there were work and household conflicts. Conflict in the family will not occur if there is a balance between roles in the family with work.

An employee who has a family has a dual role, besides acting like a wife and mother, she also acts as a breadwinner. This dual role is very risky with conflict because in general women tend to prioritize their families (husband and children) overwork. This can hamper the implementation process of achieving its performance. The dual role conflict they experience is a factor triggering work stress. This is according to the resulted by Long, Azami (12) show that women who work are more likely to experience conflicts and problems and emphasize the importance of family problems rather than work when the family is the most important domain for most women.

The same thing also expressed by Qamari (13), one of the strategies that can be applied by women who work is social support, which maintains good relations with colleagues around and superiors, it is very important to prevent unnecessary problems. Moral and emotional support from colleagues and superiors can make you more excited about work. Their presence can also play a role in helping when facing family problems. Social support at work can contribute, especially employee productivity and welfare<sup>(14)</sup>. Also, social support according to Johnson, Johnson (15) can increase productivity through increased motivation, quality of reasoning, job satisfaction and reducing the impact of work stress.

## Conclusion

Workload, working conditions and dual role conflict are related to nurses' work stress. More workload felt by nurses, non-conducive working conditions and heavy dual role conflict increase work stress for nurses. It is necessary to re-arrange the burden and shift adjusted to the nurse's ability, to create conditions that are conducive and comfortable and provide communication space to discuss the role conflict felt by the nurse.

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# Intention of Diabetic Foot Ulcer Prevention Model Based on Social Support and Personal Agency Perspectives

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## Abstract

**Context:** A diabetic foot ulcer is one of the complications occurred on diabetes mellitus patients. The incident rate of diabetic foot ulcer improves each year significantly. The research was to arrange the intention of diabetic foot ulcer prevention model based on social support and personal agency perspectives. This study was included in a cross-sectional study using a questionnaire and a simple random sampling technique on 10 health centers (puskesmas). The research instrument for social support consisted of family's support and friend's support, personal agency consisted of perceived control and self-efficacy, and intention consisted of diet intention, consuming medicine intention, physical activity intention, and foot/blood sugar controlling intention. The data analysis applied SEM-PLS software. The diabetes mellitus patients who did not have ulcer were 329. There was correlation between social support and personal agency of diabetic foot ulcer prevention by having Coefficient value for 0,68, and T value for 16,27, there was correlation between personal agency and intention to prevent the diabetic foot ulcer by having coefficient value for 0,57 and T value for 2,96, and there was correlation between social support and intention to prevent the diabetic foot ulcer by having coefficient value for -0,27 and T value for 2,08. The social support contributed highly to the intention through a personal agency, and the social support contributed directly to intention in preventing the diabetic foot ulcer. It is suggested that diabetes patients should get supports from family and friends to improve the perceived control and self-efficacy hence the intention of diabetic foot ulcer prevention can be improved.

**Keywords:** *Social Support, Personal Agency, Intention, Diabetes*

## Introduction

A diabetic foot ulcer is one of the dead causes in the world, and it can attack whoever the individual is. Diabetes triggers morbidity such as blindness, kidney failure, and non-traumatic amputations<sup>(1)</sup>WHO predicts that the increase of Diabetes Mellitus sufferers in Indonesia reached 8,4 million in 2000 and will be about 21,3 million in 2030<sup>(2)</sup>. In 1990, Indonesia was in the 16<sup>th</sup> place for diabetes, while it was ranked 6<sup>th</sup> in 2010 and changed to the 5<sup>th</sup> place in 2015.

Amputation is done every day for diabetes mellitus patients in the world<sup>(3)</sup> Data from<sup>(4)</sup>. Riskesdas revealed that Indonesia was ranked 10<sup>th</sup> for the world's highest

foot amputation number. Besides treatment and healthy lifestyle, the patients' behavior is one of the determining factors of the success in preventing the diabetic foot ulcer so that it can decrease the amputation incident rate. The effect of amputation that is occurred in patients with diabetic foot ulcer can cause longer treatment periods, the higher treatment costs, and the more decrease the patients' life qualities. The effect of a diabetic foot ulcer is strongly perceived by the patients, thus, the roles and supports of family are really helpful. The support can be instrumental such as the provision of facilities that can support the patients' activities and the companion during treatment periods in health center, and also material and transportation to the treatment place. Good support from

the family improves the intention of diabetic foot ulcer prevention. This study aims at arranging the intention model of the diabetic foot ulcer prevention behavior based on the perspective of social support and personal agency in city of Gorontalo.

**Material and Method**

This was a cross-sectional study that had been conducted from December 1<sup>st</sup>, 2018 to May 31<sup>st</sup>, 2019 on respondents suffering from the diabetes mellitus. The samples were 329 respondents out of 1516 population. They were diabetes mellitus sufferers who did not have foot ulcer aged 18 years and over, and had been selected by simple random sampling technique. The variables consisted of social support (X1) which was everything around the individuals that influenced the behaviors of them in preventing the diabetic foot ulcer. The social support (X1) itself comprised of family’s support (X1.1), and friend’s support (X1.2). The question items included assessment support, instrumental support, informational support, and emotional support.

Other than social support (X1), the personal agency was another independent variable (X2). It was the individual’s self-ability to prevent diabetic foot ulcer consisting of a perceived variable (X2.1) and self-efficacy (X2.2). The last was the dependent variable namely intention (Y), the strong desire of the individuals themselves to prevent the diabetic foot ulcer involving the dieting intention (Y.1), physical activities intention (Y.2), consuming medicines intention (Y.3), and foot and blood sugar controlling intention (Y.4). The questionnaire had been ethically tested at Airlangga University of Surabaya, and it had owned its validity and reliability tests. Data analysis was completed by SEM PLS (Partial Keast Square) software.

**Findings:** The research result at Table 1 shows that the diabetes patients for elderly category aged 52 - 65 years are 214 (64,3%), female category consisted of 240 respondents (72,9%), respondents who are Senior High School graduates achieve 223 (67,8%), and those who do not have job (housewives and retired employees) are 215 (65,3%).

**Table 1: Respondents’ Charateristics, 2019**

Characteristics	Classification	Frequency	Percentage	Mean ± SD Min - Max
Age	Late Adult (35– 45 years)	30	9,0	Mean: 57.29 SD : 8.88 Min :35 Max : 84
	Early Elderly (46 – 55 years)	62	18,6	
	Late Elderly (56 – 65 years)	214	64,3	
	Elderly> 65 years	23	6,9	
Sex	Male	89	27,1	
	Female	240	72,9	
Job	Unemployment	215	65,3	
	Farmer	61	18,6	
	Private Employee	30	9,1	
	Civil Servant	23	7,0	

Table 2 reveals that respondents who have family’s support in less category are 71 respondents (21,3%) and those who receive support from friends in less category are 95 (28,4%), and there are 174 respondents (52,9%) who receive social support in a sufficient category.

**Table 2: Social Support, Personal Agency and Intention to Prevent Diabetic Foot Ulcer Variable**

Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Social support	Family’s Support	Less	71	21,3	44,65 ± 13,32 20 - 60
		Sufficient	116	34,7	
		Good	141	42,2	
	Friend’s Support	Less	95	28,4	44,61 ± 14,06 25 - 64
		Sufficient	107	32	
		Good	127	38	

Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Overall Social Support Score		Less	48	14,6	89,93 ± 17,68 37 - 128
		Sufficient	174	52,9	
		Good	107	32,5	
Personal agency	Perceived control	Less	157	47,7	18,89 ± 6,04 7 - 34
		Good	172	52,3	
	Self efficacy	Less	175	53,2	13,44 ± 1,80 8 - 16
		Good	154	46,8	
Overall Personal Agency score		Less	168	51,3	32,38 ± 6,08 19 - 46
		Good	161	48,9	
Intention	Dieting	Less	119	36,2	10,04 ± 1,33 6 - 12
		Good	210	63,8	
	Physical activities	Less	121	36,8	6,73 ± 0,92 4 - 8
		Good	208	63,2	
	Consuming medicines	Less	119	36,2	6,72 ± 0,87 4 - 8
		Good	210	63,8	
	Foot and blood sugar controlling	Less	119	36,2	6,76 ± 0,90 3 - 8
		Good	210	63,8	
Overall Intention Score		Less	160	48,6	30,27 ± 2,84 21 - 36
		Good	169	51,4	

Table 2 shows that almost all perceived control in a high category are 172 respondents (52,3%), respondents who have a low category of self-efficacy are 175 (53,2%), and the total of personal agency is in less category for 168 respondents (51,1%). Then, 210 respondents (63,8%) are in high category of dieting

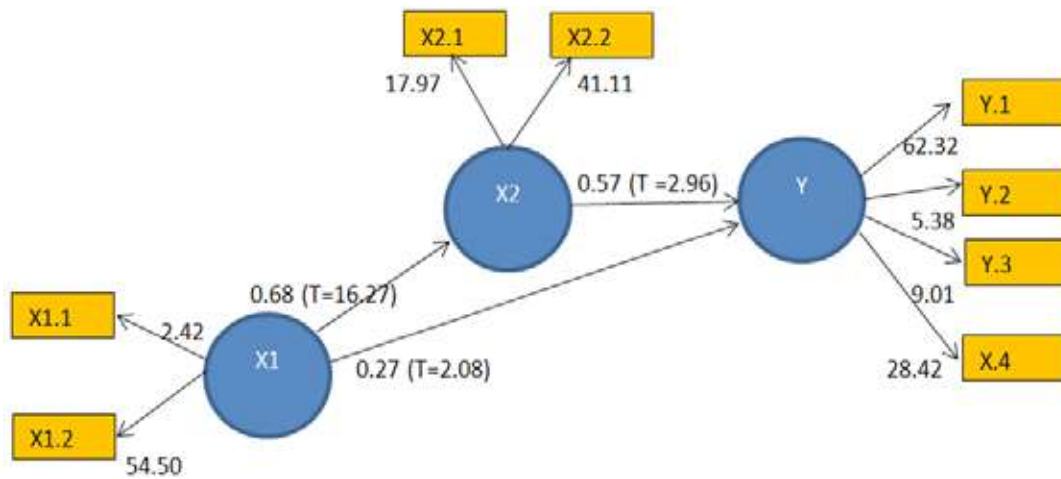
intention, 208 respondents (63,2%) are in high category of physical activities intention, 210 respondents (63,8%) are in high category of consuming medicine intention, and 210 respondents (63,8%) are in high category of foot/blood sugar controlling intention.

**Table 3: Cross Loadings with Convergent Validity and Reliability Result**

Construct and Indicator		Loading (λ)	T-statistics	Chronbach's Alpha	Information
Social support	X1.1	0.968	2.42	0,96	Valid & Reliable
	X1.2	0.971	54,50		
Personal agency	X2.1	0.954	17,97	0,85	Valid & Reliable
	X2.2	0.762	41,11		
Intention	Y.1	0.989	62,32	0,97	Valid & Reliable
	Y.2	0.987	5,38		
	Y.3	0.989	62,32		
	Y.4	0.83	27,28		

Table 3 reveals that there is no loading factor for less than 0,5 and T-statistical value is less than 1,96, hence all variables are considered significant and all latent

constructs are reliable and marked with the Chronbach's Alpha score which is higher than 0,6.



**X1 = Social Support, X2 = Personal Agency, Y = Intention**  
**Picture 1; Statistical T Value of Structural Model**

**Discussion**

Picture 1 reveals that there is direct correlation between social support with personal agency of diabetic foot ulcer prevention for 0,68 unit with T-statistical value for 16,27 ( $T_{count}$  is higher than  $T_{critic}(1,96)$ ), there was a direct correlation between personal agency and intention of diabetic foot ulcer prevention for 0,57 unit with T-statistical value for 2,96, and there was direct correlation between social support and intention of diabetic foot ulcer for -0,27 unit with T-statistical value for 2,08.

The social support comprises assessment support, instrumental support, informational support, and emotional support. The research result at picture 1 reveals that there is correlation between social support with the personal agency of diabetic foot ulcer prevention. It is found out that the informational and instrumental supports are required by the patients. The supports can be in the form of discussion among the family members about diabetic foot ulcer prevention and treatment to give when there is an indication of wound to occur and preparing appropriate meals for the diabetes patients. The positive impact felt by the respondents is the improvement of personal agency or individual ability to observe the symptoms of diabetic foot ulcer, and the patients become more confident to do the diabetic foot ulcer prevention.

Family support is required in this phase to assist the patient in preventing potential injury. Diabetic foot ulcer symptoms consisting of less to nothing sensation, dry skin, paralysis in foot area, and callus can be found<sup>(5)</sup>.

Diabetic foot ulcer is one of the sensory nerve defects which can cause the decrease of pain sensation at half to all part of foot area<sup>(6)</sup>. Normally, people who get injured require 2 to 5 days for the inflammation phase till the wound healing process<sup>(7)</sup>.

One of the family support categories experienced less by the respondents is assessment. The support is in the form of dieting support. The family, basically, suggests the patient do a diet, yet there is not any limitation for foods supply, for example, the food containing many calories. Therefore, the respondents are not maximal in running their diet. The research conducted by May beery S.L and Lindsay S., exposes that the behavior of the people around the patients who support the diabetes patient treatment program will increase the obedience of the patients in taking treatment<sup>(8)</sup>.

The research result at picture 1 shows that there is a correlation between personal agency and intention of diabetic foot ulcer prevention. The questionnaire result shows that the respondents are difficult to do physical activities 3 times a week based on the programs of the health center. It is because the respondents are not capable of doing that especially for those who have activities as the housewives. Respondents think that their tasks as housewives are more important than doing exercise. Respondents believe that doing activities as housewives can fulfill the need for physical activities for diabetes sufferers.

The lack of personal Agency, according to the health workers, is initiate by patients having many activities at home. The respondents' ages are in late elderly category



for 56 - 65 years. Their household activities should be adjusted with their ability, hence, the patients should focus only on diabetic foot ulcer prevention and other complications. The nurses, in this case, are having crucial roles in improving the personal agency. According to Hsieh Y. L., et al. the health officers are responsible in improving the patients' intention to follow the diabetes complication treatment because a high personal agency will improve the intention of diabetic foot ulcer prevention<sup>(9)</sup>.

Hence, the health officers and the family can do an orientation to patients about how to prevent any injury when doing activities and how to do foot treatment. If it is well-oriented, it will improve the diabetes patients' intention, hence they will obediently conduct the treatment program. It is strengthened by Pakaya which states that orienting the patients to rules and treatments will improve the intention and obedience of patients in following the treatment<sup>(10)</sup>. It is also supported by Pinidiyapathirage J., et al., that personal agency in self-efficacy is one of the important predictors to improve diabetes patients' intention in doing physical activities<sup>(11)</sup>

Table 2 shows that the family's support which is in a low category is 21,3%. The lack of family's support, in terms of instrumental support, strongly influences the behavior of diabetic foot ulcer prevention. The instrumental support is performed by helping the patient to do physical activities; the family can accompany the patient to visit the health center. By doing that, the patient will be more enthusiastic to follow the treatment. The study conducted by Lengerke V., K. en L., states that supports from all parties, including family, will improve the intention of patients to prevent the diabetic foot ulcer<sup>(12)</sup>.

The questionnaire result shows that social support from friends strongly helps the individual to visit the health center. The result is supported by Shuhaida N, M, H., et al., that social support has a significant correlation with blood sugar controlling behavior<sup>(13)</sup>. Social support is a heterogenic concept in which it can help o improve the mental health in terms of intention and physical health in preventing he diabetic foot ulcer<sup>(14)</sup>. The intention is also influenced by attitude, perceived norm, and personal agency<sup>(15)</sup>.

According to Ajzen and Fisben, to do an intention, there should be mutual cooperation with ones who support the intention itself, because intention is

determined by the environment or situational<sup>(16)</sup>. Faries D. M.,has stated that there is often a gap between intention of an individual with the expected result in which the respondents who have intention are difficult to realize it in behavior<sup>(17)</sup>.

## Conclusion

The developing model of intention to prevent the diabetic foot ulcer is influenced by supports from family and friends in order to improve the intention through personal agency variable. It is suggested that there should be further research related to knowledge and motivation in improving the intention to prevent diabetic foot ulcer.

**Conflict of Interest:** None

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**Ethic and Consent:** The ethics commissions of health research at Faculty of Nursing, Universitas Airlangga (Number 1173-KEPK) approves to the protocol by giving informed consent of research and consent form to be respondents by guaranteeing the confidentiality of research.

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# The Development of Diabetic Foot Ulcer Prevention Model Based on Psychosocial Perspectives, Attitude, Intention, Coping Mechanisms

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## Abstract

**Context:** Objective: Foot ulcer is one of the diabetic complications that causes death in the world. Preventive behavior can be used to prevent diabetic foot ulcers. Therefore, this study aims at developing a model of diabetic foot ulcer prevention based on psychosocial, attitude, intention and coping mechanisms. The study used a cross-sectional study design to look at the relationship between variables using simple random sampling in 329 respondents, ages 18-85 years, who made an inspection visit at a health care center. The research instrument consisted of psychosocial variables namely knowledge and stress, attitude, intention, coping mechanisms, and foot ulcer prevention. Furthermore, the data were analyzed using SEM-PLS software. Results shows most of the respondents were in the youth category ages 18 - 65 years. Analysis of shows that there is a psychosocial influence on attitude  $T = 10,92$ , there is an effect of attitude on intention  $T = 2,43$ , there is an influence of intention on coping mechanisms  $T = 8,28$ , there is an influence of intention on Foot ulcer prevention  $T = 2,57$ , there is an influence of coping mechanisms on foot injury prevention  $T = 5,02$ . Knowledge, stress, attitude, intention and coping mechanisms contribute to prevent diabetes foot injuries. The Conclusions Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms and intentions.

**Keywords:** *Psychosocial, Attitude, Intention, Coping Mechanisms, ulcer*

## Introduction

Diabetes mellitus (DM) is a non-communicable disease because of abnormalities of insulin secretion in beta cells, insulin action, or both.<sup>1</sup> Indonesia is one of the countries with the highest number of diabetic ranked 5th in the world.<sup>2</sup> Research conducted by Hena M. Shows that prevention of diabetic complications can be prevented by increasing behavior from subjective attitude to norms perceived control of behavior, knowledge and behavioral intentions.<sup>3</sup> This study aims to develop a model of diabeticfoot ulcer prevention based on psychosocial, attitude, intention, and coping mechanisms.

## Material and Method

The study used a cross-sectional study design on 329

respondents from January 2019 to May 2019. Diabetic patients were selected using simple random sampling with the criteria for patients having ever / never diabetic foot ulcers at the age of 18-85 years.<sup>2</sup> The research variable was psychosocial that is consist of respondent's knowledge of diabetes and patient' stress that refers to the DDS (distress scale),<sup>4</sup>coping mechanisms refers to problem management and emotional regulation, attitude, intention, and Foot ulcer prevention. The research instrument was tested by a questionnaire and the result showed that it is valid and reliable.

**Findings:** Table 1 shows that the majority of respondents were young people aged 18 - 65 years, the majority were female (72,9%), most were high school education (67,8%), most were married (99,39%).

**Table 1: Respondents' Characteristics diabetic patients**

Characteristics	Classification	Frequency	Percentage	Mean ± SD Min - Max
Age :	Youths (18– 65 years)	306	93	Mean: 57,29
	Middle-aged adults (66 – 79 years)	19	5,8	SD : 8,88
	Elderies (80 – 99 years)	4	1,2	Min : 35
Sex	Male	89	27,1	
	Female	240	72,9	
Education Level	Higher Education	57	17,3	
	Senior High School	223	67,8	
	Elementary School/ Junior High School	34	10,3	
	Non-students	15	4,6	
Marital status	Married	327	99,39	
	Single	2	0,61	

Table 2 shows that knowledge about DM is in most good category (89,4%), most did not experience the stress of 254 respondents (77,2%) and severe stress (1,4%). The experiential attitude was mostly in good category (53,5%), the instrumental attitude was mostly in poor category (54,1%), total attitude score was in most categories (56,5%). The intention scores were

mostly high (51,4%), coping mechanisms for problem management indicators were mostly non-adaptive categories (52,6%), Emotional regulation indicators were mostly non-adaptive categories(57,1%), total preventing diabetic foot complications were mostly in the good category (52,9%).

**Table 2: Psychosocial, attitude, Intention, coping mechanisms and Foot ulcer prevention for diabetic foot complications**

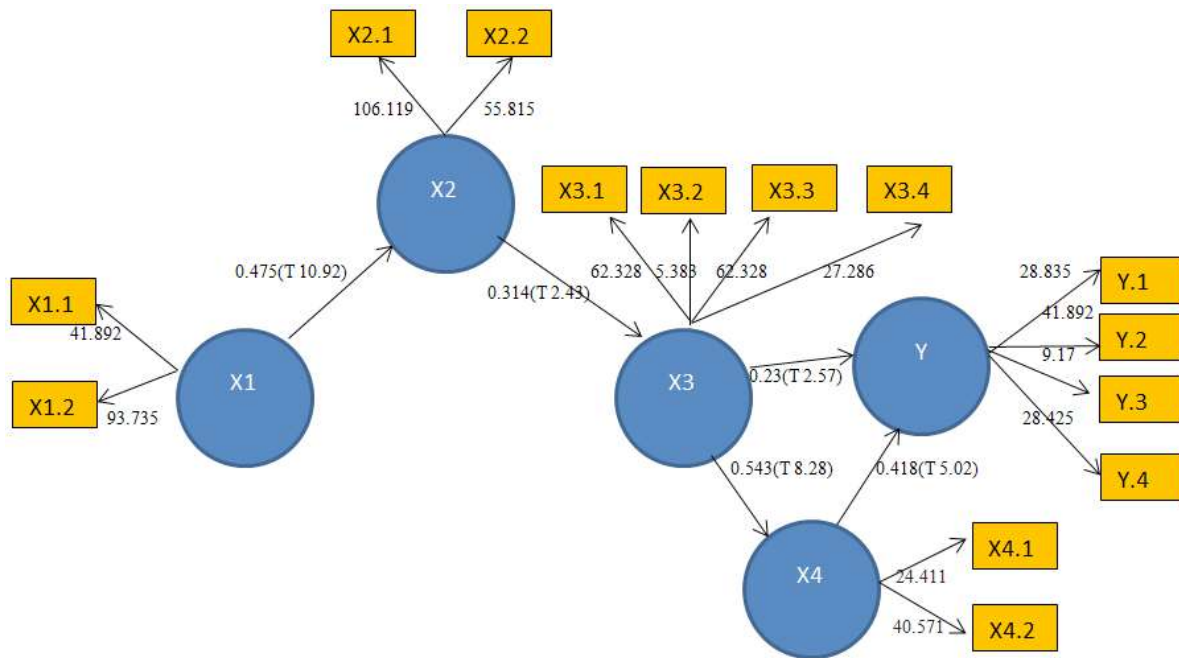
Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Psychosocial	Knowledge of DM	Low	3	0,9	93,26 ± 10,95 39 - 100
		Moderate	32	9,7	
		Good	294	89,4	
	Stress	Not stress	254	77,2	13,64 ± 3,72 9 - 32
		Low	40	12,2	
		Moderate	31	9,2	
		High	4	1,4	
Attitude	Experiential attitude	Less	153	46,5	11,82 ± 1,66 6 – 18
		Good	176	53,5	
	Instrumental attitude	Low	178	54,1	13,39 ± 1,80 8 - 16
		Good	151	45,9	
Overall attitude score		Low	186	56,5	25,22 ± 3,02 18 - 32
		Good	143	43,5	
Intention	Dietary	Low	119	36,2	10,04 ± 1,33 6 - 12
		High	210	63,8	
	Physical Activity	Low	121	36,8	6,73 ± 0,92 4 - 8
		High	208	63,2	

	Taking Medication	Low High	119 210	36,2 63,8	6,72 ± 0,87 4 - 8
	Blood glucose monitoring	Low High	119 210	36,2 63,8	6,76 ± 0,90 3 - 8
Overall intention score		Low High	160 169	48,6 51,4	30,27 ± 2,84 21 - 36
Coping mechanisms	Problem management	Non-adaptive	173	52,6	26,60 ± 3,64 16,32
		Adaptive	156	47,4	
	Emotional regulation	Non-adaptive	188	57,1	36,30 ± 4,72 22 - 44
		Adaptive	141	42,9	
Foot ulcer prevention	Diet	Low	176	53,5	6,17 ± 1,23 3 - 8
		Good	153	46,5	
	Physical Activity	Low	164	49,8	12,76 ± 2,31 4 - 16
		Good	165	50,2	
	Taking medication	Low	178	54,1	7,10 ± 0,99 4 - 8
		Good	151	45,9	
	Blood glucose monitoring	Low	175	53,2	6,18 ± 1,22 3 - 8
		Good	154	46,8	
Overall Foot ulcer prevention score		Low Good	155 174	47,1 52,9	32,27 ± 3,75 18 - 40

Table 3 shows that the psychosocial construct variables, attitude, intention, coping mechanisms, and preventive measures averaged above 0,5, T values above 1,96, Chronbach's Alpha scores > 0,6 are valid and reliable.<sup>5</sup>

**Table 3: Cross Loadings with Convergent Validity and Reliability Result**

Construct	Indicator	Loading ( $\lambda$ )	T-statistics	Chronbach's Alpha	Information
Psychosocial	Knowledge	0,96	49,48	0,96	Valid & Reliable
	Stres	0,97	93,73		
Attitude	Eksperiential attitude	0,96	106,11	0,96	Valid & Reliable
	Instrumen attitude	0,96	55,81		
Intention	Diet	0,98	62,32	0,97	Valid & Reliable
	Physical Activity	0,98	5,38		
	Taking medication	0,98	62,32		
	Monitoring	0,83	27,28		
Coping mechanisms	Problem management	0,95	24,41	0,92	Valid & Reliable
	Emotional regulation	0,90	40,57		
Foot complications prevention	Diet treatment	0,90	28,83	0,89	Valid & Reliable
	Physical Activity Action	0,71	41,89		
	Taking medication Action	0,75	9,01		
	Monitoring Action	0,86	28,42		



**Figure 1: X1 = Psychosocial, X2 = Attitude, X3 = Intention, X4 = Coping Mechanisms, Y = foot complications prevention.**

**Discussion**

1. **Psychosocial influence on attitude:** Figure 1 shows that there is a direct psychosocial influence on the attitude of patients in Gorontalo. Respondents reported the cause of the patient’s stress because they had suffered complications to the foot and had an amputation of the toe. This condition causes patients to often think of their illness, which can trigger stress. Respondents report that stress not only affects the lives of individuals but can also trigger an increase in blood sugar. The results of research conducted by Tomayahu M. and Adam L that stress can increase blood sugar levels in diabetic patients. These results indicate that there is a significant relationship with stress with an increase in blood sugar levels.<sup>6</sup>

Respondents reported an increase in knowledge and attitude since attending counseling on diabetic foot complications prevention. Research conducted by Khunkaew S. that low knowledge can reduce the attitude of diabetic patients towards patient blood sugar control.<sup>7</sup> This is reinforced by research conducted by Abbasi Y. F., et al., That knowledge has a significant relationship with increasing patient attitudes.<sup>8</sup>Diabetic patients report an increased knowledge can change the attitude of patients in

preventing diabetic foot ulcers. This is indicated by positive changes in terms of experiential attitude in which patients report happy doing physical activity every day.

2. **Effect of attitude on intention:** Figure 2 shows the influence of attitude towards the intention to prevent diabetic foot ulcers. The results showed respondents reported rarely doing physical activity. Some respondents also reported that the implementation of the diet was not carried out to the maximum, did not carry out the diet continuously, and carried out the diet only at certain times. Respondents also reported having the habit of consuming sweet foods and drinks in the morning and evening. Nevertheless, the patient’s attitude towards taking medicine is quite good, where the patient does not feel bored by taking diabetes medication every day. Diabetes medication is always taken every month in accordance with the stock of drugs given by the health center. According to Ajzen, I., & Fishbein, M. Behavioral intentions of someone in behavior are closely related to individual attitudes and normative beliefs about the behavior in question. If attitudes and beliefs are good, it will increase individual intentions in behavior.<sup>9</sup>This was confirmed by Lestarina W.N. that a positive attitude towards treatment has a significant relationship to the patient’s blood sugar control. A positive

attitude that adheres to treatment will increase the intention to frequently control diabetes treatment.<sup>10</sup> This is in line with research conducted by Abbasi F.Y. that there is a significant relationship between attitude and practice for diabetes prevention.<sup>8</sup> A positive attitude of patients towards the prevention of diabetic foot complications can increase patient intention. Research conducted by Putri M. shows that there is a significant relationship between attitude and the intention of the elderly with diabetes in visiting health services.<sup>11</sup> This result shows that attitude gives the biggest contribution to increasing intention to prevent diabetic foot ulcers.

### 3. Effect of intention on coping mechanisms:

Table 3 shows the loading factor no less than 0,6. Figure 1 shows that there is a significant effect on the coping mechanisms of the patient. According to Pinidiyapathirage J., et al., Intention is one of the strong predictors to improve patient coping.<sup>12</sup> Patient participation in the form of patient visits in health care facilities is one of the benchmarks evaluating the increase in patient intention to prevent diabetic foot complications.<sup>13</sup> Obstacles in visiting health facilities, including monitoring are the lack of patient intentions.<sup>13</sup> Some patients report a lack of intention in monitoring foot hygiene and blood sugar monitoring. According to patients, the intention to maintain foot hygiene is already there, but the implementation has not been maximized. This shows the intention to prevent diabetic foot complications has not reached the stage of action. According to Faries DM, many things can be done to realize intentions in action including increasing attitude, perceived norm, personal agency, self-efficacy.<sup>14</sup> According to him in realizing a diabetes prevention behavior is difficult to realize, especially related to diet, physical activity, taking medication and monitoring blood sugar.<sup>14</sup> The intention has a close relationship with improving coping mechanisms. A good coping mechanisms from an individual can control an unpleasant situation and increase the intention to run a diabetes treatment program. With a good coping mechanisms, it will be able to control situations that can cause stress.<sup>15</sup> If individual stress has occurred it can cause a lack of individual intention to prevent diabetic foot ulcers.

### 4. Effect of intention on Foot ulcer prevention:

Figure 3 shows the influence of intention on the patient's actions to prevent diabetic foot ulcers.

Some patients report having strong intention in wound monitoring, and blood glucose monitoring as it is quite high. This is demonstrated by participating in activities related to diabetes in-service facilities. Respondents reported that in addition to being carried out in service facilities once a month, patients also performed physical activities at home once a week. Some respondents reported experiencing obstacles in carrying out routine blood sugar checks as a result of less cost. This reason is one of the causes of the decrease in the intention of some respondents in taking action to prevent diabetic foot complications. The intention to carry out a diet is reportedly done well in the form of maintaining a daily diet with reference to 3J, namely the amount, hours and types of food. Research conducted by Braver D.N.R et al. that a change in a patient diet-related to food intake, fruit fat and fruit intake is strongly influenced by the patient's intention to take precautionary measures. If patient's intentions are good, it will produce a preventative measure for diabetic foot ulcers.<sup>16</sup> This study is strengthened by Lestarina WN which shows there is a significant influence on the intention with adherence and injured preventive in the form of periodic blood sugar control.<sup>10</sup> To produce good intentions, several elements that are very influential are needed, including the main factors are knowledge and skills to conduct a behavior. The second factor is that there are no obstacles to taking action.<sup>17</sup> Barriers can be from around individuals including families, barriers to distant service areas. With these obstacles, family support is needed to increase the patient's intention to prevent diabetic foot ulcers.

### 5. Effects of coping mechanisms on diabetic foot complications prevention:

The results of Figure 1 show that there is an effect of coping mechanisms on diabetic foot ulcer prevention. Some respondents pointed out coping mechanisms in adaptive problem management. The adaptive response is indicated by examining a doctor or health care facility when experiencing signs of foot abnormalities. This shows the level of awareness of the complications is quite high. According to Okafor S.E., the importance of coping for individuals can improve behavior more adaptive to stress. The results of his study showed that good coping tended to show fewer depressive symptoms and increase positive behavior.<sup>18</sup> The results revealed that not all patients know the danger of diabetic foot ulcers, which lead to amputation. Some patients do not understand

that diabetic foot ulcers can be prevented by taking care of the feet. According to Pranoto A. Infection of wounds resulting from poor treatment causes gangrene in wounds caused by bacteria and aerobic clostridium. The degree of infection starts from first degree without infection to fourth-degree with severe infection accompanied by sepsis.<sup>19</sup> This is supported by research conducted by Amelia R. that good and correct treatment behavior in the feet can reduce the incidence of diabetic foot ulcers.<sup>20</sup>

### Conclusion

Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms and intentions.

**Conflict of Interest:** None

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# Association of Syphilis and HIV among Indirect Female Sex Worker in Indonesia: Secondary Data Analysis of Integrated Behaviour Biological Survey in 2015

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## Abstract

**Background:** Every day there are more than 1 million new cases of curable sexually transmitted infections (STIs) among people aged 15-49 years. Female sex workers (FSWs) are a key-affected population susceptible to acquiring HIV and sexually transmitted infections (STIs). Syphilis and human immunodeficiency virus (HIV) infections are diseases that can be transmitted through sexual contact, so it is not surprising that a person suffers from both at once. Syphilis was still considered an important cause of relation to the spread of infection HIV and it has been shown to increase HIV sexual transmission. The aim of this study is to determine the association of syphilis and HIV among IFSW in Indonesia in year 2015.

**Method:** This study was a cross sectional study with multistage random sampling (MRS) as a sampling method from Integrated Behaviour Biological Survey (IBBS) in 2015. The study was conducted 22 districts/cities in 11 provinces of Indonesia. The respondents were 1,678 IFSWs aged 15-49 years old who were interviewed and willing to blood rapid test to determine the HIV and Syphilis status and never been tested for the HIV.

**Results;** Study showed prevalence of HIV was 1.9% and prevalence of syphilis was 2.2%. Respondents with positive syphilis were significantly about 8 times more likely to get HIV infection (8.4; 95%CI: 3.2- 21.8; p-value <0.001). Respondents with positive syphilis that inconsistency of condom use were significantly about 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-56.7). The combination of syphilis, education, knowledge about HIV and age decreased the risk to 8.2 (3.2 – 21.6) with p-value <0.001. As stratified by age and education, all respondents with positive syphilis that younger less than 30 years were significantly about 15 times more likely to get HIV infection (PR=14.4; 95%CI 5.2 – 46.0).

**Conclusions:** There was association between syphilis positive and HIV positive. Respondents with positive syphilis that inconsistency in condom use, low education and younger less than 30 years were significantly increased the risk of HIV infection among IFSWs.

**Keywords:** *HIV AIDS; Syphilis; Condom; IFSW; IBBS.*

## Introduction

New HIV infections have been reduced by 40%

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since the peak in 1997. It has been estimated that there were approximately 37.9 (95% CI 32.7 to 44.0) million people worldwide people living with HIV in 2018; among them, 1.7 (1.4 to 2.3) million were new HIV infections. In Indonesia, HIV prevalence of people living with HIV among adults (15–49 years) was 0.4% and 46.000 people were newly infected with HIV and 38 000 people died from an AIDS-related illness<sup>[1,2]</sup>.

Indonesia's HIV epidemic is still concentrated

among specific key populations (direct and indirect female sex workers, people who inject drugs, men who have sex with men, transgendered people, and high-risk men. There has been a shift in the proportion of injection through injecting drug users (IDUs) as the primary mode of transmission to sexual transmission in Indonesia. Based on the IBSS 2015 result showed that prevalence of HIV was 60.6% through sexual behaviours<sup>[2,3]</sup>.

According to data released by World Health Organization (WHO), every day there are more than 1 million new cases of curable sexually transmitted infections (STIs) among people aged 15-49 years<sup>[4]</sup>. STIs spread predominantly through unprotected sexual contact, including vaginal, anal and oral sex. Furthermore, it has been well established that the presence of STI in sex partners increases significantly the rate of HIV transmission among sex partners. Reported cases of syphilis continue to be characterized by a high rate of HIV co-infection. According to the National AIDS Commission (KPAN), STI sufferers have 2-9 times greater risk of contracting HIV compared to non-sufferers.

Female sex workers (FSWs) are a key-affected population susceptible to acquiring HIV and sexually transmitted infections (STIs), as well as transmitting the virus to others. UNAIDS stated that the risk of acquiring HIV is 21 times higher for sex workers worldwide<sup>[1]</sup>. According to the results of a meta-analysis by Baral et al, 2012, FSWs were 13.5 times more likely to be infected with HIV than women of the same reproductive age in low- and middle-income countries<sup>[5]</sup>. Syphilis and human immunodeficiency virus (HIV) infections are diseases that can be transmitted through sexual contact, so it is not surprising that a person suffers from both at once. Syphilis was still considered an important cause of relation to the spread of infection HIV and it has been shown to increase HIV sexual transmission<sup>[6,7]</sup>.

Sex work has been defined as the provision of sexual services in exchange for money, goods, or other benefits. Sex work is usually classified as “direct” (open, formal) or “indirect” (hidden, informal). Direct FSW (DFSW) are typically women who do define themselves as sex workers and earn their living by selling sex. Indirect FSW (IFSW) are women for whom sex work is not the first source of income. They may work as waitresses, hairdressers, tailors, massage girls, street vendors, or promotion girls and supplement their income by selling sex on a regular basis or occasionally. They do not

consider themselves as sex workers and often work outside of known venues for sex work. Therefore, they are even more difficult to reach than women known as direct sex workers<sup>[8,9]</sup>.

The absence of relevant information association syphilis and HIV infection in IFSW populations in Indonesia makes the author feel the need to conduct this study in order to recommend effective interventions to reduce the prevalence of IFSW infected by HIV in Indonesia. Understanding the real situation and specific characteristics of IFSW, such as its socio-demographic characteristic would help the relevant stakeholder to implement stronger and more specific strategies, policies and programs. The aim of this study is to determine the association of syphilis and HIV infection among IFSW using the IBBS (Integrated Biological and Behavioural Surveillance) data in 2015.

## Method

This study is based on retrospective analysis of IBBS among IFSW. IBBS survey was cross-sectional in design with multistage random sampling (MRS) as a sampling method. Conducted in 22 districts/cities in 11 provinces of Indonesia. The study population in this study were female aged 15 years or older who have had commercial sex with at least one customer in the past month and were present at the survey site during the survey team visit at the selected survey area such as (bar, massage parlours, salon, etc.), never been tested for HIV prior to the survey and completeness of serological HIV and syphilis status. Totally there were 3.152 interviewed respondents. However, 1.475 respondent were excluded since they have HIV testing prior to the survey. The total number of respondents following both interview and HIV rapid blood testing were only 1.678 people.

A standardized structured questionnaire was used to collect information. The collection of information about behaviour and socio-demographic were done by interviews while the collection of biological data is done through venous blood collection. The syphilis examination was carried out with RPR and TP rapid while anti-HIV with rapid test. Collecting, editing and analysing data IBBS 2015 using software STATA (v.12, StataCorp). The effect between the independent and dependent variables in this study determined by Prevalence Ratio (PR) with confidence intervals (CI) 95% and estimated using Cox Regression Model in constant time. Final model with variables only showing significant associations with HIV (p-value <0.05).

**Ethical Considerations:** Ethical clearance for this study was obtained from the Research Ethical Committee Faculty of Public Health Universitas Indonesia (No: 129/H2.F10/PPM.00.02/2014).

**Results**

Of 3,153 respondents, we excluded 1,475 respondents since they ever been tested for HIV prior to the survey conducted. 1,678 completed HIV rapid serologic test and among those completed the test, 32 respondents (1.9%) were identified as HIV-positive individuals. Among 1,678 respondents who completed blood examination for sexually transmitted infections (STIs), 36 individuals (2.2%) were found positive for Syphilis, 397 individuals (31.5%) were found positive for Chlamydia, 147 individuals (11.9%) were found positive for Gonorrhoea. Most of respondents were aged <30 years (61.2%), high education (59.2%), Married/Divorced/Widowed (72.4%), currently living with friends/family/permanent partner or others (53.4%), have child (63.6%). (Data not shown).

Of the respondents, 88.2% had good essential HIV knowledge; 50.4% have perception of HIV susceptibility; 75.2% never had experienced Condom

Breakout within past 3 months; 54.2% had Alcohol consumption within past year; 65.7% of those had sexual contacts with commercial sex partner, did not use condom consistently; 88.3% had Vaginal Douching, 87.4% had Injected drugs within past year; 82.3% had never Attended a meeting or discussion related to HIV. (Data not shown)

We conduct stratification analysis of condom use consistency, education and age. As compared to consistency of condom use with commercial sex partner, all respondents with positive syphilis that inconsistency of condom use were significantly about 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-53.7). As compared to education, all respondents with positive syphilis that low education were significantly about 15 times more likely to get HIV infection (PR=14.9; 95%CI 3.7 - 60.2). However, all differences of PRs between strata were not significant but for consistency of condom use and education. As compared to age, respondents with positive syphilis that younger less than 30 years were significantly about 15 times more likely to get HIV infection (PR=15.4; 95%CI 5.2 – 46.0). The differences of PRs between strata were significant for the age stratification result. (Table 1).

**Table 1: Stratification Analysis of Syphilis and HIV Status**

Variable		PR Strata (95% CI)	PR Crude (95% CI)	Adjusted PR (95% CI)	P-value Test Homogeneity	ΔPR (%)
Consistency condom use with sex commercial	Inconsistent	12.7 (3.01 – 53.7)	8.3 (3.4 - 19.9)	7.8 (2.5 - 24.50)	0.379	6
	Consistent	4.4 (0.6 – 30.7)				
Education	Education High	5.9 (1.9 - 18.5)	8.3 (3.4-19.9)	7.9 (3.3-18.9)	0.312	5
	Education Low	14.9 (3.7 - 60.2)				
Age	< 30 years	15.4 (5.2-46.0)	8.3 (3.4-19.9)	7.4 (3.1-17.7)	0.119	12
	≥ 30 years	4.1 (1.002-16.7)				

The two different models of multivariate analysis adjusting for relevant potential confounders showed consistent positive associations between syphilis infection and occurrence of HIV infection. The adjusted PRs of the two models of associations for the syphilis infection were 7.7 (95% CI: 2.1-28.5) and 7.5 (95% CI: 2.5 – 22.9) respectively. (Table. 2).

**Table 2: Cox model of association between Syphilis and the HIV infection**

Model	PR (95% CI)	P-Value
<b>Model 1 (Full/ Initial Model):</b> Syphilis, Gonorrhoea, Age, Education, Marital Status, Knowledge Of HIV, Consistency Condom use With Sex Commercial, Injected Drug, Condom Breakout, Perception of HIV Susceptibility	7.7 (2.1-28.5)	0.035
<b>Model 2 (Reduced/Final Model):</b> Syphilis, Gonorrhoea, Age, Education, Marital Status, Knowledge of HIV, Injected Drug	7.5 (2.5 – 22.9)	0.003

## Discussion

From 3,153 respondents, we excluded 1,475 respondents since they had ever been tested for HIV prior to the IBBS survey. This was done to assure temporal sequence between the behaviours as the risk factors and the HIV status as the outcome. In this study we found that the prevalence rate of HIV among eligible participants was 1.9% and prevalence rate of Syphilis among eligible participants was 2.2%.

In this study, we found heterogenous effects of Syphilis towards HIV infection, across strata/ categories of variables of condom use consistency, education and age of respondents, although the heterogenicities across strata were not statistically significant. Respondents with positive syphilis who inconsistently used condom were significantly 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-56.7), while respondents with positive syphilis with consistent condom use were significantly 4 times more likely to get HIV infection (PR=4.4; 95%CI: 10.6.0-30.7). Several studies in other countries show similar patterns<sup>[10,11,12,13]</sup>. Research conducted by Isac et al. India, showed that the prevalence of HIV infection and high-titre syphilis among FSWs have steadily declined with increased condom use<sup>[14]</sup>.

Syphilis is a disease caused by the bacterium *Treponema pallidum*. Actually, the mechanism of *T. pallidum* coinfection and HIV cannot be fully understood, but many experts believe that the coinfection begins with *T. pallidum* infection<sup>[15,16]</sup>. Syphilis transmission is possible due to inoculation of abrasion due to sexual contact resulting in skin or mucous layer erosion, and then after a period of time it will produce inflammation and genital ulcers which are important factors for HIV transmission. This event is followed further by the spread of *treponema* through regional lymph nodes and hematogenously through blood stream to other parts of the body<sup>[15,16]</sup>. Syphilis and HIV infection are both transmitted sexually diseases. Other studies demonstrated that STIs including syphilis was associated with an increased risk of HIV acquisition<sup>[17,18]</sup>.

The reduce models of our multivariate analysis, adjusting for several relevant potential confounders such as Gonorrhoea infection, Age, Education, Marital Status, Knowledge of HIV, Drug injection, showed consistent positive associations between syphilis infection and occurrence of HIV infection. The adjusted PRs of the reduce/ final model of associations between syphilis and HIV infection was 7.5 (95% CI: 2.5 – 22.9) with p-value

0.003.

We found respondents with positive syphilis with age less than 30 years were significantly 15 times more likely to get HIV infection (PR=15.4; 95%CI: 5.2–46.0). However, the differences of PRs between strata were not significant. Similar results were reported by other studies conducted by Medhi et al, showing that young age possessed high vulnerability to STIs including to Syphilis<sup>[17]</sup>. Unlike our results, Halatoko et al. in Togo, found that FSWs aged 30 and over were 5.95 times more likely to be infected with Syphilis<sup>[18]</sup>. This result could be partly explained due to preventive behaviours practised by the individuals as their age increased. Our study indicated that many infected individuals did not know their infection status, engaged in high-risk behaviours and practices, and perceived themselves as having low risk of HIV infection. They were more likely to spread the virus to their clients and sexual partners. Targeted HIV prevention and treatment programs should be urgently developed and implemented for this IFSW population.

Limitation of the study is self-reported of risk factor may lead respondents to over-reporting the condom use. Self-reported sexual behaviour in the face of social stigmatization and discrimination (toward FSW) might have led to social desirability bias.

## Conclusions

There was association between syphilis and HIV infection. Syphilis infection increased the risk of HIV. Respondents with positive syphilis having inconsistency in condom use, low education and younger than 30 years were significantly increased the risk of HIV infection. Integrated prevention program is really needed considering that both Syphilis and HIV could be prevented in almost similar way. The HIV program need to reach IFSW in their earlier age, as they are more vulnerable to HIV infection during that very active sexual period.

**Conflict of Interest:** The authors declared that no competing interest.

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# The Knowledge of the Use of the Contraceptive Method among Married Men with Fertility Age 15-54 Years (Analysis of IDHS 2017 Data)

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## Abstract

**Context:** The use of contraceptive is one of programs to suppress birth rate in some countries. To complete the target of Sustainable Development Goals (SDG) in 2030, some programs are launched and one of them is family planning initiated by Indonesian government, namely Keluarga Berencana (KB). The program has been implemented since 1970 until now. The KB program has got changes and innovation. Nowadays, the impact of the KB program has shown the good result where the fertility of Indonesian population is getting decreased to 2.3 based on World Population Data Sheet. However, among the success of the program, the program has many problems in Indonesia. The study aims to know and to determine whether there is an influence of knowledge about contraceptive method with the men's fertility marked by owning some children, based on the result of Indonesia Demographic Health Survey (IDHS) in 2017. The study used secondary data from the result of IDHS 2017 and cross sectional study. The study used secondary data from the result of IDHS 2017 with 9668 samples which are married men. Multivariate analysis of the study was Logistic Regression Analysis. The multivariate analysis shows that the related variable means variable of knowledge about contraception with OR value, 3.90 after getting controlled by variables of age, education, and wealth. Based on the results of multiple logistic regression analysis, knowledge about contraception method is significantly related to fertility.

**Keywords:** Knowledge; Contraception; KB program; IDHS

## Introduction

Nowadays, the growth of population in the globally is getting increased, especially in developing countries where the population growth increasing fast. It is contrast to the mature of the young population as productive age to fulfill the standard living related to the work, income, consumption patterns, and so on. To solve the increase of population rate in the world, whole world has cooperated and established an agreement, namely Sustainable Development Goals (SDG) that launched in 2018 and hopefully realized in 2030. Indonesia has program to suppress the birth rate and it has been implemented since 1970.<sup>(1)</sup> The government of Indonesia has given reaction to the problem and overcomes it through the planning family program, namely Keluarga Berencana (KB).<sup>(2)</sup> In implementing the program to the society, there is the concept of Norma Keluarga Kecil Bahagia dan Sejahtera (NKKBS)

applied. Based on Law number 52 of 2009 concerning population development and family development states that family development is an effort to create a quality family that lives in a healthy environment; where child birth is regulated, the ideal distance and age for birth, regulating pregnancy, through the process, protection and assistance in accordance with reproductive rights to create quality families. The success of KB program can also be found out from the decrease of Total Fertility Rate (TFR) in Indonesia based on SDKI data in 1991. The TFR of Indonesia in 1991 was decreasing 3 times continuously on subsequent surveys.<sup>(3)</sup>

Based on the latest data (SDKI 2017 data), TFR of Indonesia in on 2.3. SDKI data in 2012 showed that the trend of the contraceptive prevalence has tended to increase since 1991-2012 (3.0-2.6) while the trend of fertility rate of TFR tends to decrease. The trend indicates that the increasing of national fertility rate did

not fulfill the target of Indonesian TFR. Comparing to the Rencana Pembangunan Jangka Menengah Nasional (RPJMN) target in 2014, contraceptive prevalence rate (CPR) has exceeded the target with the achievement of 61.9%, but the TFR has not reached the target yet.<sup>(4)(5)</sup> In spite of the decreasing target from 2012-2017 (2.6 to 2.3), it has reached yet the target set by the government is 2. The high birth rate in developing countries is enable to be explained by various factors included: the absence and the low of education level, gender inequality, the high mortality rate, child labor, and the ineffective use and awareness of modern contraception.<sup>(6)(7)</sup> The problem related to the knowledge and eastern culture where everything is dealt with by the household is the responsibility of the wife and the husband responsibility is to earn money for living; and whether it is also related to the knowledge and the attitude of husband who does not pay attention about the use of KB contraceptive as the control of birth declared by the government; or there is perception that the problem is the business of the wife.<sup>(8)(9)(10)</sup> Therefore, the researcher is interested to conduct the study to find out the relation between the knowledge of contraception method among merried men with fertility at the age of 15-54.<sup>(11)</sup>

**Subjects and Method**

The research design was a quantitative study and used secondary data of SDKI 2017 data. The subjects of the study were married men who were 15-54 years old and were samples of SDKI 2017. The recapitulation result of early study were 10.009 men, after getting cleaning data, the samples were 9668 men who got further processing data. The analysis method of the study was multiple logistic regression analysis.<sup>(12)</sup>

**Results**

**Table 1: The characteristic of respondent**

Characteristic	Categories	N	Percentage (%)
Age	15-34	3026	31,3
	35-54	6642	68,7
Education	No education-Secondary	8221	85,0
	Higher	1447	15,0
Residence	Urban	4921	50,9
	Rural	4747	49,1
Wealth	Poorest- poorer	3853	39,9
	Middle - Richest	5815	60,1

Characteristic	Categories	N	Percentage (%)
Knowledge of contraception	No	112	1,2
	Yes	9556	98,8
Perception of men about contraception	Disagree	6205	64,2
	Agree	3463	35,8
Fertility	< 1	646	6,7
	≥ 1	9022	93,3

The table of characteristic of respondent showed there were 9668 respondents where the most respondent were 6642 respondents of age 35-54 years old (68,7%). Most respondents also have education in elementary school-senior high school, 8221 respondents (85,0%). Besides that, respondents living in the rural place are 4747 (49,1%). Moreover, most respondents have economic status are average-rich, 5815 respondents (60,1%). Most respondents also have knowledge about good contraceptives, 9666 (98,8%). Furthermore, almost respondents do not agree that contraceptives are women business as many as 6205 respondents (64,2%); and fertility marked by owning children and the respondents have ≥ 1 children, 9022 respondents (93,3%).

**Table 2: Chi-Square Test (Bivariate selection)**

Variables	P-Value	Odds Ratio
Knowledge of KB program	0,001	4,025
Residence	0,264	0,883
Wealth	0,150	1,190
Education	0,000	1,688
Age	0,000	0,180
Perception of KB program	0,318	0,892

**Table 3: The model of the early analysis of multiple logistic regression**

Variables	Early P-Value	Early Odds Ratio	CI 95 %	
			Lower	Upper
Knowledge of KB program	0,001	4,025	1,745	9,281
Residence	0,264	0,883	0,710	1,098
Wealth	0,150	1,190	0,939	1,508
Education	0,000	1,688	1,298	2,195
Age	0,000	0,180	0,146	0,220
Perception of KB program	0,318	0,892	0,713	1,117

Table 2 showed the result of the bivariate selection on each variable by noticing the result of p-value on each



variable that there were 4 variables which were enable to go to the next step of multivariate with p-value, such as: variables of knowledge of KB program, wealth index, education, and age.

**Table 4: The model of the final analysis of multiple logistic regression**

Variables	Final P-Value	Final Odds Rasio	CI 95 %	
			Lower	Upper
Knowledge of KB program	0.001	3,900	1,68	9,00
Residence	-	-	-	-
Wealth	0.038	1,262	1,01	1,57
Education	0.000	1,738	1,34	2,25
Age	0.000	0,180	0,14	0,22
Perception of KB program	-	-	-	-

Multivariate analysis used logistic regression analysis. The results of analysis showed that variables related to fertility were the variable of knowledge about contraception method (p-value). Besides that, covariate variables also having impact to fertility were wealth, 0.038 (p-value <0.05); education, 0.000 (p-value <0.05); and age, 0.000 (p-value <0.005). The result of analysis on final Odds Ratio (OR) each variable were the variable of knowledge (3.90), the variable of wealth (1.26), the variable education (1.73), and the variable of age (0.18).

## Discussion

Based on the results of multivariate analysis with multiple logistic regression analysis, the knowledge about the contraception method was significantly related to the fertility of men with p-value <0.05 and OR value 3.90. It means that men having low knowledge about the types of KB program method have ratio of 3.90 times to have more children than the men having the knowledge about the types of KB program method. Other controlled variables, they have significantly good value where p-value <0.05 with OR of each controlled variable. The variable of wealth is OR value of 1.26 where men whose high wealth only have ratio of 1.26 than the men whose low wealth. The men whose high education have ration of 1.73 times to have more children than the men not whose high education. The men who are >35 years old have ratio of 0.18 to have high fertility than the men who are <35 years old. Moreover, the variables of perception about KB program and residence do not significantly give the impact because the p-value >0.05.

The high birth rate in developing countries is enable to be explained by various factors included: the absence and the low of education level, gender inequality, the high mortality rate, child labor, and the ineffective use and awareness of modern contraception.<sup>(6)</sup> The control of high birth rate is not only concerned by health workers, but also all parties involved, a married couples (husband and wife) on how to find out the useful information by participating the programs held by the government through health public, especially to the couples of childbearing age about knowledge and health education related to the use of contraceptives devices and the important method of contraception.<sup>(13)</sup> Therefore, the main purpose of the research is to find out or to identify whether there is an influence of knowledge about contraceptive method with the men's fertility as preventive service to the society through various health education about KB program as the preventive step on how the couples of childbearing know the important of couples commitment related to the use of KB program in controlling birth. The birth rate is not only the responsibility of health workers but also it is responsibility of couples (husband and wife) as the main actor.<sup>(14)</sup> If couples and health workers are able to cooperate, it is not impossible that the birth rate in Indonesia can be at a set standard so that it will have a good impact on the quality of human resources in various of life. The knowledge of contraception method is interfered by wealth, education, and age variables with the statistically significant result and the value of OR showed the effects of the variables. The study used secondary data of SDKI 2017 data so that it had several limitations such as the existence of bias (random error and systematical error) and the limitation research variables. Besides that, there were some respondents who did not answer the question, so that researcher excluded them because they were not included to inclusion criteria what the researcher wanted.

## Conclusion

The result of study is the data which is useful to describe the characteristic from knowledge level to the perception of KB program. Based on the results of multiple logistic regression analysis, knowledge about contraception method is significantly related to fertility. Suggestions for this problem, the increasing of preventive efforts by cooperating with community leaders or stakeholder in the regions in some activities/ events, even formal activities (school, health service, and so on) and informal activities (social media, influencers, and so on); socialization and education must

be kept doing in the whole region of Indonesia in efforts to promote health and health education about the use of contraception method by providing more concerned counseling to the couples of the childbearing age.

**Conflict of Interest:** The Authors declare no conflicts of interest

**Source of Funding:** Self

**Ethical Clearance:** The use of the IDHS 2017 data has got permission/license from BKKBN (the state institutions BKKBN as a representative of the Indonesia government administering the IDHS 2017) via online/website of IDHS 2017. It is also approved to get access the data in March 31<sup>st</sup> 2019.

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# Preliminary Study: Reliability and Validity of CFM-1 Form as Physical Literacy Assessment Instrument

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## Abstract

**Context:** This study aimed to determine reliability and validity of newly developed physical literacy assessment instrument named CFM-1. For the inter-tester reliability sixty two respondents (37 males, 25 females) aged  $21.97 \pm 0.54$  years old with 2 years basics sports science background voluntarily participated. All respondents were given detailed explanations on CFM-1 instrument, and introductory on physical literacy using the online module developed. Respondents were shown videos of similar action (throwing) but from five different children aged 5-6 years old. Upon completing the viewing, respondents were then asked to rate the performance of the child in the video using CFM-1 instrument. Similar protocol was repeated with all the respondents for the second time. CFM-1 rating given by the respondents were then recorded and analyzed. Validity was determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide. Results showed for reliability, Cronbach's Alpha  $\alpha$  was 0.767 for motivation, 0.524 for knowledge, 5.733E-14 for confidence, 0.475 for understanding and 0.712 for overall physical competence. For physical competence Likert Scale of 1-5, reliability Cronbach's Alpha  $\alpha$  was 0.826. The CFM-1 instruments can be said as reliable to be used for physical literacy assessment, with good reliability observed for all psychomotor and affective domain of learning involved, but some modification in term of the method of testing may need to be clarified and adjusted (especially for the cognitive part of the test - knowledge and understanding). Overall CFM-1 is valid and has an acceptable range of reliability level as an instrument for physical literacy.

**Keywords:** *physical literacy, childhood, adulthood, assessment, reliability*

## Introduction

Physical literacy is not a new concept. In fact, physical literacy should be considered as the essence of physical education for all age groups. Widely accepted definition of physical literacy consist the element of motivation, knowledge, confidence, understanding and physical competence when performing any physical activity or exercises<sup>1-6</sup>.

An individual can be said as physically literate when they have the motivation to consistently pursue physical activity. At the same time that motivation is supported by the know how or knowledge, which will ensure the activity perform is safe, correct technique and effective. With the knowledge, then it will contributes towards the confidence in doing the skill and understanding on why it should be done. With all those four elements, then it comes to the psychomotor and physical ability in ensuring the movement can be performed with competence. When an individual possess all of this, the assumption is that they will be able to be active for life. This is physical literacy by definition.

Based on those definition, one can actually start to assess and monitor their physical literacy level. There are several studies that have quantify the reliability

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and validity of instruments for physical literacy assessment<sup>7-12</sup>. However, the number of studies currently still limited in numbers, with many more improvements can be done with all the instruments.

One of the limitation of the currently available instruments is that it is limited in term of usage, where it can only be used with specific types of movement and for certain age group only. This limitation may be due to the fact that most of the instruments accept the understanding that physical literacy is only for children, at the beginning phase of their physical growth.

For the purpose of this study, the accepted understanding is that physical literacy is something that should not be limited only to early childhood<sup>13</sup>. Thus the instrument developed and tested is actually to be used from childhood up to adulthood. One part of physical literacy is physical competence, and physical competence in any movement or activity will have their progress or digress period. Can we said that an older adult which used to be competitive athletes but now unable to even perform simple hop as still physically literate?

Physical literacy also should not be limited only to fundamental movement skills (FMS) such as running, jumping, hopping and many more. But it should be dependable on what is the goal or purpose of the movement or activity.

For these reasons, a new instrument has been developed with code named CFM-1. In order to determine it reliability and validity, this study was conducted.

### Method

#### Experimental Approach to the Problem:

**Reliability:** The test-retest method was used to determine the inter-tester reliability of the CFM-1 instrument.

**Validity:** Validity was determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide.

### Penilaian Celik Fizikal Malaysia (CFM1)

NAMA PENUH / FULL NAME

---

TELEFON / PHONE

---

EMAIL

---

TARIKH LAHIR / DATE OF BIRTH

---

TARIKH UJIAN / TEST DATE

---

TINGGI / HEIGHT (cm)

---

BERAT / WEIGHT (kg)

---

JENIS UJIAN FIZIKAL / TYPE OF PHYSICAL TEST

---

#### MOTIVASI / MOTIVATION



#### PENGETAHUAN / KNOWLEDGE



#### KEYAKINAN / CONFIDENCE



#### KEFAHAMAN / UNDERSTANDING





**Motivasi:** Peserta kelihatan (visual) dan mengatakan (verbal) bahawa mereka amat bersemangat/bermotivasi mahu melakukan lakuan / pergerakan berkenaan.

**Pengetahuan:** Peserta tahu bagaimana untuk melakukan lakuan atau pergerakan tanpa sebarang panduan kecuali dengan melihat contoh lakuan.

**Keyakinan:** Peserta memaklumkan tanpa paksaan dan tanpa ragu-ragu bahawa mereka yakin untuk melakukannya.

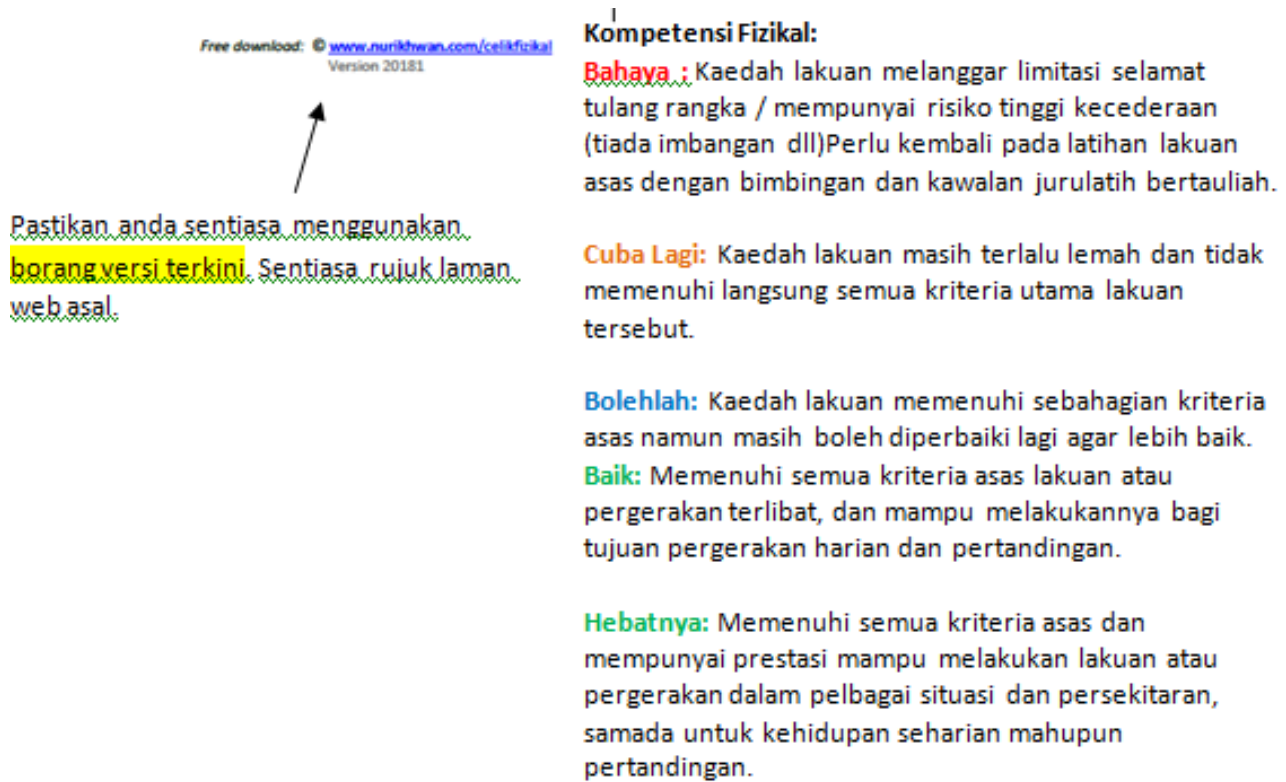
**Kefahaman:** Peserta faham objektif lakuan berdasarkan pernyataan verbal mereka dan cubaan/kemampuan mereka melaksanakan arahan lakuan/pergerakan hingga selesai.



**Subjects:** Sixty two respondents aged  $21.97 \pm 0.54$  years old with 2 years basics sports science background voluntarily participated. Out of the 62 respondents, 37 were male. All participants were still active in sports participation either recreationally as an athlete or in coaching positions (personal trainer / assistant sports coach etc).

**Instrument:** The newly developed physical literacy assessment form name CFM-1 (dual English and Malay language) and Malay language physical literacy module<sup>14</sup> were used. Five videos recorded by the researcher's showing actual overhead ball throwing action by children aged 5-6 years old were used together with the CFM-1 form. The video also includes the verbal communication process happening between the children and the instructors (researchers' team).

**How to use CFM-1:**



**Figure 1: On the left is the original CFM-1 form, and on the right is the CFM-1 form with usage instructions.**








**Procedures:** For the reliability assessment, all respondents were given detailed explanations on CFM-1 instrument, and introductory on physical literacy using the online module developed. The respondents were then given the opportunity to ask any questions pertaining to their understanding on the explanations. After all respondents confirms their understandings, they were then shown videos of similar action (overhead ball throwing) but from five different children aged 5-6 years old. Upon completing the viewing, respondents were then asked to rate the performance of the child in the video using CFM-1 instrument. Similar protocol was repeated with all the respondents for the second time within 15 days time interval. CFM-1 rating given by the respondents in both occasions were then recorded and analyzed.

**Ball throwing action:** General guidelines given to all respondent is that the rule of thumb for overhead ball throwing is the success of the child to throw the ball towards the next person waiting to catch it in front of them. Second to that, an excellent throw will means the ball reach the intended destination and person with appropriate ball speed and target (within range direct to

hand for easy catch). Thirdly, the mechanics of throwing performance should not violate any proper biomechanics of movement in relation to musculoskeletal function and form. And fourthly, the most excellent throw should incorporated whole body motion indication transfer of force direct from the ground (ground reaction force) towards the throwing hand.

Validity was only determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide<sup>1,4,6,8,15</sup>.

**Data Analysis:** The CFM-1 utilized the thumbs-up and thumbs down icon for five overall assessment related to motivation, knowledge, confidence, understanding and physical competence. More comprehensive ratings on physical competence were also asked using five smiley faces depicting five qualitative ratings, which were then assigned into Likert Scale rating system. Figure 2 indicates how the qualitative assessment icons be made into quantitative values. All quantitative values were then recorded in a Microsoft Excel sheet for further statistical analysis.

Qualitative Icon	Quantitative Ratings	Qualitative Respond	
	2 marks	Yes.	
	1 marks	No.	
			<b>Likert Scale</b>
	1 marks	Danger	<b>Strongly disagree</b> with the ability to perform the action safely and effectively.
	2 marks	Try Again	<b>Disagree</b> with the ability to perform the action safely and effectively.
	3 marks	Acceptable	<b>Slightly Disagree</b> with the ability to perform the action safely and effectively.
	4 marks	Good	<b>Agree</b> dengan with the ability to perform the action safely and effectively.
	5 marks	Awesome!	<b>Strongly agree</b> with the ability to perform the action safely and effectively.

**Figure 2. Marking system for CFM-1 form. Qualitative ratings descriptors with their respective quantitative ratings**

**Statistical Analysis:** Means and standard deviations were used to represent centrality and spread of data for all performance measures. The intra-class correlation (ICC) one-way random analysis was used to determine the inter-rater reliability when performing assessment using CFM-1 form together with Cronbach’s Alpha to measure internal consistency between all of respondents.

**Results**

First time assessment with scale of 1 (YES) or 2 (NO), for throwing action respondents mean ± standard deviation’s rating was 1.87 ± 0.34 for motivation, 1.76 ± 0.43 for knowledge, 1.98 ± 0.13 for confidence, 1.94 ± 0.25 for understanding and 1.87 ± 0.34 for overall physical competence. For physical competence Likert Scale of 1-5, with 5 most excellence, the first session’s rating was 3.71 ± 0.55.

For the second time assessment, respondents’ average rating was 1.89 ± 0.32 for motivation, 1.74 ± 0.44 for knowledge, 2.00 ± 0.00 for confidence, 1.89 ± 0.32 for understanding and 1.76 ± 0.43 for overall physical competence. For physical competence Likert Scale of 1-5, with 5 most excellence, the second session’s rating was 3.68 ± 0.59.

For reliability, Cronbach’s Alpha α was 0.767 for motivation, 0.524 for knowledge, 5.733E-14 (ICC single and average measures = 0.000) for confidence, 0.475 (ICC = 0.309 single measures, 0.472 average measures) for understanding, 0.712 (ICC = 0.525 single measures, 0.689 average measures) for overall physical competence.

For physical competence Likert Scale of 1-5, reliability Cronbach’s Alpha α was 0.826 (ICC = 0.707

single measures, 0.828 average measures). The CFM-1 also has been found valid to be used for physical literacy assessment purposes.

**Table 1**

Domains	Session 1 Mean ± SD	Session 2 Mean ± SD	Cronbach's Alpha α	ICC	
				S	A
Motivation	1.87 ± 0.34	1.89 ± 0.32	0.767	S	0.626
				A	0.770
Knowledge	1.76 ± 0.43	1.74 ± 0.44	0.524	S	0.362
				A	0.531
Confidence	1.98 ± 0.13	2.00 ± 0.00	5.733E-14	S	0.000
				A	0.000
Understanding	1.94 ± 0.25	1.89 ± 0.32	0.475	S	0.309
				A	0.472
Physical Competence	1.87 ± 0.34	1.76 ± 0.43	0.712	S	0.525
				A	0.689
Comprehensive Ratings for Physical Competence	3.71 ± 0.55	3.68 ± 0.59	0.826	S	0.707
				A	0.828

\* S=ICC single measures; A=ICC average measures

Table 1. Average ratings given by respondents to the overhead ball throwing performance for one single video selected out of five videos for the purpose of this test. For this study α coefficient between 0.65 and 0.8 is considered as “Good”, with below 0.5 considered as “Unacceptable”. For ICC values: < 0.5 poor reliability, values between 0.5 and 0.75 moderate reliability, values between 0.75 and 0.9 good reliability, and values greater than 0.90 indicate excellent reliability.

**Discussion and Conclusion**

Out of all six test items listed in Table 1, the “Understanding” item’s reliability level based on Cronbach’s Alpha is the lowest and below acceptable level. This indicates that current method of use for CFM-1 need to be improved and rectify as it seems not able to determine the understanding domain of physical literacy. Understanding level was determined by asking questions such as “Do you know why we need to do this?” and/or “Do you know how to do this?”. However, as it was verbally asked with some on-site modifications by the tester in order to make it understandable to the involved very young kids, it may have been hard to be interpreted (either they understood or not, as not every kids will answer directly yes or no) by respondents that watch the video of the communication happening shortly prior the activity. Due to this, CFM-1 form may not be reliable enough to assess understanding level among 5-6 years old children.

As for the comprehensive physical competence which was based on 5-level Likert scale, the reliability level can be considered as excellent. For other items rated based on thumbs-up (yes = 2-points) or thumbs- down (No = 1-point) icon, the overall physical competence and motivation domains showed good level of reliability. The knowledge domain on the other hand, indicated that it has a very low level of reliability, nearly falls in the same reliability level as “understanding” domain. Again, it may in the end depends on the acceptance or perception of the respondent (tester), on what constitute as knowledgeable. Some may assume that able to perform or able to say yes or nodded their head will simply means they have the knowledge, but others may be looking for more comprehensive assessment of knowledge.

In conclusion, the CFM-1 instruments can be said as reliable to be used for physical literacy assessment, with no problems in term of reliability observed for all psychomotor and affective domain of learning, but some modification in term of the method of the test be conducted may need to be clarified and adjusted (especially for the cognitive part of the test - knowledge and understanding).

**Practical Applications:** The CFM-1 instruments when used to assess literacy level in any types of physical movement or exercise or activity, should always be accompanied by itemized criteria of what can be said as a excellence performance level for it.



This criteria can either be obtained from any resources related to that particular movement or activity, or can be developed by the assessor based on their own experience and knowledge. Most important to always ensure that the goal of the movement is clearly accepted and understood by the assessor and the participant. The used of quantitative marking system is not compulsory to be used, as if the records are kept based on actual CFM-1 form provided, future quantitative statistical analyses is always possible. Marking system for thumbs up and thumbs down in future will be changed into 1 and 0, instead of 2 and 1 marks. This makes it easier for tester to use as it goes well with qualitative description which said yes or no.

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**Conflict of Interest:** Nil.

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# Perceived Dimensions of Service Quality on Patient Satisfaction and Loyalty in Healthcare Context: A Systematic Approach

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## Abstract

**Context:** This research demonstrates a model for conducting an empirical study in the health clinic to enhance the efficiency of service quality. The aim of this research is to systematically identify and review structural effects of service quality on patient satisfaction and loyalty in healthcare context. The method of this research followed the guidelines of the PRISMA statement. The search was conducted in Scopus database between 2010 and 2019. The studies included 27 articles for the synthesis. The results found that several number of service quality dimensions on patient satisfaction and loyalty were investigated. Therefore, this study is focused on four dimensions: infrastructural quality, procedural quality, interactional quality and personnel quality. This research also suggested the structural relationship model between service quality dimensions on patient satisfaction and loyalty in health clinic. The article concludes with suggested future research work.

**Keywords:** *Conceptual framework, healthcare, patient loyalty, patient satisfaction, service quality.*

## Introduction

Improving the quality of healthcare services has become an important and critical issue, many hospital managers are working to improve the quality of healthcare. The 11th Malaysia Plan 2016-2020 states that the standard and the quality of healthcare will be further enhance and improve system delivery for better health results. However, according to study by (1) stated that the healthcare industry continuously faces inefficient management system, administrative inefficiency, inadequate human resources and steep regulatory compliance. When searching for ways to enhance service quality and to select the best choice, it is essential to consider infrastructure, processes, people and policy criteria (2).

In order to look for acute care with high expectations of quality health services, the healthcare industry needs to find ways to ensure excellence in delivering performance and patient satisfaction(3). Therefore, these challenges are necessary to maintain high standards of care and handle services performance. Patient satisfaction is an

important element in the healthcare quality and a major indicator of achievement in the medical sector(4).

In the healthcare industry, health clinics in Melaka provide the same kinds of service, but they are distinguished based on the quality of service. Patient loyalty to health clinic is therefore a significant promotional instrument for sharing service quality in Melaka's health clinic with other people. According to (5), the emphasis on loyalty is growing because patient satisfaction leads to an rise in the organizational image. While the connection between the ideas in question, there is a gap in marketing literature linked to the effect of service quality aspects on patient satisfaction, loyalty to health clinics, particularly in the healthcare industry.

The providers of healthcare can be classified in primary, secondary and tertiary care (6). The main health centers, community health centers and district hospitals are typically primary and secondary organizations. Many researchers have studied the healthcare service in hospital. However, not much work has been done to determine the quality of healthcare services in

terms of infrastructure, procedures, international and clinical staff. This service quality is intended to assess the quality of service perceived by the customer. As a results, Melaka's health clinic is considered primary health centers to address this gap.

**The purpose of this research is to systematically identify and review the following:**

- Structural dimensions of service quality on patient satisfaction and loyalty in healthcare context.
- To develop a future research model of the service quality in healthcare context on patient satisfaction and patient loyalty

### Methodology

**Reporting Systematic Review:** In order to collect significant information for the determination of healthcare service quality dimensions in the literature, this study have developed according to the Preferred Reporting Items for Systematic review and Meta Analyses (PRISMA) guidelines and flow diagram by(7) as shown in Figure 1. The process involved steps such as identification process, screening process, eligibility criteria and the final selection of articles.

**Identification Process:** This section includes selection of records using various database searched and additional records through other sources. Other resources included relevant studies recommended by experts. A systematic search using database such as Emerald insight, Science Direct, Taylor and Francis, IEEE and Springer that are in Scopus and Web of Science index was carried out. Criterion of time duration was based on the limited knowledge between year 2010 and 2019. The following key terms were used for search purposes: healthcare service quality; health quality; health service; primary healthcare and/or patient loyalty.

**Screening Process:** For the screening process, PRISMA guidelines were followed which checked the database search outcomes for duplication using Mendeley software. Every duplicate item has been removed. Abstracts have been read, and full- text surveys have been thorough.

**Eligibility Criteria:** The articles using quantitative, qualitative or mixed method studies were considered

for systematic review. However, combined keywords were used to narrow the search which only included English language and peer-review article. Studies were also selected if they complied with each of the following criteria:

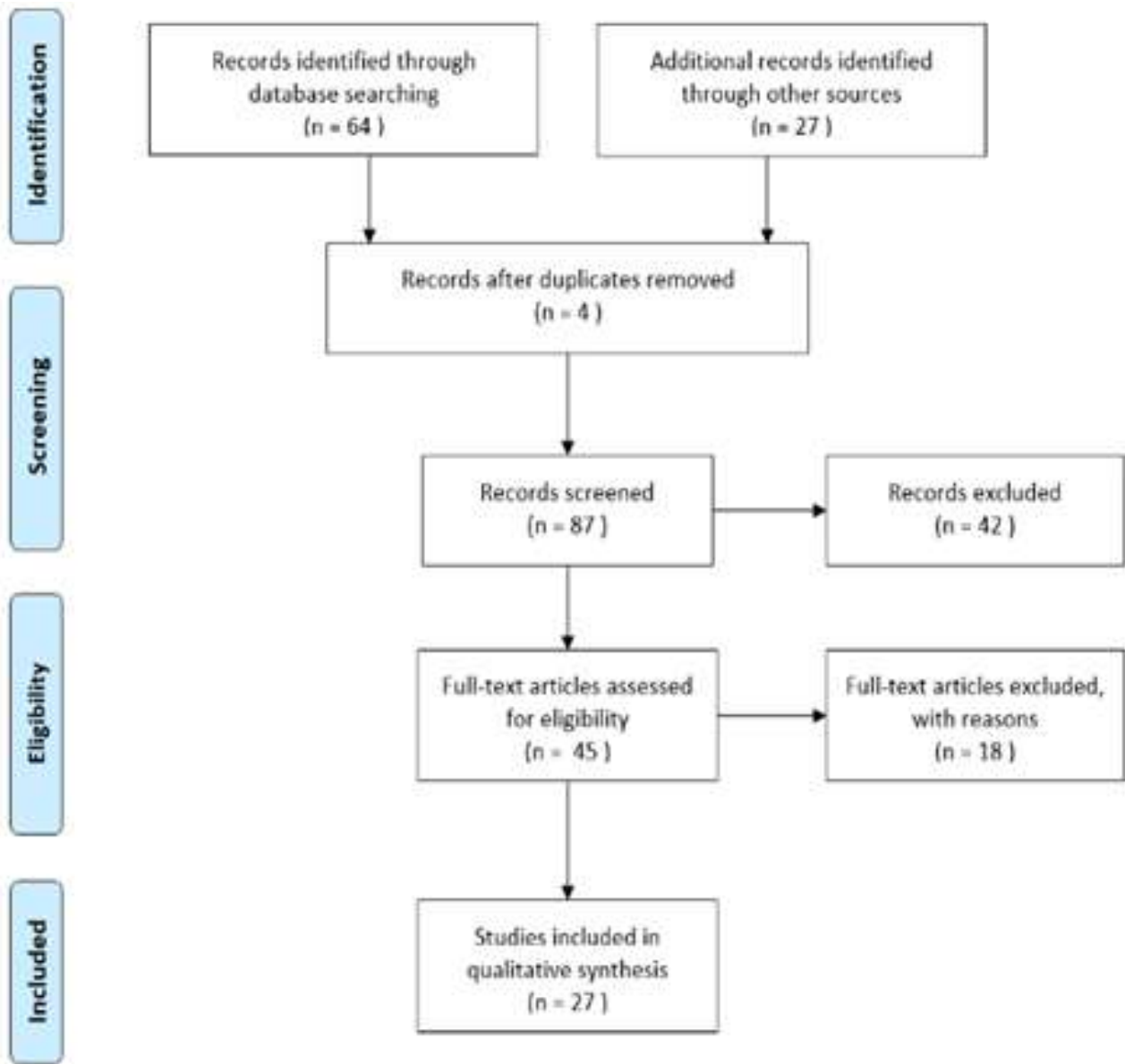
1. Focusing on measuring dimensions of service quality of healthcare
2. Tested any theoretical framework related to patient satisfaction and loyalty
3. Assessed any association between health service quality, patient satisfaction and patient loyalty
4. Discussing models or instruments or tools used for measuring service quality in healthcare
5. Addressing development or application of a measurement tool or model or instrument and referring to the primary healthcare.
6. Availability of full access by the researcher

Studies that were not considered for this review include organizational reports, editorials, book chapters, reviews, comments, conference abstracts or proceedings and letters that can suffer less rigorous review processes. Moreover, excluded studies that did not mention precise sampling technique adequately, studies of patient satisfaction or loyalty with specific health diseases or facilities and studies highlighting hospital performance that did not contain empirical evidence.

**Data Analysis:** A summary of the included studies' characteristic was described. This study did not attempt to collect the data for a meta-analysis. Data have therefore been narratively synthesized. Therefore, for better comparison of studies, an evidence table was manually generated.

### Results and Discussion

**Selection of Articles:** Studies that did not meet the eligibility criteria or not relevance to the present study were excluded from the next stage of review. Moreover, studies of which full texts were not found were excluded from this stage. Then, detailed information on the service quality dimensions in healthcare context and development of measurement instruments were obtained.



**Figure 1: A Flow Diagram of study selection**

**Findings:** The initial searches in this study identified 64 titles and abstracts. Some 4 articles were duplicates owing to the same articles emerged in the selected database. Then, this study had 87 titles and abstracts for the eligibility criteria after elimination of the duplicates. 42 articles were removed from the list of eligible. This study retained 45 potentially eligible full articles and the eligibility criteria were applied. Moreover, the approach to service quality dimensions was applied to all the full articles to check the instruments. This study included 27 articles for the synthesis and the remaining articles (n = 18) were excluded due to did not mention precise sampling technique adequately, studies of patient

satisfaction or loyalty with specific health diseases or facilities and studies highlighting hospital performance that did not contain empirical evidence. A flow diagram of study selection is shown in Figure 1.

This review study, four dimensions of the service quality in healthcare have been recognized, which could have played a role on patient satisfaction and patient loyalty including infrastructural quality, procedural quality, interactional quality and personnel quality.

**Infrastructural quality:** Infrastructural quality relates to the feeling of patients about the physical equipment in the healthcare industry to promote service

delivery (6). Moreover, the infrastructure dimension implies that the facility should have appropriate construction and facilities as indicated by(2). On the other hand, infrastructural dimension in this study is similar to tangibles, healthscape, physical environment, facility quality, and tangibility or image. From the previous studies concluded that physical environment has potential influence on patient satisfaction. Hence, the items under each dimension were grouped.

Healthcare providers therefore need to know the infrastructure characteristics that customers require for their environment, accessibility and resource availability, as well as tangible service facilities such as equipment, appearance, hygiene and other physical facilities.

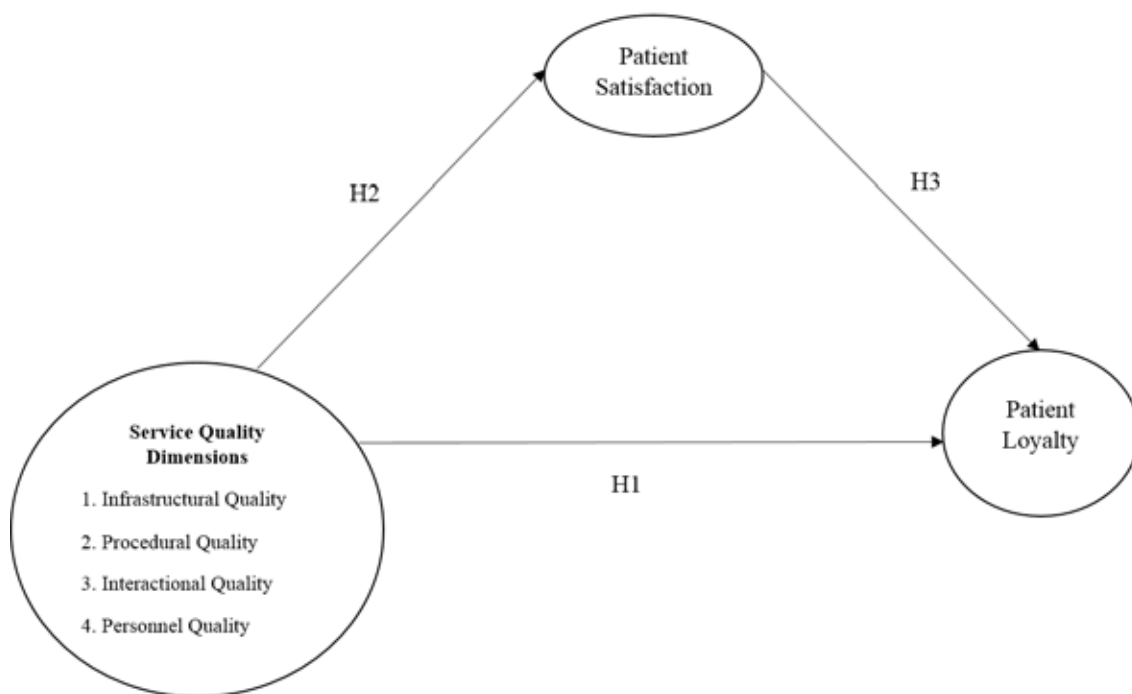
**Procedural Quality:** Procedural quality relates to the impression of patients regarding the management of the provision of health care. Moreover, procedural quality is the second major field that the healthcare industry should manage as stated by(8), which address essential administrative functions like admission, waiting time, follow up and patient safety that are associated with medical treatment.

The health industry can never be rated higher for its service delivery without adequate procedural quality management. Therefore, procedural quality dimension evaluates admission, patient safety, waiting time, and

follow-up. Health executives must know that procedural quality is the anticipated fundamental level of service for hospitals and clinics.

**Interactional Quality:** Interaction quality refers to patients’ impression about the interaction or communication with clinic staff during the treatment. Moreover, interaction quality represents the dyadic relationship between the client and the staff or service personnel. It is included as the second primary dimensions. In other words, this means that interaction quality is a subjective view of the delivery of the service and represents the perception of the interactions that are performed during the service meeting.(9)model of functional quality is a comparable to that dimension.

Within the literature studies, the important of staff quality is well supported(10). In this dimensions,(8) divided the concept of interactional quality into three sub-dimensions which are staff attitude, personalized attention and information availability. These three sub-dimensions are similarly explained by(2)which include knowledge, manner and skills. The interaction between healthcare personnel like doctors and nurses with patients is best assessed by these dimensions, as they cover the most significant elements of the provision of service.



**Figure 2: A Proposed Model of Research**

**Personnel Quality:** Personnel quality refers to patients' impression about skills and ability of clinic staff during the interaction. Moreover, the interaction between patient, medical and administrative staff is performed by personnel service. During the service, attitudes and behaviors of the employees can affect patient perceptions (11). Employees should also be pleased with high-contact services to satisfy the client.

Quality of personnel plays a significant role in patient service assessment. Some of the research shows that the quality of personnel substantially affects the general satisfaction of the patient (12–15).

The patient develops favorable emotional reactions that contribute to a favorable word in the mouth as an interaction consists of interpersonal components. So that, the service quality of personnel is directly linked to patient satisfaction. Hence, personnel quality dimension evaluates staff competency, trustworthiness and staff diversity.

**Conceptual Framework:** On the basis of the literature review, several prior research has been examined on the Service Quality (SQ), Patient Satisfaction (PS) and Patient Loyalty (PL). The researcher aims at analyzing of the relationship between SQ and PL. And mediating role of PS is also assessed between SQ and PL. This model is called the suggested research model as shown in Figure 2.

### Conclusion

As conclusion, the outcome of this study will provide better understanding of healthcare service quality dimensions. This is because, service quality plays an important role in healthcare industries. Although healthcare providers can make decision that would increase the patient satisfaction of all relevant groups. This paper has made an empirical study to identify the relationship between SQ and PL and mediating role of PS. Thus, the relationship can be seen clearly after the result has been analyzed. Moreover, research hypotheses are being created on the basis of the proposed model and a previous study. Then, develop the questionnaire is the next step of this research to be used to collect the data from pilot study. In short, self-administered questionnaire survey will be used as the quantitative approach to collect data.

**Recommendation:** The future study is to see which aspects of quality of healthcare facilities influence patient

satisfaction and loyalty that can assist government pay more attention to enhancing the quality of service in public clinic or hospital. Furthermore, this study suggested that there is a need to employ experimental study design to detect true causal relationship and more studies on cultural and socio-economic differences affect patient satisfaction and loyalty.

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**Ethical Clearance:** Not required

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**Conflict of Interest:** Nil

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# Caring Behavior Improvement Model on Nursing Students at the Health Polytechnic of Ministry of Health, Pangkalpinang

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## Abstract

**Context:** This study aims to establish models and measures of caring behavior in nursing students at the Health Polytechnic of the Ministry of Health, Pangkalpinang. The research method used is a quantitative method with survey techniques in phase I, and experiments by making a book as an experimental tool with the design of the One Group Pre-test Post-test for stage II. Furthermore, the data analyzed by qualitative method in stage III. The sample consisted of 69 students; a combination of first-year and second-year students. This study revealed that the Compassion variable influenced the formation of Competence, whereas the Conscience and Commitment variables did not affect the formation of Competency. Meanwhile, overall, the variable Compassion, Conscience, Commitment, and Competence influence the formation of Caring Behavior.

**Keywords:** *Behavior, caring, health polytechnic, nursing, students*

## Introduction

The 2030 Sustainable Development Goals Agenda (SDGs) in the health sector sets some goals to ensure a healthy life and promote prosperity for all people of all ages<sup>1</sup>. This goal causes health efforts need to find techniques in improving health services and make the latest technological discoveries under the development of science<sup>2</sup>. In nursing practice, human or patient is an object of a nursing care service and care is the basis or foundation in providing nursing care.

Nursing is a form of professional service that has a paradigm which includes four components: human, health, environment, and the nurse itself. Nurses are a noble profession because they require patience and calmness in serving patients who are suffering from illness. A nurse must be able to serve patients wholeheartedly, understand the problems faced by clients, and look attractive. For this reason, a nurse needs the ability to pay attention to others, intellectual,

technical, and interpersonal skills that reflected in caring behavior<sup>3</sup>.

Caring is essential for nursing and is a focus for nursing practice. Caring behavior is also crucial for growth and development, improve, and improve the condition or way of life for humans<sup>3</sup>. Caring is also an attitude of respecting others, paying attention, and learning someone's likes and how someone thinks and acts. Providing caring is simply not just an emotional feeling or behavior since caring behavior aims and functions are to build social structures, outlook on life, and cultural values of each person that is different in one place<sup>3</sup>. Then the performance of nurses, especially in caring behavior, becomes significant in influencing service quality and patient satisfaction, especially in hospitals, where service quality determines the image of service institutions, which in turn can increase patient satisfaction and service quality<sup>3</sup>. In some extent, the effect of nurse services could be directly related to patient satisfaction<sup>4</sup>, and recovery<sup>3,5</sup>.

Therefore, it is needed not only professional skills that understand all forms of nursing activities, but students are also required to have caring behavior to provide quality nursing services and prevent nurses from misuse of health services<sup>6</sup>. Caring behavior in various studies is the essence of nursing and is related

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to the structure of knowledge and theory that nursing students learn during their education and is shaped by the way nurses carry out their practices<sup>7</sup>. The formation of caring behavior in a nurse begins when he decides to become a nurse and is measured in dedication as a nurse in carrying out duties by using all the professional knowledge learned and the number of moral norms and values<sup>8</sup>.

### Method

This research used quantitative survey techniques and continued with experiments by writing a manual book. Experiments carried out in one group, without a comparison, by holding a pre-test and post-test, to determine the effects of the treatment, so that the magnitude of the effects of the experiment can be certainly known. The testing of caring behavior is monitored by preceptors when students do field practice. Furthermore, interviews were conducted with students, study program managers, and stakeholders. The population and sample in this study were all Pangkalpinang Health Polytechnic students as many as 69 people; 30 of them are first-year students and 39 others are second-year students.

### Results

**1. Determining Factor Testing:** The determinant factors are the influence of gender variables, student levels, interests, commitment, curriculum, and initial knowledge of student caring behavior shows in Table 1.

**Table 1: Determining Factor Testing**

Model	R	R-square	Adjusted R-square	Standard Error of The Estimate
1	0.772	0.596	0.577	5.12121

The coefficient of determination shows that 59.60% of the formation of students caring behavior can be explained using gender variables, student levels, interests, commitment, curriculum, and initial knowledge, while other causative factors can explain the rest of 40.40%. The standard error of estimate (SEE) explains that the existence of gender, student level, interests, commitment, curriculum, and the initial knowledge can be predictors of student caring behavior.

**2. Testing the Caring Behavioral Model:** The caring behavior of students in this study is in a good category. There are differences between caring behavior between first-year students (at intervals

of 63.07%) and second-year students (65%). Also, it is known that there are seven aspects of caring behavior that are not optimal based on the list of caring dimensions (Caring Dimensions Inventory; CDI) designed by Watson and Lea<sup>9</sup>, shown in Table 2.

**Table 2: Student’s Caring Behavior**

No.	Caring Behavior	%	Category
CDI 1.	Assist clients in ADL	59.06	Not Good
CDI 2.	Make nursing notes about the client	59.78	Not Good
CDI 3.	Feeling guilty/sorry for the client;	63.41	Good
CDI 4.	Providing knowledge to clients as individuals	60.14	Not Good
CDI 5.	Explain clinical procedures	61.59	Not Good
CDI 6.	Dress neatly when working with clients	63.77	Good
CDI 7.	Sit with client	65.58	Good
CDI 8.	Identify the client’s lifestyle	61.23	Not Good
CDI 9.	Report the client’s condition to a senior nurse	64.86	Good
CDI 10.	With clients during clinical procedures	62.32	Good
CDI 11.	Be nice with clients	65.58	Good
CDI 12.	Organize work with other nurses for clients	73.55	Good
CDI 13.	Listen to client	63.41	Good
CDI 14.	Consultation with doctors about the client	64.49	Good
CDI 15.	Advise clients regarding aspects of self-care	63.04	Good
CDI 16.	Sharing about personal problems with clients	59.78	Not Good
CDI 17.	Provide information about clients	75.72	Good
CDI 18.	Measuring the client’s vital signs	63.41	Good
CDI 19.	Placing the client’s needs before personal needs	64.13	Good
CDI 20.	Be competent in clinical procedures	65.94	Good
CDI 21.	Involve the client in care	63.04	Good
CDI 22.	Provide guarantees regarding clinical procedures	70.29	Good
CDI 23.	Give privacy to clients	63.77	Good
CDI 24.	Be happy with the client	61.59	Not Good
CDI 25.	Observe the effects of medication on the client	64.49	Good

**3. Building the Model:** The coefficient of determination indicates that 47% of the formation of caring competencies can be explained using the variable compassion, conscience, and commitment, while the remaining 53% can be explained by other causative factors. The standard error of estimate explains that the existence of compassion, conscience, and commitment can be ruled as predictors of student caring competencies. Because the probability of Sig is 0.036 (<0.05), this regression model is feasible to be used in predicting caring behavior.

The second test uses the behavior variable parameter (Y2) as the dependent variable, while the compassion (X1), conscience (X2), commitment (X3), and (X) competence variables become independent variables. The coefficient of determination of 1 shows that 100% of the formation of caring behavior of students in this study can be explained using the variable compassion, conscience, commitment, and competence. The magnitude of the standard error of estimate (SEE) of 0 explains if the existence of compassion, conscience, commitment, and competence can be ruled as predictors of the competencies of caring students.

## Discussion

**Stage I Testing:** Determinant factors that influence the student's caring behavior consist of (1) gender, (2) student level, (3) student interest in becoming nurses, (4) student commitment in nursing assignments, (5) curriculum used in the formation of caring behavior, and (6) the initial knowledge students have. Caring behavior is built by three essential performance components—compassion, confidence, and commitment—which basically formed by competence and moral standards.

Second-year nursing students who have gone through the lecture process seem to have awareness and love of the profession as nurses than first-year students. Also, service experience and practice in hospitals or health centers have a more significant effect on mastery of nursing competency of the second-year nursing students. Female students tend to have better-caring behavior than male students, but male students show an improvement caring behavior when they in their second-year. It explains that during the process of good lectures and provide space to conduct real practice in hospitals or health centers, both male and female students perform similar qualified treatment and it redefined the conventional conception<sup>10</sup>.

Based on this research, it shows that the variables of interest, commitment, and competence of students significantly influence the caring behavior in their implementation in the hospital or everyday life. This is undoubtedly in accordance with the theory which states that the development of the nursing world that has adopted technology directs the caring behavior of nurses not only to the sincerity of the soul in caring for patients but also is the ability to be dedicated to others, supervise with caution, show concern, feelings empathy for others, and feelings of love or affection<sup>3</sup>.

The commitment of nursing students to the profession as nurses has a significant influence on caring behavior. Sincerity in serving and commitment to follow nursing procedures has been implemented well by students. Various assumptions show that the caring conception is subsequently partially learned by students both through experience and in attracting meaning in their lectures, which appears in the significant influence of students' knowledge variables on their caring behavior.

**Stage II Testing:** The second phase of the research consisted of the preparation of integration material and the integration material trial, which was compiled in a handbook of Caring Behavior Guidelines. After going through the stages of discussion and observation, the following arrangement of the guidebook is determined as follows:

Chapter 1. Introduction; Chapter 2. Definition of Caring; Chapter 3. Caring Behavior; Chapter 4. Caring for Patients; Chapter 5. Communication with Caring; and Chapter 6. Development of Caring.

Next, the Caring Guide is distributed to students to evaluate then give suggestion for adjustments. The results of observations made by preceptors and filling questionnaires show data that caring behavior by students is generally behavior that is following nursing action procedures, namely:

1. Provide information about clients;
2. Organizing work with other nurses for clients;
3. Provide guarantees regarding clinical procedures;
4. Be competent in clinical procedures;
5. Sit with clients;
6. Be nice with clients;
7. Report the client's condition to the senior nurse;

8. Consultation with doctors regarding clients;
9. Observe the effects of medication on the client.
10. Placing the client's needs before personal needs;
11. Dress neatly when working with clients;
12. Providing privacy to clients;
13. Feeling guilty/sorry for the client;
14. Listen to clients;
15. Measuring the client's vital signs;
16. Advise clients regarding aspects of self-care;
17. Involve clients in care;
18. With clients during clinical procedures.

Aspects of caring behaviors that are still weak includes explain clinical procedures, be happy with clients, identifying the client's lifestyle, and providing knowledge to clients as individuals. Other weak aspects of competence are report nursing notes about the client, sharing personal matters with clients, and help clients in ADL.

**Stage III Testing:** This phase is the guided interview to explore the model development. Testing of the variable compassion—in the form of sensitivity to the difficulties and pain of others can be in the form of helping someone to stay afloat, providing opportunities for sharing, and provide full support—seems to give effect to the formation behavior to do commitment work. However, competence variable and confidence, statistically does not affect student competence directly.

Based on interviews with students (P1: Women), it is known that, in general, sensitivity to the difficulties and pain of patients manifested in the action of helping someone to stay afloat, provide opportunities to share feelings, build by routine practices. Various class discussions provide opportunities for students to express their feelings and empathize. Also, P1 states that practice in hospitals is needed because even though students' knowledge is good, in reality, the practice of caring behavior itself has been carried out according to the indicators studied in the guidebook. Students with good caring behavior still depends on the nature of the patient itself; whether the patient is open or willing to express their feelings while being treated.

According to interviews with students (L1: Men), the confidence of students in taking action grows because

they master the memorization of actions contained in the textbook, as well as lecture notes, but only a few lecturers insert material about how a person student foster confidence in carrying out actions. Students still often get a rejection from family and patients because of the low patient's trust to the student as a nurse. Respondent L1 realize that a nurse is required to have moral standards that grow from a humanistic value system that respects and wants to care for the welfare or health of his patients. However, the central aspect that needs to be built is that the student must first make changes to his behavior.

Caring behavior is fully developed together from aspects of compassion, competence, conscience, and commitment. These variables must be owned and operated by a student to be able to have good caring behavior while caring must be defined as an action that aims to provide physical care and pay attention to emotions while increasing patient safety<sup>7</sup>. Therefore, caring attitude must be given through honesty, trustworthiness, and good intentions at the same time.

Another student's interview (P2: Women) state that lectures should include caring material that following the guideline developed by researchers, but at an early stage, it should be inserted or integrated in each course. Respondents (P3: meeting) stated that the approach in conducting nursing care must be purely carried out sincerely to help the patient's healing process, not only to make a report on nursing care.

Interviews with students (L2: Men) revealed that students expect more examples in the guidebook, although they expect more detailed understanding in aspects of courage and verbal communication. Respondents (L3: Men) stated that self-confidence needs to be built by knowing good nursing knowledge and being skilled at doing it so that the confidence of the family and the patient itself will grow. Discussion with the lecturer team emphasized the importance of the caring guidebook to be immediately presented as a complement to lectures, in addition to be a guide for students as well as supporting references for lecturers in providing courses so that it can be used optimally.

## Conclusion

1. The determinant factors that significantly influence the formation of caring behavior in students are the commitment of students as prospective student nurses, nursing knowledge, student interest as

nurses, and student levels, as well as the indirect influence of gender variables and lecture curriculum.

2. The Caring manual book is structured as follows; Chapter 1. Introduction; Chapter 2. Definition of Caring; Chapter 3. Caring Behavior; Chapter 4. Caring of Patients; Chapter 5. Communication with Caring; and Chapter 6. Caring Development.
3. Compassion variable influences the formation of competency, whereas conscience and commitment variables do not affect the competence formation, while overall compassion, conscience, commitment and competence affect the formation of caring behavior.

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# Coping Strategies Used By Mothers in Children with Autism

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## Abstract

**Context:** Stress caring for children with autism contributes to weak emotional stability, decreased psychological and physiological functions for mothers. Previous research suggests several method that mothers use to overcome various problems. The purpose of this study was to determine the coping strategies of mothers in children with autism as well as to find out the source of stress and see the response to mothers at Sunter children's growth and development clinic. This study uses a qualitative approach to data collection through in-depth interviews. The sample selection technique uses a purposive sampling technique. The main informants in the study consisted of 8 mothers and the supporting informants were 2 child caregivers and 2 therapists. Triangulation used is source triangulation. Data analysis technique is done by content analysis. The results of this study found that there are two stressors faced by the mother, namely internal (concerns of child growth and development, the future of the child and the lack of knowledge about autism) and external (lack of family support, economic and environmental) and there are 3 responses to stress shown, namely the response cognitive (dizziness and lack of concentration), emotional responses (disappointed and sad) and behavioral responses (shock, surrender and crying). Mothers use both types of coping strategies, namely problem focused coping and emotional focused coping in several different ways.

**Keywords:** Strategy: coping: mother: children: autism.

## Introduction

The prevalence of autism continues to increase in the world<sup>(1)</sup>. WHO in 2013 estimated the global prevalence of ASD to be 1 in 160 children. According to UNESCO data, the prevalence of autism sufferers worldwide in 2011 was 6 out of 1000 children with autism. This prevalence is estimated to represent the average number and reported prevalence varies substantially throughout the study<sup>(2)</sup>. In 2012 there were 1:88 children those with autism and in 2014 an increase of 30% namely as much as 1.5% or 1:68 children in the USA have autism<sup>(3)</sup>. In Indonesia, the number of autistic sufferers every year is estimated to have increased by around 500 people each year, and autistic sufferers are more male than female with ratio of 4: 1<sup>(4)</sup>.

Many researchers do not yet understand about the exact cause of autism but they suspect genetic and environmental links that affect autism in children<sup>(5)</sup>. Autism is the inability to interact with others and language disorders<sup>(6)</sup>. Autistic children need greater consideration and care compared to children without these conditions, thus it is common for parents to be stressed in dealing with this<sup>(7)</sup>. According to several studies, mothers who have autistic children report emotional condition that include mistrust, deep sadness, depression and self-blame<sup>(8-10)</sup>. These stressors often result in higher levels of depression for parents of children with ASD<sup>(11)</sup>.

Several studies have shown coping strategies to fortify parents in order to avoid the negative effects caused. Lazarus and Folkman (1984) says it is divided into two main functions, namely problem focused coping which is an individual effort by dealing directly with the source of the cause of the problem and emotional focused coping which is the behavior in an effort to deal with emotional pressures or stress caused by the problem at hand<sup>(12)</sup>. Families and parents in these conditions desperately need motivation, socio-economic

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support and abilities<sup>(13)</sup>. Some of the strategies used one of them is his own initiative where parents are involved in activities that make them happy. Parents usually use one or more coping strategies such as active avoidance, active rejection, positive thinking and religion<sup>(11)</sup>.

Sunter children's growth and development clinic is one private clinic located in Sunter, North Jakarta. Based on the results of a preliminary study, autistic children who are currently undergoing therapy at the clinic there are still many children who are hyperactive, out of focus and tantrums. Every mother shows different responses. Such conditions and other conditions may be able to suppress the mother that will cause stress and also affect the child. Therefore an appropriate coping strategy is needed. Based on this, it is important to know the causes of stress experienced by the mother and how coping strategies carried out by mothers who have autistic children.

## Method

This research was conducted to understand how mothers of children with autism addressing the problems that occur in their children at Sunter children's growth and development clinic using a qualitative approach. The study was conducted at Sunter children's growth and development clinic in November 2019. The sample in this study was between 26 to 35 years and has undergone therapy at Sunter children's growth and development clinic for more than 6 months. The informants in this study consisted of 8 mothers of autistic children who had received therapy for at least 6 months, 2 caregivers and 2 therapists. Data collection method is in-depth interviews. The sample selection technique uses purposive sampling. Triangulation conducted was triangulation of sources that cross-check the answer of infoman mothers of children with autism through their caregiver and therapist. Furthermore, the data were analyzed using content analysis.

## Result

Based on the results of the study found that most children are the first children with maternal age ranging from 26 to 35 years. Mother's educational background is mostly undergraduate. Almost all mothers work as housewives. The last education therapist who worked at Sunter children's growth and development clinic was Diploma III and undergraduate in the health sector and on average had worked for about 2 years.

Based on the results of interviews conducted, there are 2 sources of stressors experienced by mothers with autistic children, namely internal stressors and external stressors. Besides that, there are 3 responses shown by the mother, namely emotional response, behavioral response and cognitive response, such as the following quotes:

*"Because initially the family did not accept ya, I'm afraid of my child, how is this child going forward, because I still didn't understand the autisms"*  
(Informant 1)

Identified external stressor conditions namely families have not received yet and financial problems. As stated by the following informant:

*"It turns out that the costs are also not a little because many things must be done, certain foods, picky and choose ya ma'am"*  
(Informant 1)

In addition, 4 out of 8 mothers also said that the stress was due to community views such as being ostracized and underestimated. Like the following quote:

*"I also moved his church ma'am, because at his church before I felt he was underestimated, the neighbors also thought differently from him, sorry for that"*  
(Informant 7)

Meanwhile, there are emotional responses that are shown by expressions by some mothers namely disappointed and sad. The quote is as follows:

*"At that moment it was sad (eyes filled with tears)"*  
(Informant 4)

The behavioral response expressed by the mother is in the form of a response of shock, resignation and crying as a result of the stressor she feels. The following quote from one mother:

*"Sometimes I even cry and continue pray"*  
(Informant 4)

Some mothers also feel dizzy and lack concentration which is a cognitive reaction. The following quote from one mother:

*"When I found out he was autistic, I came to my mind and didn't focus on doing anything, just in a stunned home, thinking "why is it my child? how come ya? "I got dizzy"*  
(Informant 8).

All mothers use coping strategies in the form of problem focus coping and emotional focus coping in dealing with some stressors that occur in the mother, namely seeking social support, planful problem solving, and confrontative coping.

Some mothers seek social support to find comfort to calm situations that can make it no longer bother what is happening. Like the following quote:

*“If there is anything, I often share stories with my husband, thankfully my husband supports and helps what is assigned by the therapist to do at home”*

(Informant 8)

In addition, mothers also carry out planning for their children in the future. 3 of the mothers put their children into special schools while 5 of the mothers put their children into public schools but some used accompanying teachers:

*“Now he has school, he can already understand a little if told, there are teachers who can also accompany in the school”*

(Caregiver 2)

All mothers deal with problems that occur in children by making direct. The effort done is to bring the child to the doctor directly and go on a Gluten Free Casein Free (GFCF) diet on children. Like the following quote:

*“Children who are dieted and not yet dieted are clearly visible change, have started to be able to focus and listen to instructions, most parents here already understand and go on the GFCF diet.”* (Therapist 1)

Meanwhile, for emotional focus coping, there are also two ways that are done by the mother, namely self control and accepting responsibility.

Based on the results of the interview, the average result of mothers doing self-control with gratitude and pray. Like the following quote:

*“Every night I pray and make sure he prays too, so that he is immediately given the will to talk”*

(Informant 6)

Mothers who have children with autism, 5 mothers mentioned that they tried to be patient, sincere and aware of their responsibilities. One of the quotes from the mother and the therapist's expression are:

*“The average mother here has accepted her child, if given the task to train their children at home they also want to do.”*

(Therapist 2)

## Discussion

The number of mothers giving birth to children with autism is increasing worldwide<sup>(14)</sup>. This study was conducted to identify the stress that occurs in mothers with autistic children and their coping strategies in overcoming problems that occur by collecting data from 12 informants. This research found that the mothers of autistic children experience almost the same challenges.

The most common concern is that mothers are more worried about the future of their children and their children's dependence<sup>(10,15)</sup>. Some things experienced by mothers are stigma in society and financial problems. Many mothers with autism children will face stigma and discrimination in their environment and this stigma will have an impact on their well-being<sup>(16)</sup>. Stigma is one of the most difficult aspects faced by mothers with autistic children<sup>(17)</sup>. Stigma experienced by mothers and prolonged occurrence will lead to serious problems in mental health<sup>(18)</sup>. Apart from the problem of stigma and the influence of the mind due to circumstances experienced by children, namely the existence of stressful life events from other factors (related to career or related to finance)<sup>(19)</sup>.

There are 3 responses to stress in this study which were shown by mother namely cognitive response, emotional response and behavioral response. In cognitive responses, mothers tend to lack concentration and dizziness and the response to maternal behavior shows responses in the form of shock, resignation and indeedis. This is consistent with what was revealed in Nasir (2011) which stated that the stress response seen from cognitive responses can be seen through chaotic thoughts and decreased concentration, as well as the behavioral responses shown with patterns of behavior such as fear, anxiety, anger, shock and crying<sup>(20)</sup>.

Some research results show that in terms of problem solving in parents who have autistic children, most parents use two ways, namely problem focus coping and emotional focus coping<sup>(10,17,21)</sup>. Coping strategies can affect the level of stress experienced by parents and also the level of their resilience<sup>(22)</sup>. The results of this study indicate that all mothers in dealing with problems that occur using both coping strategies, namely problem focused coping and emotional focused coping.

Mothers use three strategies to overcome problems that occur namely planning problem solving, seeking social support and direct effort. Mothers choose problem-

solving planning by planning the child's future because by doing so the stress level can be less<sup>(23)</sup>. One study found that to overcome the pressure of having an autistic child, mothers more often sought social support in the form of information support and real support (with the help of a husband or family)<sup>(24)</sup>. Research that presents about one of problem focused coping about direct effort is Magnawiyah's research (2014) which shows that parents will bring their children directly to the doctor for medical treatment by following routine therapy for their children. Other direct efforts undertaken by the mother is to adopt a diet<sup>(17)</sup>.

In addition to problem focused coping, mothers also use emotional focused coping in handling problems<sup>(21)</sup>. Dina et al in 2017 describes aspects of self control done by mothers in various ways, mothers recognizes that the pressure caused by children makes them have to control themselves, the behaviors that arise are patience and restraint, meditating or praying and sleeping a little<sup>(25)</sup>. Another emotional coping strategy is related to accepting responsibility. The strategy is able to reduce self-threatening situations and more easily adapt to stress<sup>(26)</sup>.

### Conclusions

Mothers at Sunter's child growth and development clinic use both types of coping strategies in different ways namely problem focused coping in the form of seeking social support, planful problem solving and confrontative coping and emotional focused coping in the form of self control and accepting responsibility. There are 2 stressors faced by mothers, namely internal stressors in the form of children's growth and development concerns, the child's future and the lack of knowledge about autism and external stressors in the form of lack of family support, economic and environmental. In addition, there are 3 responses to stress namely cognitive responses (dizziness and lack of concentration), emotional responses (disappointed and sad) and behavioral responses (shock, surrender and crying).

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# Dental Status and Characteristics of Oral Fluid in Patients with Juvenile Rheumatoid Arthritis

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## Abstract

Changes and disturbances in any human system can be a trigger for the emergence, exacerbation or progression of diseases of other organs and systems. This is confirmed by modern scientific works that demonstrate the dependence of dental status on background pathology. Considering the fact that biofilm of the oral cavity can be a risk factor in maintaining a high degree of activity of the underlying disease, as well as the informativeness of oral fluid indices, studies in this direction seems relevant. Aim of the research is to study the physical and immunohormonal characteristics of oral fluid in patients with juvenile rheumatoid arthritis depending on the duration of arthritis.

**Materials and Method:** A dental examination was conducted on 65 patients with JRA aged 12-16 years (average age  $13.55 \pm 0.21$  years), among whom the debut of arthritis less than 6 years was observed in 32 patients (49.23%) and more than 6 years in 33 patients (50.77%). Comparison control group (CG) was 15 almost healthy patients. Dental status was assessed by the intensity of the carious process (DMF-index) and the severity of gingivitis (PMA-index). The productive activity of the OF was characterized by the basic speed of salivation and saliva viscosity (according to the method of Redinova-Pozdeeva, 1994). The oral fluid was analyzed according to the content of hormones (cortisol, ACTH) and interleukins (IL-1 $\beta$ , IL-6, TNF $\alpha$ , IL-4, IL-10) in accordance with the duration of arthritis.

**Results and Conclusion:** It was found that in patients with juvenile rheumatoid arthritis there is a “high” degree of caries activity, a “mild” degree of gum inflammation, an imbalance in the pituitary-adrenal axis hormones and a state of immunosuppression at the local level. At the peripheral level, marked violations are observed in the principle of regulation of feedback “cortisol-ACTH” and signs of immunodeficiency according to the levels of interleukins were observed. Identified disorders tend to progress with increasing duration of arthritis. These results can be used in the practice of dentists, rheumatologists and pediatricians.

**Keywords:** Caries, gingivitis, oral fluid, juvenile rheumatoid arthritis.

## Introduction

In recent years, the diagnosis and treatment of

pathological conditions of the human body acquires a scientifically significant approach from the standpoint of comorbidity (pathogenetic interconnection of diseases) and multimorbidity (a combination of diseases of various origins). As a result of this, in clinical and experimental studies, a vector is formed to create models of total risk that determine the development of combined pathologies of an individual. Such models are based on ideas about the risk factors, the etiology and pathogenesis of diseases, which are modifiable and amenable for correction.

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Today, data on association between risk factors and major chronic diseases are partially systematized; a comorbidity index calculator for general practitioners (family doctors) has been developed. The proposed models takes into account already diagnosed diseases, blood counts, safe norms of consumed products, bad habits, physical activity. Unfortunately, these schemes lack indicators of dental health, such as the level of oral hygiene, the presence of caries and its intensity, the pathology of periodontal tissues, and the characteristics of the oral fluid. The influence of somatic pathology on the state of the dentition is undoubted<sup>[1, 2, 3]</sup>. At the same time, the significance of orofacial diseases in the initiation and progression of background pathology is less recognized and insufficiently studied. Works in this direction is single, however, the presented results allows us to consider dental pathology as comorbid<sup>[4]</sup> and as an indicator of the general condition of the body<sup>[5]</sup>.

Oral homeostasis is determined by the characteristics of the oral fluid (OF), which, in a certain extent, depends on the conditions of the large salivary glands. Considering the fact that in some cases indicators of OF can be claimed as diagnostic markers, it is of much interest to study about the structural changes in the salivary glands and their secretion in patients with somatic pathology. This is evidenced by the work of researchers in which a decrease in the metabolic activity of the large salivary glands and the functional ability of the hematosalivation barrier against diabetes mellitus<sup>[6]</sup>, bronchial asthma<sup>[7]</sup>, and digestive tract pathology<sup>[8]</sup> and a number of other diseases were established. In previous experimental studies, we established structural changes in the tissues of the parotid salivary glands in laboratory rats with adjuvant arthritis<sup>[9]</sup>, as well as during methotrexate therapy<sup>[10]</sup>. In this regard, the clinical and laboratory study of the characteristics of OF in patients with juvenile rheumatoid arthritis (JRA) is becoming relevant. This pathology has an autoimmune character, the etiology and pathogenesis are not fully studied and it has an aggressive basic therapy (cytostatic drugs throughout life) with increased prevalence of major dental diseases<sup>[11]</sup> and the probability of combined damage to the salivary glands (Schegren's syndrome) is seen. This disease can progress over the years and lead to disability.

**Purpose of the study:** Aim of the research is to study the physical and immunohormonal characteristics of oral fluid in patients with juvenile rheumatoid arthritis depending on the duration of arthritis.

## Material and Method

A dental examination was conducted on 65 patients with JRA aged 12-16 years (average age  $13.55 \pm 0.21$  years), among whom the debut of arthritis less than 6 years was observed in 32 patients (49.23%) and more than 6 years in 33 patients (50.77%). Depending on the duration of arthritis, the children represented two observation groups. The distribution of the contingent by gender was representative. Comparison control group (CG) was 15 almost healthy patients.

Dental status was assessed by the intensity of the carious process (DMF-index) and the severity of gingivitis (PMA-index in modifying, Parma, 1960). The productive activity of the OF was characterized by the basic speed of salivation and saliva viscosity (according to the method of Redinova-Pozdeeva, 1994).

The neurohumoral phase of regulation of the activity of large salivary glands was studied in the OF by levels of adrenocorticotrophic hormone (ACTH) (reagent kit "EIA-3647, ACTH" "DRG", USA) and cortisol (reagent kit "Cortisol-IFA-BEST", CJSC "Vector- Best", Russia).

The mechanisms of regulation of protective reactions at the local level were evaluated by the content of pro-inflammatory and anti-inflammatory interleukins (IL-1 $\beta$ , IL-6, TNF $\alpha$ , IL-4, IL-10) (reagent kits CJSC "Vector- Best", Russia).

Statistical analysis was performed by using of the statistical program "Statistica 6.0®" (Statsoft®, USA).

## Results and Discussion

Studies have shown that the studied parameters in patients with JRA had significant differences compared with similar ones in healthy children ( $p < 0.001$ ) (Table 1).

It was established that in children with JRA the intensity of caries corresponded to a "high" indicator and an increase in the duration of arthritis progression ( $p < 0.001$ ).

**Table 1: Dental status and characteristics of the oral fluid in patients with juvenile rheumatoid arthritis (M ± m)**

Indicator, Groups	CG	Patients with JRA (n=65)	Debut JRA less than 6 years (n=32)	Debut JRA more than 6 years (n=33)
Caries intensity DMF-index)	–	4,87 ± 0,26	3,5± 0,32	5,94± 0,35 p < 0,001
Gingivitis (PMA-index,%)	–	8,51±0,87	10,78±1,23	6,72±1,18 p < 0,001
Salivation speed (ml/min)	0,46±0,011	0,21±0,005	0,24±0,008	0,19±0,005 p < 0,001
Oral fluid viscosity (relative units)	2,85±0,08	5,18±0,1	4,6±0,13	5,64±0,13 p < 0,01
Cortisol (ng/ml)	2,81±0,22	8,03±0,61	8,51±0,78	7,56±0,94 p < 0,05
ACTH (ng/ml)	16,91±1,44	10,42±0,76	12,64±1,06	8,27±0,97 p < 0,05
IL-1β (pg/ml)	26,86±0,79	12,97±0,68	16,58±0,73	9,46±0,75 p < 0,001
IL-6 (pg/ml)	14,21±0,27	7,78±0,38	9,31±0,4	6,29±0,51 p < 0,001
TNF-α (pg/ml)	16,93±0,82	8,13±0,52	10,15±0,62	6,17±0,67 p < 0,01
IL-4(pg/ml)	2,31±0,06	1,34±0,07	1,5±0,09	1,18±0,11
IL-10 (pg/ml)	23,43±1,2	5,5±0,29	6,79±0,35	4,24±0,33

p - credibility of differences with an indicator at the debut of arthritis less than 6 years.

The severity of gingivitis by the value of the PMA index was noted at the level of “mild degree”. With the development of arthritis, the index increased slightly, then showed a decrease. This trend is probably associated with prolonged anti-inflammatory and immunosuppressive basic therapy, which, of course, was reflected in the periodontal status. In our case, the effect of dental hygiene measures on the possibility of inflammation in the gums was minimal, because the examined contingent did not have a course on teaching the rules for oral care and controlled brushing of teeth.

In patients with juvenile arthritis as a whole, there was a decrease in the speed of salivation to the level of “hyposialia” and an increase in the viscosity of the oral fluid to the level of “adverse”. Changes in indicators were more significant with an increase in the duration of arthritis, indicating a progressive dysfunction of a qualitative nature of the salivary glands.

The increased role of humoral factors in the development of dental pathology in patients with JRA demonstrated the state of the pituitary-adrenal axis in terms of the levels of ACTH pituitary hormones and

adrenal cortex cortisol. The study of these hormones was informative, since the level of cortisol in the oral fluid as a whole reflects its content in the blood serum. Unlike the indicator in the blood, oral cortisol is considered biologically active, since it does not have transport proteins [12, 13] and is averaged over a longer period [14].

Analyzing the obtained data on hormone concentrations and their ratio, it can be assumed that when the time period of the incidence of arthritis is less than 6 years, in principle, the regulation of feedback “cortisol-ACTH” has less profound changes. With a duration of JRA of more than 6 years, the changes were more pronounced, which reflected the development of impaired functional activity of the endocrine system with significant in the occurrence of a pathology of a dental nature. Our results were consistent with published data on the violation of all forms of metabolism in patients with JRA and the difference in the adaptive mechanisms of the endocrine glands depending on the duration of rheumatoid arthritis [15].

A comprehensive assessment of the cytokine profile made it possible to establish that the levels of

pro-inflammatory cytokines in patients with JRA at the local level were significantly different from the same in the control group ( $p < 0.001$ ). Children with arthritis debut more than 6 years, the IL levels were significantly lower in comparison with arthritis patients less than 6 years. This indicated about progressive mucosal immunodeficiency as a result of depletion of the functional activity of immunocompetent cells, including salivary gland cells, with an increase in the duration of the rheumatoid process.

### Conclusion

Studies have shown that patients with juvenile rheumatoid arthritis suffer from caries of a «high» degree of activity and gingivitis of mild severity. At the peripheral level, marked violations are observed in the principle of regulation of feedback “cortisol-ACTH” and signs of immunodeficiency according to the levels of interleukins were observed. Identified disorders tend to progress with increasing duration of arthritis. These results can be used in the practice of dentists, rheumatologists and pediatricians.

**Conflict of Interests:** None declared.

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**Ethical Clearance:** In our study involving all human participants were in accordance with ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1964 and later amendmentS.

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# School Based Screening for Idiopathic Scoliosis in Premenarcheal Girls: A Pilot Study

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## Abstract

**Objective:** Idiopathic scoliosis is defined as a lateral curvature of the spine present in the adolescent age group with a higher incidence in females. There is a close relationship between curve progression and rapid (spinal) growth during puberty. The goal of this study was to determine the predictive value of Axial Trunk Rotation (ATR) less than 15° in pre-menarche girls and prevention of curve progression before the skeletal maturity.

**Method:** A total of 100 premenarcheal girls aged 6 to 13 years were screened using Adams forward bending test (FBT) and their ATR was assessed by scoliometer and pain was recorded by numeric pain scale. Scientific Exercise Approach to Scoliosis (SEAS) was administered to cases with high risk for scoliosis which were followed for 3 months.

**Results:** 6 girls in the age range of 10 to 12 years found at high risk for scoliosis with thoracic scoliotic curve ranging from 5° to 7°. 3 girls out of 6 reported pain. There was a statistically significant difference between pre and post SEAS ATR with a p value of <0.001, but scores for numeric pain scale showed insignificant results with a p value of 0.175.

**Conclusion:** The study raised awareness about scoliosis among parents, students and teachers.

**Keywords:** Idiopathic scoliosis, pre-pubertal girls, scoliometer, radiography, SEAS.

## Introduction

Idiopathic scoliosis (IS) is a three-dimensional abnormality or lateral curvature of the spine and trunk with a multitude of underlying factors.<sup>1</sup> The factors concerned in the progression of the curve are gender, growth potential and degree of curvature when scoliosis is first identified.<sup>2,3</sup> In Asian countries the prevalence

rate of idiopathic scoliosis is about 0.4% to 7% among adolescents.<sup>4-12</sup> The epidemiology of scoliosis has geographical disparity and hereditary dissimilarities that may add differences in prevalence rate of scoliosis. Scoliosis screening is presently carried out in 15 states in the United States and in the South Africa, Middle East, Sweden and some parts of Japan.<sup>13-17</sup> Many studies have indicated the lower axial trunk rotation in boys than in girls.<sup>18-20</sup> The decades of research show that detection of IS in early stages favours its effective treatment and arrests its progression further and therefore it is advocated to carry School Scoliosis Screening (SSS), using FBT and scoliometer as an effective means for early recognition when conservative treatment is more productive and successful.<sup>21</sup> If left untreated during active and rapid growth period, IS may worsen and can lead to massive spinal deformity.<sup>22-24</sup> Scientific exercise scoliosis approach (SEAS) is a customized scoliosis

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exercise programme for all conservative conditions; stand independent in low medium degree curves in growth to decrease the risk of bracing.<sup>25</sup>

**Materials and Method**

A Prospective clinical study was conducted through SSS in four regions of Dakshina Kannada-Karnataka, India. The five primary schools (PS) were randomly selected and invited to participate in this study. Five PS had 1140 girls in the age group of 6 to 13 years. A total of 100 pre menarche girls were randomly selected and 20 girls were selected randomly from each school by chit system for pilot study (Phase I). Informed consent and assent were obtained from the parents and students respectively.

**Study Procedure:**

**Phase II:** The participants were screened in secured classrooms. Physical examination was carried out and students with altered gait pattern and other deformity were excluded from the screening. The Body Mass Index (BMI) of each participant was measured. Each participant was assessed by using the Adam’s Forward Bending Test (FBT) and a scoliometer, and the spine was observed in the anterior, posterior and lateral view to measure any hump. The Scoliometer was used to measure the ATR at thoracic, thoracolumbar and lumbar region. The girls with ATR of 5° or more were considered a high risk group and were called for radiographic evaluation.

**Phase II:** SEAS a specific active self-correction technique was administered on individual basis to the 6 high risk girls and incorporated into functional exercises to improve the stability of the spine in active self-correction technique and to train the neuromotor function to stimulate the reflex of self-corrected posture during daily activities. The procedure was performed for 20 minutes/day for 3 months.

**Results**

11 girls out of 100 were found high risk and referred for further radiographic evaluation (Figure 1a). 6 were

found positive with thoracic scoliotic curve of 5° in four girls and 7° in two girls (Table 1). All the 6 high risk girls were in the age range of 10 to 12 years (Table 2). One girl among 5° degree thoracic scoliotic curve and both the girls with 7° degree of thoracic curve reported pain (Table 3). The mean BMI of positive cases was less than that of negative cases (Figure 1b). The SEAS effect showed a significant reduction at the end of 3 months of intervention but there was no significant reduction in the numerical pain scale in the positive cases (Table 4).

**Table 1: Frequency of scoliotic curve.**

	Frequency	Percentage
5 Degree	4	4.0
7 Degree	2	2.0
Nil	89	89.0
Suspected	5	5.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

**Table 2: Age wise distribution of scoliotic curve.**

		Scoliotic Curve		Total
		Negative	Positive	
Age	6	4	0	4
	7	12	0	12
	8	23	0	23
	9	9	0	9
	10	13	1	14
	11	17	2	19
	12	7	3	10
	13	9	0	9
<b>Total</b>	<b>94</b>	<b>6</b>	<b>100</b>	

**Table 3: Distribution of pain among high risk cases.**

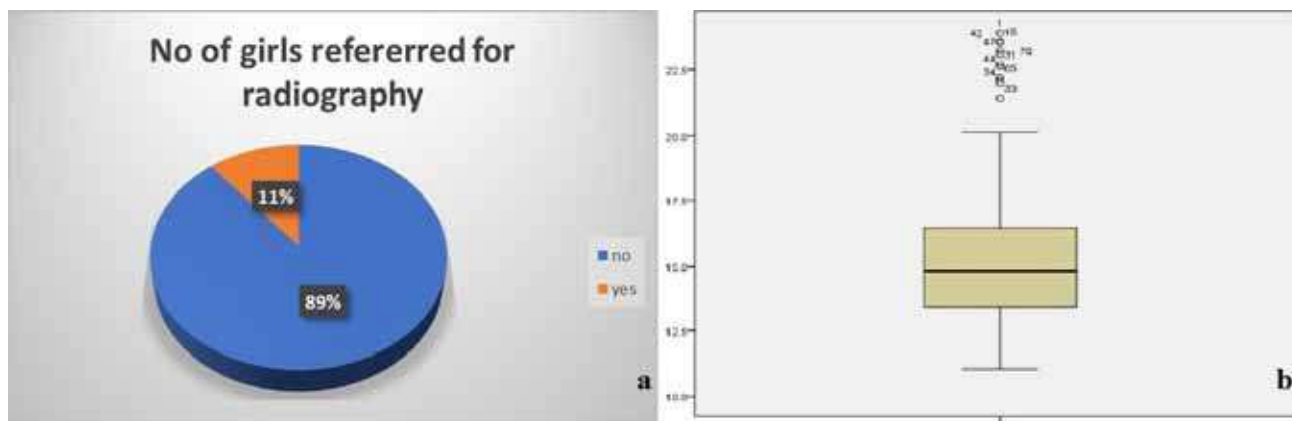
	Frequency	Percentage
Back Pain while bending down Prolonged sitting and while carrying School bag pack.	3	3.0
No pain	97	97.0
<b>Total</b>	<b>100</b>	<b>100.0</b>



**Table 4: Effect of SEAS on ATR and Numeric pain scale**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	baseline ATR in degree - post intervention ATR	1.3333	1.0328	.4216	.2495	2.4172	3.162	5	.025*
Pair 2	Pre intervention pain (Numeric Pain scale) - post intervention pain(Numeric Pain scale)	1.3333	2.0656	.8433	-.8344	3.5010	1.581	5	.175

\*p value<0.05 in ATR is statistically significant.



**Figure 1a: Number of girls referred for radiographs out of 100 screened, Figure 1b: The normal cases had higher Body Mass Index (BMI) than cases with high risk scoliotic curve.**

**Discussion**

Idiopathic scoliosis can develop before skeletal maturation and failed early detection or treatment can worsen the deformity in later life. Hence, an approach to early detection, SSS is considered a favourable in terms of the cost-effectiveness.<sup>26,27</sup> Europe has different kinds of legislations and policies for SSS. The united kingdom and Poland does not have SSS under the gambit of their national policies, while SSS is provided on voluntary basis in Spain, Israel, Turkey, Greece, Bulgaria and the Netherlands.<sup>28,29</sup> The purpose of SSS is to discover scoliosis at an early degree such that potential cases could be intervened managed conservatively.<sup>30-33</sup> 25% of girls (aged <13 years old) with an ATR ≥ 7° were found to have spinal curve below 10° or spine in a straight line.<sup>34</sup> Recent study conducted in Malaysia on female population proved remarkable results on screening programme to detect the early positive predictive value of scoliosis using scoliometer.<sup>35</sup> Screening programme with FBT techniques are associated with higher referral rate and lower precision values in identifying the scoliotic curve,<sup>36</sup> therefore the addition of advanced tool, such as

scoliometer is recommended. The students suspected to have scoliosis on screening are to be ruled out clinically by further diagnostic assessment.<sup>28</sup> The measurement of scoliosis proved to be 100% sensitive and 47% specific for 5° curve whereas 7° curve shows 83% sensitivity and 86% increased specificity.<sup>37</sup>

In the current study, the overall prevalence rate in pre menarche girls in school screening was 6%. This study showed potential scoliosis cases in the age group of 10 to 12 years with ATR less than 10°. The prevalence rates for 10, 11 and 12 years old were 1%, 2 %,3% respectively. Wong et al., 2005 reported the prevalence rate in girls increased progressively from 0.24% between the ages of 9 to 10 years, 1.37% and 2.22% between the ages of 11 to 12 years and 13 to 14 years, respectively.<sup>5</sup> The prevalence rate for 10, 11, 12 year old girls with 5° curve was (8.33%, 12.5%,16.6%) respectively and 7° curve for 10,11,12 year old girls were (33.33%). In our study prevalence rate was increasing with the age group. Yong et al., 2009 found prevalence rates for the 10, 11 and 12 year old girls as(1.37%, 0.58% and 0.21%)for ATR>10°. All the curves seen in the present study were

small curves and at right thoracic level. These findings are in consistent with the study from chongming island (china), with thoracic curves towards right side in 60.3% cases.<sup>12</sup> 75.5 %of thoracic curves were towards right side in a study in Greece.<sup>38</sup> In Finland, Nissinen et al., 1993, showed that the most common curves were at the thoracic area.<sup>39</sup> The body mass index (BMI) in scoliotic children was lower than in the normal children in several studies<sup>40-42</sup> and similar trend in BMI was seen in the present study. The ATR had a significant improvement after SEAS intervention in this study and the results were similar to Negrini et al., who showed a decrease of 0.67° in ATR in SEAS group as compared to an increase of 1.38° in non-specific physiotherapy alone group.<sup>43</sup> There was no improvement in the pain scale, pre and post SEAS at 3 months in the current study. The participants and their parents however have been briefed about home continuation SEAS programme with 3 monthly assessment. Based on the results from phase I, we calculated a sample size of 600 pre menarche girl students for next phase of study. The study is under progress currently and shall be made public as soon as it completes.

### Conclusion

This study raises awareness among parents, teachers and students about the early detection and management of idiopathic scoliosis. We recommend SSC for early detection of such cases for timely conservative management.

**Conflicts of Interest:** Nil

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**Ethical Clearance:** Yenepoya University Ethical Committee number: YUEC/2018/037.

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# HIV Infection, Religion and Spirituality in Nigerian Community Settings

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## Abstract

This article focuses on religion and spirituality regarding People Living with Human Immunodeficiency Virus (PLWH) in Nigeria. Specifically, the paper x-rayed the situation of HIV epidemic in Nigeria, followed by the impact of religion and spirituality on PLWH and finally the possible solution that can help to reduce the prevalence of the disease, as well as improve care and support of PLWH in Nigerian community settings.

**Keywords:** *HIV infections, Religion, Spirituality, Nigeria, Community Settings.*

## Introduction

HIV epidemic is still a serious health challenge that demands serious attention. Presently, Sub-Saharan Africa accounts for 66% of all people with HIV infection<sup>1</sup> while 9% of PLWH globally are from Nigeria.<sup>2</sup> Moreover, about 3.3 million people live with HIV with a 3.6% adult HIV prevalence rate.<sup>3</sup> However, the Nigerian Government is making tremendous effort to avert this epidemic through Anti-Retroviral (ARV) drug treatment. Nonetheless, less than 50% of PLWH in Nigeria are being diagnosed and treated to enhance their quality of life, reduce opportunistic infections and impact of HIV transmission in the community.<sup>4</sup> Studies have shown that the causes of stigmatization from members of the society that results to serious depression and anxiety among HIV-infected persons.<sup>5</sup> In addition, studies have also demonstrated that religious and spiritual care, coping skills and social support can be used as a mediator of perceived symptoms of stigmatization effects and improve health among those infected with HIV.<sup>6</sup>

Religion and spirituality reflects social support and thus can be employed as alternative and holistic treatment for PLWH.<sup>5</sup> Religion and spirituality can be a key role in both HIV infection prevention and care of PLWH within their community and congregation. Religion has been defined as the formal, institutional and outward expression of the sacred and has been measured by importance of religion, belief in God, religious

attendance and prayer/meditation.<sup>7,8</sup> On the other hand, spirituality includes the internal, personal and emotional expression of the sacred and is often assessed by spiritual well-being, peace/comfort derived from faith and spiritual coping.<sup>9</sup> Previous studies revealed that an intensified religious and spiritual action is associated with less psychological distress, social functioning, greater energy and will to live, better cognitive functioning and feeling that life has improved since HIV diagnosis.<sup>10,11</sup> Nevertheless, religion and spirituality can also worsen outcomes because of likely belief on their religion faith and rejection of antiretroviral therapy and because of views of HIV as punishment from God for sinful lives. This paper tries to point out the existing knowledge regarding on religion and spirituality as it related to the roles religiosity and spirituality play in PLWH in Nigeria. Furthermore, the paper reviewed the negative impact religion and spirituality has on PLWH and finally the possible solution that can help to reduce the prevalence of the disease, care and support of PLWH in Nigerian Community settings.

**The Bane of Religion and Spirituality among PLWH:** The religion of a patient can affect the way he/she perceive health and disease and association with others.<sup>12,13</sup> Many spiritual patients strive to meet some religious needs related to their disease and failure to meet these needs may influence the type of life they live.<sup>14</sup> In addition, the form of spirituality (negative or positive) embraced by a patient may have a precarious

influence on the condition of the disease as revealed in earlier research.<sup>15,16</sup> Moreso, when a patient feels punished and abandoned by a higher power is termed negative spirituality and the feeling and believe that God loves and forgives them despite their shortcomings is positive spirituality.<sup>17</sup> Patients may embrace negative spiritual/religious beliefs in preference to conventional treatment that may be detrimental to health-seeking behaviors, treatment adherence, survival and quality of life.<sup>18</sup> Previous researches have also showed that religion and spirituality may have a hurtful effects on HIV patients banished from their religious organizations because of the humiliation/misjudgment connected with being HIV-positive.<sup>19,20</sup> Some religious leaders and organizations have reacted with upright judgments and disapproval for people with HIV that have self-conscious behavior change.<sup>21</sup> Messages from the pulpit about sin and a 'bad death' due to AIDS have been common.<sup>22,23</sup> In an investigation of religious leaders in Nigeria.<sup>24</sup> establish that 54% of Christian leaders assumed that AIDS had been sent by God as a specific punishment for sexual license; a further 20% thought that it was a divine punishment covering other transgressions. Among the Muslim leaders, 68% claimed that it was wholly a divine punishment.<sup>24</sup> Despite these inadequacies, religion and spirituality has been characterized to promote acceptance and support for greater well-being of people living with HIV.

**The Place of Religion and Spirituality in the Lives of PLWH:** In Nigeria, religion and spirituality connects people of different races, class and nationality together, including PLWH. In addition, religious principles and exercises are entangled in the activities of the people and the leaders of churches, mosques and other religious communi ties play influential roles in determining the attitudes, opinions and behaviors. Researchers have shown that a religion/spirituality can assist PLWH in adoption of protective health behaviors.<sup>10,25-34</sup>

In Nigeria, religious institutions are spread throughout the country and have the capacity to reach a large number of people. The perception of HIV patients about their health, disease and interaction with relative, friends and neighbours can be determined by the way their religious and spiritual belief influences them.<sup>35,12</sup> In spite of the hilarious effect of religion and spirituality on PLWH, some scholars have suggested that religious and spiritual influences can contribute immensely to high level of satisfaction with life in PLWHA.<sup>34</sup> Even more,<sup>36</sup> investigated the views and live experiences of

men living with HIV/AIDS and suggested that religions such as Catholicism can promote acceptance and support for greater well-being of men living with HIV/AIDS. In addition, religiosity may become noticeable in the patients attitudes, religious services participation, improved religious beliefs which will show in the patients personal actions such as prayer. Positive relationship between religiosity and well-being in PLWHA is based on religion providing the basis of social support, recovery of meaning in life and a coping mechanism.<sup>37,38</sup> Therefore, since religion and spirituality could improve the adoption and practice of protective health behaviors<sup>39</sup>, religious and spiritual-based HIV/AIDS prevention programs are assumed to be an effective way to decrease the prevalence of HIV/AIDS by encouraging harmless and less HIV risky behaviors. With this in mind, many religious organizations are getting involved in HIV/AIDS prevention education programs and are likely to be more effective in preventing the spread of HIV/AIDS.<sup>40</sup>

## Conclusion

This paper presents a perspective on the state of knowledge on religion and spirituality regarding People Living with Human Immunodeficiency Virus (PLWH) in Nigeria. In Nigeria, religious institutions are spread throughout the country and have the capacity to reach a large number of people. The perception of HIV patients about their health, disease and interaction with relative, friends and neighbours can be determined by the way their religious and spiritual belief influences them.

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# Public Health Relevance of Sparganosis in Javan Spitting Cobra Snakes (*Naja sputatrix*): A Neglected Zoonotic Disease In Indonesia

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## Abstract

Sparganosis is a zoonotic disease caused by the spargana (larvae) of *Spirometra* sp. (Diphyllobothriidae). Snake are particularly important intermediate hosts for the transmission of this parasite in Asia especially Indonesia. However, their role for sparganosis in javan spitting cobra (*Najasputatrix*) is unrecognized. This study aimsto investigate the infection of cobra snakes with *Spirometra* tapeworm in Banyuwangi, Indonesia where several local sellers have been identified recently sold snakes meat for culinary purposes. A total of 37 cobra samples were bought from a localseller and euthanized. Then, continued with necropsy and parasitological examination. The result founds 71 plerocercoids within muscular and subcutaneous tissues and the prevalence were recorded at 56,7%. Our finding is the first identification confirmed record of *Spirometra* tape worm in javan spitting cobra in Indonesia. Since snakes are often a component of mammalian diet, they can be a source of *Spirometra* tapeworm infection in human and Indonesian wildlife. However, further studies are needed to investigate the prevalence ofinfection in other reptiles and amphibian hosts.

**Keywords:** *Javan Spitting Cobra, Najasputatrix, Sparganosis, Spirometra, Zoonotic.*

## Introduction

Sparganosis is a food and water-borne zoonotic disease caused by spargana (the infective stadium) of the *Spirometra* sp. tapeworm (Diphyllobothriidae). Most research regarding sparganosis has been conducted in Asia, especially in mainland China where sparganosis is a serious threat for public health.<sup>1,2</sup> However, sparganosis reports are still little known in Indonesia. This tapeworm is transmitted to humans in the following ways such as swallowing an infected copepod in natural

water, consumption of insufficiently cooked amphibians (frogs or tadpoles), snakes, birds, or even mammals such as rodents and pigs and by poulticing the skin or eyes with a split frog. The clinical manifestation of sparganosis includes ocular, subcutaneous, oral and maxillofacial syndromes and it may sometimes be fatal not only in humans but also animals.<sup>3</sup>

Intermediate hosts for *Spirometra* tapeworm such as amphibians and reptiles, are already considered important wildlife for parasite transmission in Asia.<sup>2,3</sup> In Indonesia, the only two cases of infected reptiles, in oriental rat snakes (*Ptyasmucosus*) and Indonesian bronzeback snakes (*Dendrelaphispictus*), have been recorded in Sidoarjo City and Mojokerto City with high prevalence.<sup>4,5</sup> The parasite first intermediate hosts are copepods (*Cyclops* sp.), planktonic crustaceans in which proceroids (the first larval stadium) develop. The second intermediate or paratenic hosts can be vertebrates, such

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as amphibians, reptiles, birds, or mammals (including rodents and human).<sup>3</sup> Procercooids then develop into plerocercoids (the larval infective stadium) which settle in organs and tissues of intermediate hosts.

The life cycle of *Spirometra* sp. may also include paratenic hosts, in which plerocercoid or commonly known as spargana once more settle in the tissues after passing through the intestinal wall.<sup>6</sup> However, these hosts are not necessary for the completion of *Spirometra* tapeworm life cycle. Therefore, knowledge of the *Spirometra* sp. life cycle is still limited. Adult *Spirometra* sp. reproduces mainly in the intestines of felids and canids such as the Eurasian lynx (*Lynx lynx*) and wolf (*Canis lupus*) which parasite eggs are shed with animal feces.<sup>7</sup> The high prevalence of sparganosis in Asia may be related to the local dietary habit, where snake is regarded as popular and nutritious culinary.<sup>8</sup> In Indonesia, about half of the local restaurants provide wild-caught snakes which used for culinary purposes. Moreover, the worse matters, many people enjoy eating half cooked or even completely raw meat, skin and gall bladder of snakes, without considering the high risk of infection by parasites.<sup>4,5</sup> Based on the high prevalence of sparganosis and the unhealthy habit of eating snakes in Indonesia, we conducted this study to further understand the prevalence of sparganosis occurrence in *Najasputatrix* snakes which commonly sold in local restaurants. The aim of our study were to assess the risks of human spargana infection caused by the consumption of wild-caught snakes and provide scientific foundation for preventing sparganosis transmission from animals to humans.

### Materials and Method

A total of 37 living *Najasputatrix* snakes were collected from local seller in Banyuwangi City, East

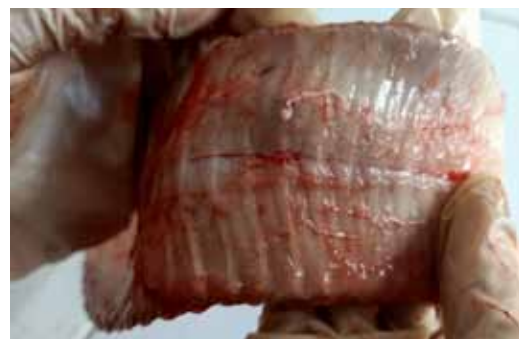
Java Province, Indonesia (114.369227 Longitude and -8.219233 Latitude) then euthanized and necropsied. The presence of spargana in snakes was examined according to the following method.<sup>9</sup> Briefly, the snakes were euthanized using ethyl-ether anesthesia, weighed and skinned. The muscles and subcutaneous tissues were carefully observed for the presence of spargana by eyes. Then, the spargana were removed from the muscles or subcutaneous tissues and put in a Petri dish containing physiological saline to observe their movement. The number of spargana collected from each infected snake were counted to estimate the intensity of sparganum infection. Identification of the larval infective stadium (plerocercoids) in wet preparation using carmine staining and clearing with glycerin then examine using a light microscope with a magnification of 40x and 100x.

### Results

Based on examination results, 21 snakes were positive infected with larvae of *Spirometra* tapeworm or called spargana with the total prevalence of 56.7%. Moreover, a total of 71 spargana were collected in this study which divided into 47 (66.1%) spargana in muscular and 24 (33.8%) spargana were found in subcutaneous tissues of *Najasputatrix* snakes. Spargana were macroscopically identified as flat, thin and white colored with ribbon-like structure. Those spargana frequently founds in groups in almost all parts of muscular and subcutaneous tissues (Figure 1). The spargana average length is +12cm, with +0,3cm body width. Microscopy examination using carmine staining method shows segmented body and mouth-like shape at the top of anterior side (Figure 2). Therefore, the results of microscopic observation were confirmed plerocercoid larvae of *Spirometra* sp. or spargana.

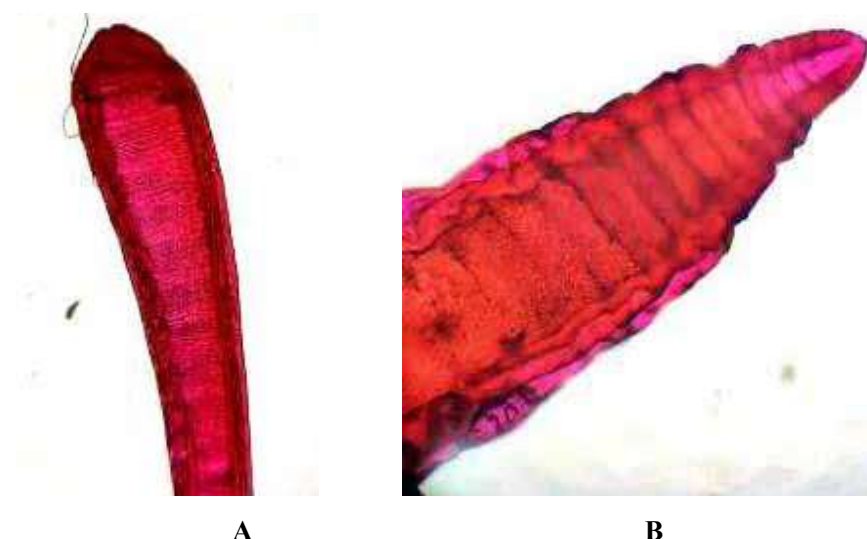


A



B

**Figure 1. Spargana (plerocercoids) of *Spirometra* tapeworm located in (A) muscular and (B) subcutaneous tissue of *Najasputatrix*. Arrows point to spargana**



**Figure 2. Photomicrograph of spargana from *Najasputatrix*. (A) anterior side and (B) posterior side using carmine staining (100x magnification).**

### Discussion

*Najasputatrix* or commonly known as javan spitting cobra snake was strongly associated with wetlands, where they can most likely become infected with procercooids by swallowing water copepods or consuming amphibians such as wild frogs.<sup>10</sup> Moreover, they can be hunting living prey upon by several species of mammals and birds that are known to occasionally eaten by reptiles.<sup>11</sup> This report also confirms the role of reptiles as parasite transmitters in Asia and reveals additional routes of sparganosis transmission in Indonesian wildlife. Further studies are recommended to provide a deeper explanation of the role of non-mammalian hosts in the spread of *Spirometra* sp. in the natural environment. Spargana of *Spirometra* tapeworm can parasitize humans and result in sparganosis, which is an important zoonotic disease. Sparganosis mainly occurs in east and south Asia, but has been reported in several countries worldwide,<sup>12</sup> including Europe, America, Africa and Australia.<sup>13</sup> In Indonesia and China, there are similar cases of human sparganosis which caused by eating rawmeat of snakes and frogs, drinking snake blood and swallowing snake gall bladder.<sup>14</sup> In addition, the risk of *Spirometra* transmission may contaminate food in the process of cooking snake meat through improper cooking method.

Consuming the meat, viscera, or blood of animals (e.g., frogs, snakes, pigs, mice and birds) in an improper way may be an important means of acquiring sparganosis.

In addition, ingesting copepods in natural water could also cause human infection. Therefore, attention should be given to sparganosis transmission caused by drinking unboiled water from the fields or other unhealthy water sources.<sup>15</sup> Moreover, it is necessary to strengthen food safety inspections of restaurants which provides snake meat. It should be emphasized that all restaurants provide only the meat of farmed snakes or frozen snake meat to the customer, in order to reduce the risk of human sparganosis.

When humans are infected by plerocercoid, commonly known as spargana, the larvae can perform visceral migration, infect many tissues and shows several clinical signs. Spargana has been reported to migrate into subcutaneous tissues and peripheral muscles such as abdominal walls, lower extremities, scrotums and chest walls. Subcutaneous sparga nosis is the most common form among type of sparganosis in humans.<sup>16</sup> Under the skin, the lesions look like rubbery and irregular lumps or nodules of 1-2 cm long that resemble a lipoma or fibroma, while causing itchiness, inflammation and pain. Some infected patients have had chronic forms and sometimes, the nodules can switch from one tissue to another.<sup>17</sup> The larvae of *Spirometra* tapeworms are very soft and thin, therefore, if people who process snake meat do not closely examine them, they will conclude that snake meat is in a condition of proper hygiene and is safe to serve as culinary products. Our study also

shows that javan spitting cobra snake meat is confirmed to be having a role in sparganosis transmission, which is related to human sparganosis.

### Conclusion

Sparganosis has become one of the important human food and water-borne parasitic diseases in Indonesia. In this study, it was found that the spargana infection rate in wild javan spitting cobra snakes sold in agricultural product markets in Banyuwangi City, East Java Province was high and that the sparganainfection originating from other snake species is considerable. Lifestyle and eating habits that may result in a sparganosis were identified in Banyuwangi City. Therefore, it is necessary to strengthen food market management, to ban the sale of wild snakes and to promote public health education in order to prevent the transmission of this parasitic disease.

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# Strength Improvement in Adults Healthy Men

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## Abstract

Increased strength in adult men is very important. It is critical to optimizing physical fitness and avoiding injury. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. This report informs that strength training is very influential to the physique, especially in the musculoskeletal functioning for adults healthy men. Strength training also has an impact on physical activities that are good for the soul and helps fight disorders such as anxiety and depression for adults men. Increased strength in adult men is very important. It is critical to optimizing physical fitness and avoiding injury. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. This report informs that strength training is very influential to the physique, especially in the musculoskeletal functioning for adults healthy men. Strength training also has an impact on physical activities that are good for the soul and helps fight disorders such as anxiety and depression for adults men. Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most of motor activities require optimal performance of at least two qualities of the three listed. The development of one of the three conditional capacities must take place in a methodical way since it directly or indirectly affects the others. Thus, the key to increasing strength in adult men is routine motor training in a structured and methodically educated routine.

**Keywords:** *Strength, adults, men, physical fitness, healthy.*

## Introduction

We will highlight a broader picture of strength expressed by the skeletal muscle system in fit and healthy human beings<sup>[1]</sup>. Later we will also see how mechanical forces are necessary for men to perform their everyday functions, from the simplest to the most complex and

deepen the role of the strength to better understand the reasons for and causes of our movements<sup>[2]</sup>. There are three conditional abilities of a person, namely resistance, strength and speed. The development of this ability counteracts the decline in muscle mass, otherwise often called sarcopenia and prevents muscle injuries in adult men. Intramuscular coordination is useful for athletes who have high endurance and who benefit from alternating recruitment or even desynchronization, allowing greater recovery for muscles that do not contract. Research also shows that intensification techniques are the best practice. There are divisions in the context of strength. The first is maximum strength, that is the highest strength that can be expressed by the nervous-muscle system voluntarily with contraction. The second is fast strength, that is the capacity of the nervous-muscle system to overcome resistance with a high level of contraction<sup>[3]</sup>.

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## Material and Method

An important factor to consider is the possible presence of hypertension that can seriously present an impediment to such training since loads very close to the ceilings determine an increase in blood pressure due to the Valsalva maneuver (exhalation to closed glottis), which inevitably occurs when almost maximal loads with low repetitions are applied; this leads to an increase in chest pressure and a reduction in the flow of venous blood to the heart<sup>[4]</sup>. This condition is established especially during exercises involving large muscle masses such as squat. This happens because it tends to unconsciously increase the intra-abdominal pressure in order to protect the vertebral column from the stress<sup>[5]</sup>.

For athletes who are periodically subjected to medical checks or to those who are constantly monitored, it is of crucial importance to cycle and periodize their workouts and to always introduce a less long rest period before the maximum strength cycle<sup>[6]</sup>. A question too often brought up concerns the optimal number of series and repetitions in the cycle dedicated to maximum force. Several studies agree that there is no substantial difference between the 3- and 5-series-per-exercise cycles. As such, it is important to perform a low number of repetitions strictly within the 4-to-7-stroke range with doubles and singles.

Predominantly eccentric trainings, like those of the negative ones, represent a very powerful means of development of maximum force. With this training it is possible to brake loads of even 120–130% of 1RM. It should not, however, be carried on for more than 2 or 3 weeks so as not to overload the connective structures excessively<sup>[7]</sup>. Plyometric trainings can also be useful for increasing maximum strength, provided that the same rules are observed for negative repetitions. Both of these method overload both the musculoskeletal system and the central nervous system<sup>[8]</sup>.

## Finding and Results

There are studies showing that the findings of this topic are very familiar and it is not surprising that these athletes always represent the “strongest” sports class with greater abilities. Maximum strength is one of the biggest mistakes an athlete can make<sup>[9]</sup>. If you want to achieve a high level of clear muscle growth and create an impressive physical structure, then you need to push hard and lift weights to strengthen your muscles and joints. In this way, improvements to posture and endurance can

be achieved and the risk of spinal column pathology such as hernia in the abdominal and back muscles can be avoided<sup>[10]</sup>. This also has an impact on increasing heart contractile capacity and coronary spraying at rest. Sportsmen have not only lower heart rates than people who do not move but also lower susceptibility to sudden changes in pressure; in addition, the circulatory system becomes more elastic and has better venous return because of greater efficiencies of the muscles.

Physical activity is also good for the soul and useful for fighting disorders such as anxiety and depression. In fact, it contributes to the release of two important types of neuromediators, namely acetylcholine and endorphins. These are molecules that produce sensations of analgesia and well-being as well as properties that lead to the definition of the happiness hormone<sup>[11]</sup>. The results of research conducted on breathing exercises prove that a number of trainings given to clients are able to increase the strength of breathing muscles<sup>[3]</sup>.

The increase in strength is not exponential; its growth is therefore not always linear over time. If this were not the case, in a few years any power athlete would be able to practice biceps curls with 200 kg dumbbells. Unfortunately, it does not go that way. In strength training we must intervene gradually and, in any case, within human limits, set realistic long-term goals that are achievable<sup>[13]</sup>.

## Discussion

The various kinds of strength mentioned above include maximum force, explosive power, resistance to explosive power and muscle endurance, which can be classified according to biological principles<sup>[4]</sup>. This power can be classified by considering both neuromuscular aspects, which function to modulate tension and metabolic aspects, which determine its duration. Therefore, maximum strength and explosive strength are characterized by neurogenic factors, while resistance to explosive forces and muscle resistance are characterized by metabolic factors<sup>[5]</sup>. Strength, speed and endurance are the main requirements for successful performance<sup>[6]</sup>. Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most motor activities require optimal performance of at least two qualities from the three listed. The development of one of the three conditional capacities must be carried out methodically because it directly or indirectly influences the other<sup>[7],[8]</sup>.

Cyclists cannot think of winning the final sprint if they are not trained, volleyball players cannot think of jumping higher if they have not increased their strength and body builders cannot think of developing further hypertrophy if they have not been through power training<sup>[8]</sup>. Among the three types of strength, maximum strength is the first to be trained. After having this quality increased, one can start working on another type of power with adequate training. Maximum strength can then become explosive strength and endurance or turn into hypertrophy<sup>[19]</sup>. Maximum strength increase occurs first with adaptation and modification at the nerve system level and morphological transformation and eventually reaches hypertrophy. Most likely, neural adaptation acts at both the central and peripheral levels; this is determined as a final result. This modification will provide possibilities to immediately recruit a very high number of muscle fibers and trigger all the blasting processes by force<sup>[9]</sup>.

Changes in nervous system level will ensure increases in intramuscular and intermuscular coordination with energy savings as the result as well as increases in the speed of the implementation of a movement<sup>[21]</sup>. Small loads can produce high outcomes through speed, but using low loads and high repetitions is sub-optimal because in such a training situation, the alternation of the recruitment of motor units comes into play, in which case it does not lead to the improvement of strength<sup>[1]</sup>. Higher loads, on the other hand, will provide greater supercompensation. If optimal muscle tension is not achieved, there may be no increase in the strength produced. Training method to increase maximum strength vary and include repeated effort method: series method, pyramidal method, dynamic method, maximal effort method, static or isometric stress method and contrasting method<sup>[10]</sup>. The latest findings reviewing articles that show that exercises that are carried out slowly and gently can reduce the risk of even simple exercises if done incorrectly can cause joint pain and muscle tension aimed at improving male posture<sup>[17]</sup>.

The method above are the result of a study which combines well with performance sports<sup>[2]</sup>. Strength training for advanced bodybuilders or fitness practitioners aims to increase the reception capacity of motor units, thereby usable in mesocycles for hypertrophic purposes. This is principally the characteristic to building strength<sup>[7]</sup>.

## Conclusions

Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most of motor activities require optimal performance of at least two qualities of the three listed. The development of one of the three conditional capacities must take place in a methodical way since it directly or indirectly affects the others. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. It serves as a starting point. A cyclist cannot think of winning a final sprint if he has not trained his strength, a volleyball player cannot think of jumping higher if he has not trained his strength and a bodybuilder cannot think of developing further hypertrophy if he has not trained his strength. Thus, the key to increasing strength in adult men is routine motor training in a structured and methodically educated routine.

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# An Analysis of ROSIER Method on Handling Acute Stroke in Emergency Room of PKU Muhammadiyah Gamping Hospital

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## Abstract

The predominance of intense stroke consistently increments from year to year. Ideal taking care of the executives was required to upgrade the standard of taking care of. ROSIER (Recognition of Stroke Inside the Emergency Room), this strategy is an evaluation that is utilized to distinguish and intercede quickly in patients with acute stroke. The motivation behind this investigation was to break down the ROSIER method in overseeing acute stroke in the Emergency Room(ER). The examination configuration was an observational investigation. Right now an example of nurses, doctors and patients in the ER PKU Muhammadiyah Gamping Hospital. The instrument utilizes surveys and perception sheets. Engaging investigation and connection utilizing the rank spearman test. The outcomes show that age, instruction and length of work are not identified with the knowledge acute stroke on nurses and doctors about stroke and its care management. Plus, it was found in the treatment of acute stroke utilizing the ROSIER method, the underlying evaluation was as yet not maximally did. The outcomes demonstrated that the underlying asesment of stroke patients was beneath 80%. While the supporting assessmen, the underlying analysis, the exchange framework and the commencement of the exchange procedure have been completed with a rate above 80%. The ROSIER method comprises of evaluation and treatment appraisals, which deliberately whenever actualized appropriately will incredibly help with accomplishing treatment targets, is dodging even incapacity and demise because of deferrals or wrong method in the asesment and taking care of treatment stroke acute.

**Keywords:** Acute Stroke, Emergency, ROSIER Method.

## Introduction

Stroke is one the main cause death in the world or globally the leading cause of mortality. In Indonesia turned into the No. 1 most noteworthy in Southeast Asia and stroke is additionally alluded to as the Silent Killer`, which is an instance of the reason for death subtly and keeps on tending to build<sup>1</sup>. RISKESDAS information for 2018 expressed that the commonness of

stroke in Indonesia at the time of  $\geq 15$  years was 10.9% every moment, while in 2013 this pervasiveness was at 7% so that there was an expansion of 3.9% over a time of 5 years. Uncommon Region of Yogyakarta (DIY) as the region that has the most elevated predominance in 2018 is 14.7% which is equivalent to the territory of East Kalimantan<sup>2</sup>.

Treatment of Strokes in ER by and large isn't ideal, it is demonstrated that the triage framework is as yet not ready to run appropriately, exceptional revival, particularly advance life bolster that supports hemodynamic framework disappointments because of neurological issue, at that point not promptly get an uncommon examination in particular brain CT Scan for decide if this acute stroke is a kind of hemorrhagic or localized necrosis and there is no particular perception

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framework in the crisis space for stroke patients. Another factor that turns into a test in the treatment of intense ischemic stroke is the best possible and well-overseen treatment in the ER for instance of the low accessibility of thrombolysis treatment and supporting foundation for thrombolysis treatment in creating nations<sup>3</sup>.

The board of intense stroke in the beginning times requires a decent technique and framework, quick and proper intercessions, particularly in the crisis room will have a noteworthy effect to lessen the danger of death and incapacity of patients. A few things can be kept from creating relentless manifestations of TIA (Transient Ischemic Attack), diminished cognizance, loss of motion of furthest points, discourse issue and different indications of neurological issue. The board of intense stroke in the ER turns into a significant piece of coordinated treatment running from treatment at home or prehospital to rehabilitation care after this patient is hospitalized. One successful strategy that can be utilized in the ER is the ROSIER (Recognition of Stroke in the Emergency Room) method, this technique is an evaluation scale that is utilized to recognize and intercede quickly in patients with acute stroke<sup>4</sup>. ROSIER is a piece of Stroke acute Management with Urgent Risk-factor Assessment and Improvement (SAMURAI), which contains compelling method for overseeing acute stroke sufferers by limiting sequelae or inability and inconveniences of acute stroke<sup>13</sup>.

**Method**

The examination configuration utilizes observational scientific research that intends to dissect stroke the board with the ROSIER strategy. This exploration was directed at the ER Rooof PKU Muhammadiyah Gamping Hospital Yogyakarta.

**The example right now:**

1. Patients entering June - September 2019
2. Nurses and Doctors in ER of PKU Muhammadiyah Gamping Hospital numbered 27 individuals.

Testing was finished by purposive sampling. Criteria inclusi of patients will be patients with an acute stroke class and not the Do Not Resuscitation (DNR) classification. The exploration instrument utilized a poll to quantify the information knowledge on nurses and doctors about overseeing acute stroke with the ROSIER method. The following instrument is perception sheet to survey: triage framework for acute stroke patients,

initial asesment, resuscitation, openness support for brain CT examines, access to thrombolytic treatment in stroke infark category, Observation and transfer system acute stroke patients. Data Analisis was performed of desciptif analitic and with rank spearmen test to break down the corelation between variable.

**Result**

The consequences of the examination clarified the recurrence conveyance of respondents' attributes, to be specific nurses and doctors in the ER of PKU Muhammadiyah Gamping Hospital and broke down the connection between age, training and length of work with the knowledge on nurses and doctors about stroke and its taking care of (table 1 and table 2). Other than that, it was additionally indicated the treatment of acute stroke by the ROSIER method by showing eight treatment segments.

**Table 1. Frequency Distribution of General Data and Knowledge of Health Officers (Nurses and Doctors)**

Variable	n (%)
<b>A. General Data</b>	
<b>Age (Years)</b>	
• 25-35	22 (81.5)
• 36-45	4 (14.8)
• > 45	1 (3.7)
<b>Education</b>	
• Diploma III in Nursing	10 (37.0)
• Ners	7 (25.9)
• Doctor	10 (37.0)
<b>Years of Work (Years)</b>	
• <1	6 (22.2)
• 1-3	6 (22.2)
• > 3	15 (55.6)
<b>B. Knowledge</b>	
• Good Knowledge	18 (66.7)
• Medium Knowledge	9 (33.3)
• Lack of knowledge	0 (00.0)

**Table 2. Spearmen Rank Test Results**

Variable	p-value
Age with Knowledge	0.967
Education with Knowledge	0.934
Long Working with Knowledge	0.625

Table 1 above shows that most of nurses and doctors are matured 25-35 years (81.5%) with 37% segments having a Diploma III in Nursing, 25.9% nurses and 37%

doctors. The greater part of respondents (55.6%) have work experience > 3 years.

While Knowledge about acute stroke care management shows that as much as 66.7% of good category and 33.3% of medium category. The examination indicated that age, training and length of work were not identified with nurses and doctors knowledge about stroke and its care management (table 2).

Treatment of acute stroke utilizing the ROSIER method appeared in the greater part of the respondents (53.7%) fall into the need triage classification priority 2. The aftereffects of the underlying evaluation of acute stroke patients outline that the appraisal procedure or introductory evaluation of patients for all segments of the appraisal is as yet not done to the most extreme. It is apparent from the outcomes that the evaluations that have been done in every appraisal are in the rate beneath 80%. The most noteworthy appraisal score was done on the evaluation of past stroke history (78.0%), evaluation of stroke beginning (70.7%) and evaluation of circulatory strain esteems (70.7%). While the most reduced score was gotten from the National Institute of Health Stroke Scale (NIHSS) score appraisal with an aftereffect of 46.3%. Revival of stroke patients is done if there are signs. The outcomes demonstrated that the most revival measures were IVline establishment (65.9%) and breathing instrument establishment(36.6%). While the least done is the arrangement of Cardiac Pulmonary Resuscitation (CPR) of 2.4%. Supporting assessment get to was done by practically all respondents (90.2%). Different examinations were completed, for example, routine blood, liver capacity and kidney fuction. Though 78% of respondents brain a CT Scan examine.

The underlying finding was made of 87.8% of respondents. Access to thrombolytic treatment was done in 9.8% of respondents. The perception framework was completed on 87.8% of respondents. The transfer system is completed at 73.2% of respondents. While the best possible commencement of the transfer procedure practically all respondents (90.2%) were completed.

## Discussion

The consequences of this examination demonstrate most of nurses and doctors knowledge about the appraisal and treatment of acute stroke in ER the great class, this shows the ROSIER method has been comprehended and applied in the treatment of acute stroke patients in

the ER. A few components could be the reason for their great degree of information, could be because of the propensity transmitted among seniors and youngsters, likewise could be because of the standard Operational Procedure(SOP) for taking care of acute stroke in the ER and obviously, there is an update to know by every person from different approaches to get data on taking care of acute stroke in the ER<sup>14</sup>.

Nurses in ER work crisis officials, particularly those working in crises with an assortment of associations and patient classes that must be unraveled, unpredictable and multidimensional issues, this requires a medical caretaker to function admirably in groups and ready to work under huge tension from different gatherings, the quality nurses keep on being improved remembering for this case the underlying evaluation procedure and activities<sup>5</sup>. This is identified with patients with stroke crisis conditions requesting the capacity to triage, quick evaluation, assurance of determinations and proper measures to forestall postpones that outcome in incapacity and passing in patients who experience an acute stroke in the ER<sup>12</sup>.

The procedure of initial asesment of acute stroke patients in the crisis office utilizing the ROSIER method comprises of asesment and treatment appraisals, which deliberately when applied appropriately will be exceptionally useful in accomplishing treatment targets, is keeping away from inability and not even demise because of postponements or wrong strategies in the asesment and treatment<sup>13</sup>. The consequences of this investigation are the underlying evaluation process in acute stroke patients who go to the ER has not been done ideally all in all, the normal surveyed esteem is underneath 80%, this will influence the appraisal or move to be made straightaway. As per the National Confidential Inquiry into Patient Outcome and Death(NCEPOD), fast and precise appraisals in Emergency Services will affect late basic leadership and poor dealing with<sup>6</sup>.

The assesment of the ROSIER technique that should be done is the appraisal of diminished cognizance and seizures, facial and appendage neurological issue, visual hindrance, appraisal of past stroke history, beginning of the assault is to what extent the patient was distinguished to have a stroke<sup>7</sup>. Hazard factors for stroke patients should be surveyed to decide the ideal anticipation and treatment bolstered when a quick evaluation of circulatory strain, glucose esteems (GDS) and a NIHSS score appraisal comprising of 1. (a) evaluation of level

of awareness, (b) reactions to questions, (c) LOC directions, 2. Turn around look, 3. Field of vision, 4. Facial loss of motion, 5. (a) right arm engine, (b) left arm engine, 6. (a) right leg engine, (b) left appendage engine, 7. Appendage ataxia, 8. Tangible, 9. Language, 10. dystraasia, 11. Consideration, with a range from 0 to the heaviest 42 scores. NIHSS can decide the examination estimation of hemorrhagic stroke (SH) if its score > 20 and NIHSS < 20 is a non-hemorrhagic stroke (SNH)<sup>8</sup>. NIHSS can likewise lessen the danger of confusions in stroke patients because of desire by evaluating the degree of patient mindfulness<sup>9</sup>.

The utilization of ROSIER in the ER will be a guide in setting up standard working method or medicinal assistance approaches for the treatment of acute stroke patients, beginning with a fast appraisal in order to decide the correct triage and resuscitation, availability of the fundamental CTScan examine is performed with a holding up time of < 45 minutes from confirmation ER, introductory analysis < 3 hours, assurance of treatment as indicated by finding including quick access to thrombolytic stroke infark. The advantages of intravenous (IV) Plasminogen Activator (tPA) tissue are time-subordinate, that is, the reaction time of the entryway to needle is 3 hours from the beginning of the assault<sup>16</sup>. The patient's necessities are as per ECASS III rejection criteria. acute stroke localized necrosis that doesn't meet the necessities of both must be finished by mechanical thrombectomy<sup>10</sup>. Right now, aftereffects of access to thrombolytic treatment with IV tPA in PKU Muhammadiyah Gamping IGD are still minimal done (9.8%), different reasons for time components and criteria and clinic strategies in regards to these treatments have not been solid.

The correct observation system in the ER so it will help the possibility of moving or transfer acute stroke patients from the crisis space to the stroke unit or intensive care unit (ICU) or the standard inpatient room is likewise a manual for the qualification of the referral framework between medical clinics with different signs. The Rapid Assessment in the proper ER can help further administration so it can lessen the quantity of Leng of Stay (LOS) patients<sup>11</sup>. Detainment of patients in the (ED LOS) including stroke patients, there are a few components, in particular the patient's inner variables, outer elements and different factors outside them two, for instance, patients in the ER will be moved to hospitalization subsequent to getting an expert specialist's conference, while the pro specialists are not

beginning at the Emergency Departement.

Different contemplations in the rapid asesment process in acute stroke patients despite everything focus on the vital Sign identified with the triage condition, if in an actual existence sparing resuscitation life saving condition some optional scodary asesment might be deferred or may not be finished. On the off chance that a stroke quiet lands at the crisis office with need triage one priority and requires CPR, establishment of endotracheal intubation, utilization of a ventilator and other advanced life support, at that point some optional evaluation will be deferred until the patient's condition is steady, for instance, a CTScan check, thrombolytic treatment and assessment other help<sup>15</sup>.

## Conclusion

### The finishes of this investigation are:

1. Emergency Departement officials right now and specialists in the PKU Muhammadiyah Gamping IGD show a large portion of the kwoledge about taking care of acute stroke in the ER with the ROSIER method in the great class.
2. Aftereffects of investigation Age, instruction and length of work of nurses and doctors are not identified with knowledge about stroke and its care management.
3. The triage of patients who go to the ER is for the most part in the need priority 2 which requires a non-resuscitation adjustment evaluation.
4. The use of the ROSIER method in the treatment of acute stroke comprises of introductory asesment, resuscitation, availability of supporting assesment, starting conclusion, access to thrombolytic treatment, observation and transfer for acute stroke patient. The underlying asesment part of acute stroke has not been done ideally

**Conflict of Interest:** None

**Ethical Clearance:** This study was approved by the Research Ethics Committee of Universitas Muhammadiyah Yogyakarta.

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# Features of Determining the Condition of the Thyroid Gland in Young People Residing in Regions with Partially Expressed Iodine Deficiency

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## Abstract

Anthropometric and sonographic studies of 92 school children of younger and older age groups were carried out. It has been proven that the transverse size of the thyroid gland is larger in boys than in girls in both age groups. However, in a sonographic assessment of thyroid volume, opposite trends were obtained. To assess thyromegaly, a sonographic assessment of thyroid volume is necessary, since the determination of the volume of the thyroid gland by ultrasound is deprived of the subjectivity inherent in different doctors on palpation. However, an assessment of the size of the thyroid gland must be carried out in accordance with the body (area) of the child, calculated on the basis of height and weight.

**Keywords:** Anthropometry, sonography, thyroid gland, students, prevention.

## Introduction

Iodine deficient diseases are one of the most common non-infectious human pathologies. In 1988, 7 million people (about 35.2% of the population) experience iodine deficiency in the world. An increase in thyroid gland was found in about 700 million people and severe mental retardation due to iodine deficiency was found in 45 million<sup>[1]</sup>. According to WHO, in the world there are more than 200 million patients with endemic goiter. Iodine deficiency resulting in goiter occurs in 187 million people globally as of 2010 (2.7% of the population). It resulted in 2700 deaths in 2013 compared to 2100 deaths in 1990. The area is considered endemic if the frequency of goiter according to ultrasound exceeds 5%

and the **median concentration of iodine in the urine in children of prepubertal age (6-12 years) is less than 100 µg/l<sup>[7]</sup>**. Especially dangerous is the decrease in intellectual performance and hence the ability to learn, among schoolchildren and adolescents, since it is at this age that a person receives the necessary amount of basic knowledge, largely determines the intellectual possibilities in later life<sup>[2]</sup>.

The proportion of the population and the number of individuals (school-age children and general population) with insufficient iodine intake (defined as proportion of population with UI below 100 µg/l) by WHO region<sup>[9]</sup> is presented in Table 1.

**Table 1: Insufficient iodine intake in school-age children (6 to 12 years) and in the general population (all age groups) by WHO**

WHO	School-Age Children		General Population	
	Proportion (a) (%)	Total number (Millions)	Proportion (b) (%)	Total Number (Millions)
Africa	42.3	49.5	42.6	260.3
Americas	10.1	10.0	9.8	75.1
South-East Asia	39.9	95.6	39.8	624.0
Europe	59.9	42.2	56.9	435.5
Eastern Mediterranean	55.4	40.2	54.1	228.5
Western Pacific	26.2	48.0	24.0	365.3

a 192 WHO Member States, b Based on population estimates in the year 2002, Source: WHO

Iodine prophylaxis is a priority in the elimination of goiter endemic. The most vulnerable part of the population are children, including those of school age. Indeed, the anatomical and functional state of the thyroid gland in school children of this age clearly reflects the current state of iodine supply and is less variable than in adolescents during the puberty period [2].

A number of authors recommend to use the following method to assess the severity of iodine deficiency diseases: anthropometric (height, weight), physical (palpation, measurement of gland size), ultrasound examination with determination of gland volume, determination of iodine content in urine and determination of TSH, T3, T4 concentrations[3]. However, not every medical institution possess laboratory and instrumental method of research which can be performed with best accuracy. Despite the fact that ultrasound examination of the thyroid gland has been used for more than 25 years, there has not yet been a generally accepted idea of what should be considered the norm in sonographic studies in school children of different ages [5,8]. In addition, today

in the world there is no acceptable for clinical practice and adequate for endocrinologists unified classification of degrees of increase in thyroid volume (in contrast to the palpator-visual scale of the WHO, in 1994) [4]. Therefore, the search for simple and cheap criteria in determining iodine deficiency in school-age people continues [6].

**The aim of the study** was to assess the diagnostic value of anthropometry and its correlation with the data of thyroid sonography in schoolchildren of different age groups for the timely detection of thyroid pathology in persons living in iodine - deficiency endemic regions during the full-time medical examination.

**Material and Method**

Two age groups of school children were selected for the study: the youngest, which consisted of students of two-three grades aged 8-9 years and older, which consisted of students of three-ten grades aged 15-16 years. The distribution of children by age and sex is presented in Table 2.

**Table 2: Distribution of children by age and sex**

Gender/Age	Female		Male	
	Number	%	Number	%
8-9 yrs	25	54	21	46
15-16 yrs	32	70	14	30
Total	57	62	35	38

Measurement of the transverse size of the thyroid gland and neck circumference in schoolchildren was carried out using a centimeter tape. When measuring the circumference of the neck, the end of the tape was fixed on the spinous process of the VII-cervical vertebra and the tape is passed over the most protruding part of the anterior surface of the neck. Height and weight of students were measured traditionally, in the medical office of the school. Sonography of the thyroid gland was performed using the SONOLINE SL-1 device manufactured by Siemens (Germany) using a linear sensor with a vibration frequency of 7.5 MHz operating in real time. Thyroid sonography took into account the shape and echo-structure, the presence of nodes, linear dimensions (length, width, thickness) and determined the volume of each part. It should be noted that the

technique of measuring the size of the thyroid gland in schoolchildren provided the following minimum of important elements. The position of the sensor on the child’s neck was accompanied by minimal pressure on the skin to prevent flattening of the gland. Measurements of linear dimensions were carried out only on such transverse and longitudinal sections of both lobes, which reflect their maximum value. Choosing a cross-section, focus on the true (anatomical) cross-sectional plane (horizontally - not at an angle), while the longitudinal size (length or height of the shares) is actually determined by the axis deviates from the vertical. The optimal is an obliquely vertical position of the sensor, when it is oriented parallel to the outer edge of the sternocleidomastoid muscle. To determine the volume of the thyroid gland used the formula:



$V$  (lobe) = length \* width \* height \* 0,479 where 0,479 - factor ellipsoidal.

The volume of one lobe of the gland is measured in cubic centimeters or milliliters. The volume of the second part is calculated in the same way. Accordingly, these volumes are added and the total volume of the thyroid gland according to the formula:

Thyroid  $V = V$  the right lobe of the +  $V$  of the left lobe. The calculation of the volume of the thyroid gland does not include the volume of the isthmus, it is not taken into account at all.

The **Results** were statistically analyzed using Wilcoxon’s nonparametric statistical paired T-test. Results and discussion. Anthropometric data of students are presented in Table 2.

**Table 3: Anthropometric data of the group of schoolchildren who were studied**

Indicators and units	Number of observations	Girls		Boys	
		Younger age group	Oldest age group	Younger age group	Oldest age group
Height, cm	92	132,2±0,02%	166,7±0,01%	133,5±0,02%	175,75±0,01%
Weight, kg	92	28,3±0,02%	54,55±0,01%	31,9±0,02%	62,57±0,01%
Neck circumference, cm	92	28±0,02%	32,4±0,01%	29,96±0,02%	35,57±0,01%
Transverse size of the thyroid gland, cm	92	2,75±0,02%	3,59±0,01%	2,91±0,02%	3,76±0,01%

Anthropometric studies of 92 schoolchildren showed that there are certain age and sex differences in schoolchildren of different age groups. However, with the same trends in changes in the transverse size of the thyroid gland, there are significant differences in other anthropometric data. Thus, in the younger age group, the difference in height between boys and girls is only **1.3 cm** (132.2 + 0.02% vs. 133.5 + 0.02%), in the older age group, this difference is significant - **9.05 cm** (166.7 + 0.01% vs. 175.75 + 0.01%).

Similar trends are observed when measuring the weight(difference), which is **3.6 kg** in the younger age group (28.3 + 0.02% vs. 31.9 + 0.02%) and **8.02 kg** in the older age group (54.55 + 0, 01% vs. 62.57 + 0.01%). The same trends persist in the measurement of neck circumference: the difference was **1.96 cm** (28 + 0.02% vs. 39.96 + 0.02%) and **3.17 cm** in high school students (32.4 + 0, 01% vs. 35.57 + 0.01%). Quite the opposite trends are observed when measuring the transverse size of the thyroid gland. As in the younger and older age groups, the transverse size of the thyroid gland in girls is less than in boys. In the younger age group, the transverse size of the thyroid gland in girls was 2.75 + 0.02% cm versus 2.91 + 0.02% cm in boys. The difference was

**0.16.** The same trends are observed in the oldest age group: the transverse size of the thyroid gland in girls was of 3.59 + 0.01% of cm vs. 3,76 + 0,01% in boys and the difference between them was almost the same as in the younger age group - **0,17 cm.**

**Findings:** In contrast to the adult population, where according to the literature the thyroid gland is larger in women, schoolchildren have the opposite dependence. These differences in the measurement of transverse thyroid size are NOT fully correlated with sonographic data. Thus, in the younger age group, the volume of the thyroid gland ranged from 6.1-6.8 ml in boys (Fig.1) and 6,7-8,0 ml in girls. Moreover, if in 8-year-old girls this difference was 0.7 ml, in 9-year-olds it already reached 1.2 ml. In the older age group, thyroid volume ranged from 13.9-16 ml in boys (Fig.3), while 14.9-15.6 ml in girls (Fig.2). And if in 14-year-old girls the same tendency was traced, as in younger age group-the volume of their thyroid gland is more on 1,0 ml than at representatives of opposite sex, while in 15-year-old schoolboys the opposite tendency took place. Thus, the volume of the thyroid gland of the boys exceeded by 0.4 ml the same indicators of the girls.

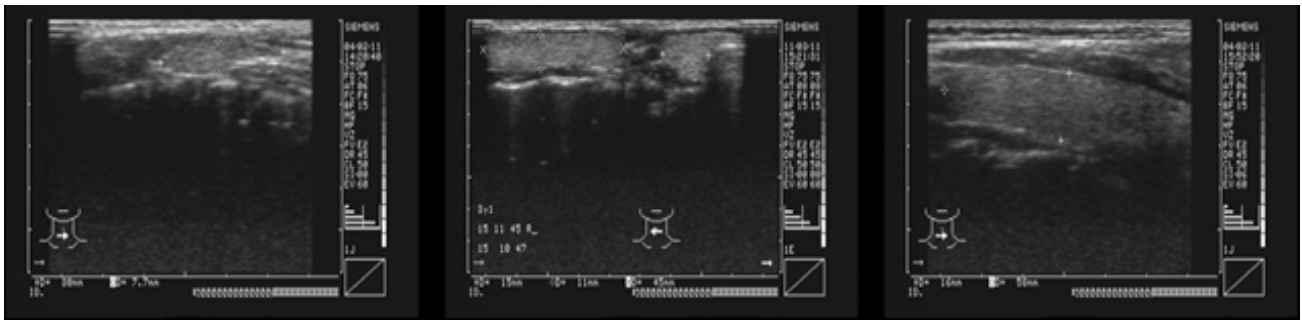


Fig. 1. Sonogram boy D., 8 years. Fig. 2. Sonogram girl L., 15 years. Fig.3. Sonogram boy A., 15 years old.

### Discussion

Thus, in children’s and adolescents practice, the “isolated” interpretation of the volume of the thyroid gland is **uninformative**, as well as the “isolated” interpretation of anthropometric data. Therefore, to assess the sonographic size of the gland in schoolchildren of different age groups, it is necessary to take into account their **anthropometric data**. The most accurate is the assessment of the size of the thyroid gland in accordance with the area of the student’s body, calculated on the basis of height and weight. This calculation of the area of the student’s body should always be based on” fresh “information about his height and body weight.

### Conclusion/Summary

Anthropometry is a simple and affordable method, but its use to assess the extent of thyroid enlargement in individuals undergoing face-to-face medical examination is not reliable. To assess thyromegaly, a sonographic assessment of thyroid volume is necessary, since the determination of thyroid volume by ultrasound is devoid of the subjectivity inherent in different doctors with palpation.

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# Experience of Indonesian Mothers in Implementing Kangaroo Mother Care During Hospitalization with Low Birth Weight Neonates

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## Abstract

**Background:** Parents who have babies with Low birth weight (LBW) face various challenges. LBW caused various problem to child. Kangaroo Mother Care (KMC) is the factor is an effective and safe alternative way of treating neonates with LBW. The aim is to describe the barriers and mothers' experience in implementing KMC during hospitalization with LBW neonates in Medan, Indonesia.

**Study Design:** A qualitative study with phenomenological approach.

**Method:** The instruments used in this study are made up of demographics data, semi-structured interview, field notes and observation guidelines with reference to the Indonesian Ministry of Health and the Indonesian Perinatology Society modules.

**Results:** Mothers had moderate knowledge (33%) about KMC and poor knowledge (47%) about its benefits. The negative attitudes of the mothers 40% were due to the limited available facilities which cause inefficient implementation and reduce the mothers' motivation in performing KMC for their babies. Mothers with negative attitude towards its implementation were 40%, as they did not get enough support from the family.

**Conclusions:** KMC implementation during hospitalization was not optimal due to various factors. Those barriers could be identified from the lack of KMC socialization programs, the limited number of trained nurses who have knowledge and skills about KMC, nurses' attitudes that show lack of support and commitment in implementing KMC programs and cultural factors that are still unfriendly with the KMC program.

**Keywords:** Mothers' experience, barriers, kangaroo mother care, low birth weight neonates.

## Introduction

Low birth weight (LBW) is a term used to describe a live-born baby weighing less than 2500 grams regardless of gestational age<sup>1</sup>. Complications that occur

in neonates with LBW during the first 72 hours of life are jaundice, asphyxia birth, hypothermia, hypoglycemia, respiratory distress syndrome and sepsis<sup>2</sup>. According to the World Health Organization, Indonesia ranks 9th in the world with a percentage of LBW more than 15.5% of births every year<sup>3</sup>. The neonatal mortality rate in Indonesia in 2014 was 78.5% occurring at the age of 0 - 6 days<sup>4</sup>. Considering the high risk of death and other complications that occur during the first week of birth, each LBW neonate is mandated to undergo a series of regular standard assessment, at least twice during the first week. This is performed in order to detect any early signs of a disease or clinical disorders so that the proper assistance can be given immediately to prevent neonatal

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death. Therefore, it is necessary to assess mothers' knowledge in relations to providing care for babies with LBW. The Kangaroo method is very efficient in reducing the occurrence of complications in neonates with LBW and also an important intervention in reducing infant mortality as a result of LBW.

Previous studies revealed that parents who have babies with LBW face various challenges. According to Cervantes, Feeley, and Lariviere<sup>5</sup>, mothers experience depression considering the physical barriers encounter while administering oxygen as they are unable to carry or see the babies during these periods. Woodward, et al.<sup>6</sup> discovered that mothers experience some level of stress and the change in the role of parents was considered the most stressful while the communication between parents and staff was the least stressful. The stress is a result of lack of health education during pregnancy, stressful life events, postnatal depression and the unstable condition of the baby.

The KMC is an effective and safe alternative way of treating neonates with LBW, especially in developing countries. The method is very easy and inexpensive<sup>7</sup>. It is more effective in reducing mortality in LBW compared with the conventional method. KMC increases the body weight, head circumference and length, satisfaction during breastfeeding, enhancement of maternal-infant attachment and most mothers feel at home with the method<sup>8</sup>. KMC also allows mothers to have direct skin contacts with the babies through whom they could get some warmth from the mothers. According to a study, KMC provides physical and psychological discomfort for mothers comes with a boring environment, mothers feel tired, stressful and isolated. Its implementation requires mothers to stay in the hospital when they might be needed by other children at home<sup>9</sup>.

Various health benefits have been achieved for neonates with LBW since the introduction of KMC in hospitals. Despite all these benefits that come with this method, not all mothers choose to it. And from the explanation above, it is obvious that there are few verifiable evidences as regards to mother's experience during hospitalization in implementing KMC, particularly in the Indonesian context.

## Method

**Study Design:** A qualitative research with descriptive phenomenology approach was used to examine and describe the experiences of the mothers

hospitalized with neonates having LBW at a perinatology unit in Indonesia.

**Participant:** Sample consisted of 30 mother who have babies with Low birth weight using the purposive sampling. However, the sample size was also determined by the saturation of data. The inclusion criteria for the participants include; having at least one month experience in the perinatology unit, having experience in KMC while being hospitalized and the willingness to participate in this study.

**Data Collection:** The instruments used in this study are composed of demographics data and semi-structured questionnaire interviews with field notes and observation guidelines in accordance with the Indonesian Ministry of Health and the Indonesian Perinatology Society modules. The data collected from the mothers' experience were recorded with a tape recorder.

**Data Analysis:** Data was analyzed using Colaizzi method. The method consisted of 7 steps, namely: 1) reading all transcripts of interviews transcripts to get participants' feeling, 2) reviewing each transcript and extracting of significant statement related parent experiences, 3) describing the meaning contained in the significant statement, 4) Organizing the meaning formulated into the theme group, 5) Integration the result into description form, 6) identify the structural basis of phenomenon and 7) asking participant to validate the finding of phenomenon as the end stage.

**Findings:** The implementation of KMC in the perinatology was not optimal because the healthcare personnel was not effective in passing the needed information to the participants, lack of knowledge and skills on the part of the mothers and healthcare personnel, inadequate support from the healthcare personnel and family members as well as other barriers from the mothers and the healthcare facilities.

## Results

### Knowledge, attitude and behavior of mothers regarding KMC

**The first experiences perform:** Table 2 shows that 14 mothers (47%) out of the 30 participants had poor knowledge about KMC, 18 mothers (60%) had positive attitudes toward KMC and 21 mothers (70%) perceived they had performed KMC.

Seen in table 1

**Barriers in Implementing KMC:** Table 3 shows that 8 mothers (27%) experienced limited support from the family, 5 mothers (17%) did not implement KMC due to some distinctive cultural beliefs in caring for babies with LBW and 6 mothers (20%) had limited facilities and equipment.

**Seen in table 2:** The results of this study illustrate several themes based on the experience of Indonesian mothers in implementing kangaroo mother care during hospitalization with low birth weight neonates. Five themes emerged from the interviews: 1) feeling scared that something would happen, 2) improving the survival and recovery of the baby, 3) increase bonding (emotional bond) between mother and baby, 4) mood disturbances and 5) environment as an obstacle.

**Theme 1: Feeling scared that something would happen**

Based on the results of interviews, the majority of participants stated that carrying out the kangaroo mother care (KMC) was something strange and frightening. Scary for mothers is the experience where for the first time doing KMC this is because the mother is afraid of hurting the baby, the release of tools attached to the baby’s body and KMC makes a feeling strange to the mother and other family members.

*“... I was afraid when I did KMC for the first time, because I was afraid to hurt my baby...” (P2).*

Themes 2: Improving the survival and recovery of the baby

Participants explained that they did their best to pay attention to and fulfill their baby’s needs. Mother’s experience when applying KMC shows results in their babies avoiding cold, stabilizing temperature and respiratory rate, reducing the occurrence of infections, increasing body weight, body length and head circumference and increasing breast milk.

*“... Every day, every time my baby thirsts hungry and I give milk to hug the baby’s body and put it into my chest while giving breastfeeding...” (P20).*

*Themes 3: Increase bonding (emotional bond) between mother and baby*

All participants in this study described bonding as a continuous process of affection between mother

and LBW baby with hugging, talking, playing and breastfeeding. This interaction includes when the mother invites her baby to tell stories, touch, gaze and smile. It even when the baby is asleep or breastfeeding.

*“... Hugging, touching the skin and seeing his face have made my heart happy...” (P1).*

**Themes 4: Mood disturbances**

It is understandable that the majority of mothers with LBW show higher levels of stress and anxiety compared to mothers who have babies with enough months. Although the adverse effects of maternal anxiety and depression on infants have been well documented, little attention is paid to the mother’s emotional response.

*“... Sad, so sad when I first saw my baby. I cry, feel guilty. I don’t know if my baby will survive...” (P21).*

**Themes 5: Environment as an obstacle**

All participants stated that the unavailability of admission room is one of the obstacles for mothers to do KMC in the perinatology room. This feeling is based on the lack of privacy and feeling limited to the mother when doing KMC. Other factors that contribute to feelings of discomfort can be seen in the uncertainty about the ability to do KMC.

*“... There are many mothers around the room who have to share places to do KMC and lack of privacy makes me uncomfortable...” (P 29).*

**Table 1. Mothers Level of Knowledge, Attitude and Behavior regarding KMC (n= 30)**

Variables	Frequency (n)	Percentage (%)
<b>Knowledge</b>		
High	6	20
Moderate	10	33
Poor	14	47
<b>Attitude</b>		
Positive	18	60
Negative	12	40
<b>Behavior</b>		
Perform	21	70
Not perform	9	30

**Table 2. Barriers in Implementing KMC (n=30)**

Barriers	Frequency (n)	Percentage (%)
Limited support from the family	8	27
Unclear procedure for implementing KMC	4	13
Ineffective KMC socialization to mothers and families	4	13
Nurses attitude	3	10
Traditional belief	5	17
Limitations of facilities and equipment	6	20

**Discussion**

The results showed that 6 mothers, representing 20% of the total participants, had high/good knowledge about KMC, 10 mothers (33%) had moderate/average knowledge and 14 representing 47% had poor knowledge. This was as a result of the healthcare personnel ineffective way of communicating information about KMC to the mothers during hospitalization. The mothers only obtain information about breastfeeding techniques, how to change diapers and how to change baby clothes. Hence, these mothers were not provided with enough motivation to implement the method. Other factors that could be responsible are the fact that the mothers were less experienced and the low level of formal education. Therefore, it is very important to provide health education on the special care needed by premature babies.

The poor level of knowledge on KMC is as a result of the goals, benefits and ways of implementing this method. According to Notoatmodjo<sup>10</sup>, some of the factors that influence mothers’ knowledge about KMC are educational level, occupation, experience, religion, as well as some socio-cultural factors. Solomons and Rosant<sup>11</sup> in another study found out that majority of mothers, precisely 83.3%, had no prior knowledge about KMC and 60% of nurses did not have the required skills relating to the method. However, mothers who were committed to KMC seemed satisfied with the results and indicated that they would continue implementing it at home. And most of these mothers did not have the prior knowledge and were only told about KMC during the treatment of their babies at the perinatology unit.

KMC was considered as an ideal method in terms of meeting the baby’s needs for warmth, breastfeeding, protection from infection, stimulation, safety and love<sup>12</sup>. This study found that 70% of mothers implemented KMC to their LBW neonates while receiving treatment

at the perinatology unit. Lack of facilities and equipment were found as barriers in implementing KMC. The facilities and equipment include private rooms with curtains, Kangaroo bags, chairs, counseling room and media for program information like leaflets, booklets, flipchart and video. These limitations reduce mother’s motivation in implementing KMC. According to Hill, et. al.,<sup>13</sup>, mothers felt they did not have good privacy while implementing KMC.

Some of the factors that hinder mothers in implementing KMC during hospitalization period are lack of support from family and healthcare personnel, unclear Standard Operating Procedure (SOP), ineffective socialization with mothers and families regarding KMC, lack of skilled healthcare personnel, traditional beliefs and limited hospital facilities and infrastructure. Other hindrance to KMC is personal experience, culture, media of communication and information, government, religious institutions and emotional factors<sup>14</sup>.

According to this study, mothers had a lack of knowledge on the implementation of KMC method. It reflected in the themes that emerged, such as: fear that something would happen, mood disorders and the obstacles as a result of the environment. Insufficient knowledge would result in the difficulty in implementing KMC. This is in accordance with previous studies which found that mothers were also afraid of injuring their babies while performing KMC<sup>15</sup>. Moreover, it was found that the lack of information from healthcare personnel about the practical application of KMC was a barrier<sup>16</sup>.

**Conclusion**

The complexity of KMC and the lack of standard operational are parts of what make its implementation very difficult. In this study, mothers’ level of knowledge, attitude and behavior regarding KMC and its implementation were identified. It also found several

barriers in implementing KMC in Indonesia and results of the study are concluded as highlighted below.

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# Postoperative Hypersensitivity and Digital Radiographic Assessment of a Zinc Modified Versus a Conventional Glass Ionomer Cement in Deep Carious Lesion: Randomized Controlled Clinical Trial

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## Abstract

**Aim of the Study:** This study aimed to determine the effect of different glass ionomer in the healing of deep carious lesion after partial caries removal

**Design:** A total of 50 teeth of patients who fulfilled the inclusion criteria were selected to participate in the study. Then they were divided into two main groups: control group (Equia fill) and intervention group (Chemfill rock). Postoperative hypersensitivity (using thermal test and percussion test) and periapical lesions (using digital periapical radiograph) were tested in this period at the baseline (T0), after three months (T3) and after six months (T6).

**Results:** Categorical data were presented as Frequencies (n) and Percentages (%). Fisher's exact and Cochran's Q tests were used to analyze inter and intra group comparisons respectively. The significance level was set at  $P \leq 0.05$  for all tests.

**Conclusion:** The hypersensitivity and periapical lesion was not affected by the type of glass ionomer

**Clinical significance:** Different type of glass ionomer can be used in deep carious lesion.

**Keywords:** Deep carious cavities, glass ionomer cement, postoperative hypersensitivity, chem Fil Rock.

## Introduction

After the revolution in restorative materials due to the innovation of adhesive material and the change from the concept of drill and fill to biological model and conservatism, many techniques have been developed to treat deep carious lesion<sup>(1)</sup>. These techniques depend

on decreasing the bacterial population allowing the remineralization of the remaining dentin by changing the ecological system by removing the superficial layer of carious dentin with the highest bacterial population and leaving the deepest layer of affected dentin (affected by bacterial acid that usually precede the bacteria itself) then sealing the cavity. Bacterial population has a main effect on the propagation of carious lesion, so elimination of bacterial acid increases the power of remineralization of infected dentin. One of these techniques is the partial caries removal<sup>(2)</sup>. The success rate of partial caries removal is up to 91%<sup>(3)</sup>.

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The glass ionomer was the material of choice for this technique due to their biocompatibility, chemical



bond and fluoride release. Many modifications have been done to improve the glass ionomer properties, the addition of metal ions (silver and recently zinc) is one of this modification. Beside improving the mechanical properties, it was found that the addition of metal ion to glass ionomer decrease the bacterial growth<sup>(4)</sup>. Few clinical studies have evaluated the role of antimicrobial agents incorporated into restorative materials and their potential anti-caries effect.<sup>(5)</sup>

Zinc increase the uptake of fluoride and enhance remineralization by preventing the surface remineralization (allow better penetrate of fluoride into deeper surface (prevent lesion arrestment). Zinc also bind with the hydroxy apatite crystal making it less soluble in acid<sup>(6)</sup>. Multiple in vitro studies showed that Zn modified glass ionomer has better mechanical performance and antibacterial action<sup>(7,8)</sup> but due to lack of evidence from enough well conducted clinical studies, this study will be conducted.

The null hypothesis was that both conventional glass ionomer and zinc modified glass ionomer are successful in the management of deep carious lesion.

### Material and Method

A total of 50 teeth of patients who fulfilled the inclusion criteria were selected to participate in the study. Consent was taken from each patient prior to the commencement of the study. Teeth were divided into 2 main groups by utilizing simple random sampling method each group was 25 participants according to base material tested. The selected participants were divided into two groups: group (A<sub>1</sub>) control group (EQUIA fill) and group (A<sub>2</sub>) intervention group (CHEMFILL). The study took place over a period of six months (T). Postoperative hypersensitivity and periapical pathosis were tested in this period at the baseline (T<sub>0</sub>), after three months (T<sub>3</sub>) and after six months (T<sub>6</sub>).

Simple randomization has been used every patient took a number from 1 using random integer set generator. The assessor was blind, but due to the difference in the material, the operator did not been blinded.

#### Clinical Procedures:

**Preoperative Clinical Assessment:** A detailed chart for each patient was taken. A proper pain history

was taken to exclude the absence of any signs of irreversible pulpitis. Clinical examination was done to find any sign of inflammation like swelling, fistula or abscess. Cold pulp testing was done to ensure pulp vitality using Refrigerant spray (Endo Frost, Roeko, Coltène/Whaledent, Germany). The spray is applied by a cotton pellet and the patient told the operator in case of pain sensation. Percussion/palpation and mobility tests were performed, Periapical digital radiograph was performed (T<sub>0</sub>) to detect the presence of any periapical lesion or widening in periodontal ligament. These tests were repeated each follow up visit at T<sub>3</sub> and T<sub>6</sub>.

**Caries Removal Procedure:** Local anaesthesia was given to the patient, then isolation using rubber dam was done. Access to carious lesion using high speed hand piece. The removal of Deep carious tissue was performed following the guidelines published by the International Caries Consensus Collaboration (ICCC). The caries was selectively removed using spoon excavator (*no51,52, Dentsply, Maillefer*) The caries was totally removed from the cavity wall with spoon excavator or low speed hand piece with carbon-steel rose-head bur to perform a proper marginal seal. Glass ionomer restoration were applied according to manufacturer instruction.

### Results

**I-Postoperative hypersensitivity:** Frequencies (n) and Percentages (%) of Postoperative hypersensitivity incidence in both groups were presented in table (1)

Fisher's exact test showed no significant difference in the occurrence of postoperative hypersensitivity at baseline (P=0.667) and after 3 months (0.500), while after 6 months there was a significant difference between both groups (P=0.025). At baseline both groups had the same percentage of occurrence of postoperative hypersensitivity (13.0%). After 3 months the percentage decreased in the control group to (8.7%) while remaining fixed in the intervention arm. After 6 months there was no incidence of postoperative hypersensitivity in the control group, while intervention cases suffering from sensitivity increased from (13.0%) to (21.7%) by the end of the follow-up period.

**Table (1): Frequencies (n) and Percentages (%) of postoperative hypersensitivity incidence in both groups**

Follow-up	Postoperative hypersensitivity	Intervention		Control		P-value
		%	n	%	n	
Baseline	Absent	87.0%	20	87.0%	20	0.667ns
	Present	13.0%	3	13.0%	3	
3 months	Absent	87.0%	20	91.3%	21	0.500ns
	Present	13.0%	3	8.7%	2	
6 months	Absent	78.3%	18	100%	23	0.025*
	Present	21.7%	5	0%	0	

\*; significant ( $p \leq 0.05$ ) ns; non-significant ( $p > 0.05$ )

**II-Periapical Lesion:** Frequencies (n) and Percentages (%) of periapical lesion incidence in both groups were presented in table (2).

Fisher’s exact test showed no significant difference between both groups regarding the occurrence of periapical lesions after 3 and 6 months ( $P=0.500$ ).

Starting from baseline till the end of the follow-up period, members of the intervention group were free from periapical lesions. While for the control group only (4.3%)of participants had periapical lesions starting from 3 months till the end of the follow-up period.

**Table (2): Frequencies (n) and Percentages (%) of postoperative hypersensitivity incidence in both groups**

Follow-up	Periapical Lesion	Intervention		Control		P-value
		%	n	%	(n)	
Baseline	Absent	100%	23	100%	23	--
	Present	0%	0	0%	0	
3 months	Absent	100%	23	95.7%	22	0.500ns
	Present	0%	0	4.3%	1	
6 months	Absent	100%	23	95.7%	22	0.500ns
	Present	0%	0	4.3%	1	

\*; significant ( $p \leq 0.05$ ) ns; non-significant ( $p > 0.05$ )

**Discussion**

In this study we use the partial caries removal techniques <sup>(9)</sup> as treatment for deep cavitated lesion according to the recent consensus recommendation that support it success, less risk of pulpal exposure and less cost compared to other alternative techniques like step wise excavation <sup>(10)</sup>. Clinical studies showed that No risk to left infected dentine under the restoration sufficiently sealed and no need for re-entry to remove the residual dentine. It showed high success rate both clinically and radiographically. <sup>(11,12)</sup>

In our study, we use two different type of high

viscosity glass ionomer as with the Minamata Convention the use of mercury will be phased down and this undoubtedly will influence dental treatment regimens and economic resources <sup>(14)</sup>. Zinc modified glass ionomer is a new one of metal modified glass ionomer as zinc substitution calcium ions in the crystalline structure of glass ionomer resulted in increasing the density of glass as zinc due to higher atomic weight of zinc ion <sup>(15)</sup> This substitution results an increase in oxygen density which represent the degree of atoms packing in glass which increase the strength and fracture toughness of glass ionomer <sup>(16)</sup>. In addition, the zinc has an antibacterial property and remineralizing effect, low concentrations

of zinc can both reduce enamel demineralisation and modify remineralisation but its effect on caries is not yet determined<sup>(6)</sup>. Zinc can interact with hydroxyapatite crystal by adsorption onto crystal surfaces and/or incorporation into the crystal lattice which result a decrease in hydroxyapatite solubility, Zinc also can modify the crystal-growth of orally relevant calcium phosphates<sup>(6)</sup>.

Most of dentist use the clinical sensitivity to hot and cold for assessment of pulp vitality, for many years the clinical sensitivity was considered irrelevant, but according to the study conducted by **Ricucci et al., 2014**,<sup>(17)</sup> there was a good correlation between the clinical sign and histological status of the pulp. **Pigg et al., 2016**<sup>(18)</sup> stated that the cold test using the endofrost had good validity to distinguish a vital pulp from a nonvital pulp.

Our follow up visit was scheduled after 3 months and six months. The available evidence supports that the peak of increase in dentin microhardness and dentistry is the first 3 months after partial caries removal. This may be due to decrease of bacterial activity, reorganization of collagen fibre and the increase in calcium ion concentration<sup>(19)</sup>. as the pulp death could occur and remain silent a second visit is scheduled at 6 months to give more chance dentin formation<sup>(20)</sup>.

The result of our studies showed that for hypersensitivity assessment both material (zinc modified and conventional glass ionomer) showing no statistical difference at base and 3 months follow up while there was a statistical increase in the postoperative hypersensitivity after 6 months favouring the control. **Molina et al, 2013**<sup>(8)</sup> and **Molina et al 2014**<sup>(21)</sup> support this result. this could be attributed to many factors like the size of the cavities type of occlusion of the patient and the minor variable in the pulp response<sup>(22)</sup>. Another factor is the mechanical properties, the Equia fill showed higher diametral and flexure strength than the Chemfill rock<sup>(7, 23)</sup>. This could affect the clinical performance of glass ionomer and sealing ability of lesion and the lesion and the ingress of fluids, <sup>(24)</sup>**Giray et al 2014**, support that the microleakage with Chemfill rock is higher than the Equia fill on the other hand <sup>(25)</sup>**el Deeb and Mubarak 2018**, reported that bonding properties of Chemfill rock to stimulates carious dentin is better than the Equia fill.

Regarding the periapical lesion, there was no significant statistical difference between the two group

or within the same group during the follow up periods, which could confirmed that partial caries removal and sealing of carious lesion is a successful line of conservative treatment for deep carious lesion<sup>(9, 11)</sup>. Even with the absence of statically difference two cases of the control group showed periapical lesion. This result could interpreted by the selection criteria of case and the possible variation between the clinical sign and symptoms and the histopathological status of the pulp<sup>(17)</sup> also its may contributed to the increase of ion release in the zinc reinforced glass ionomer which may result higher remineralization of affected dentin, increase the dentin hardness and increase the antibacterial effect<sup>(26)</sup>, also <sup>(27)</sup> **Prudencio et al 2003**, found that the addition of zinc to glass ionomer present an increase in fluoride release than conventional glass ionomer .

Within the limitation of this study, the results supports that the partial caries removal could be the technique of choice for management of deep carious lesion without the need of second re-entery, this finding are in agreement with<sup>(9, 28)</sup> .also the result of our study support that glass ionomer could be used as final restoration especially due its less techniques sensitivity, time, cost of treatment which of mean concern due to the large national expenses on the dental health each year.

## Conclusion

We concluded that both type of glass ionomer could be used successfully in deep caries management. the postoperative hypersensitivity and pulpal reaction were not affected by the type of restoration. The technique of caries removal could be effective factor in preservation of pulp vitality

**Clinical Significance:** Different glass ionomer could be used in treatment of deep cavities but further studies to assess the survival rate as final restoration

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**Competing Interests:** No conflict of interest

**Ethical Approval:** The Ethics and research committee, Faculty of Dentistry, Cairo University approved the study and patients' consent was obtained.

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# Impact of Stimulation on Infant's Communication Development in Kuantan, Indonesia; A 2- 4- and 6-Month Follow-up Study

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## Abstract

**Introduction:** Stimulation has a large effect on children's development, but the impact of stimulation especially in infant's communication development was unknown. The primary objective of the study was to evaluate the effect of stimulation on infant's communication development at 2, 4 and 6 months of age.

**Method:** This is a longitudinal study held in Kuantan Singingi District, Riau Province-Indonesia from January to October 2017. We enrolled all newborns whose parents lived and settled in Kuantan Singingi district and had normal delivery. Newborn with major congenital abnormalities, pathological jaundice, low birth weight and whose mother were smoking were excluded. Data of infant's communication development and parent's stimulation were collected at 2, 4 and 6 months. the Age and Stages Questionnaire third edition (ASQ-3) was administered to assess infant's communication development and the Infant/toddler Home Observation for Measurement of the Environment (HOME) Inventory was administered to assess parent's stimulation. We analyzed the relationship between parent's stimulation and infant's communication development at 2, 4 and 6 months using logistic regression analysis.

**Results:** We enrolled 474 newborns and their parents. Compared to less stimulated infants, infants who got enough stimulation by their parents had better communication developments at 2 months (OR 11.1 95% CI: 3.8-32.4), 4 months (OR 2.6 95% CI: 1.3-5.3) and 6 months (OR: 2.2 95% CI 1.1-4.3).

**Conclusion:** Giving enough stimulation by parents can affect the communication developments of their infants.

**Keywords:** 2-6 months; stimulation; infants; communication development.

## Introduction

The quality of human is determined from the first 1000 days of life, since the beginning of the fetus grows

in the womb (270 days during pregnancy) and 730 days in the first 2 years of a child's life<sup>1</sup>. Early life is an important golden period in a child's life. In general, researchers and the government are very concerned about nutrition so that the human resources presented are of high quality. There is another thing that escapes attention is stimulation, growth and development of a child that needs to be considered well at that time. First 1000 days of life is a time when there are important opportunities in the growth and development of children<sup>2</sup>. Some studies related to child stimulation and development show that stimulation has a large effect on children's development. Growth can be observed with the addition of height and weight. However, for infant development it is not easy

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to measure because there are several variables that are measured to determine the baby's development.

Assessment of infant development is measured from 4 aspects. These aspects are gross motoric, fine motoric, social personal and language. Language ability is a combination of all children's development systems. Language skills involve motor, psychological, emotional and behavioral abilities<sup>3</sup>. Language is not just talking (vocal expressions to form words) but body language such as eye contact, facial expressions, body movements<sup>4</sup>. Talking is a mental skill of the group, because it is not only the coordination of the muscles that make up the sound, but also the mental aspects of the intellectual. The infant's language development is influenced by brain development, experience and stimulation. Delay in the early development of language skills can affect various functions of everyday life, social personal life, learning difficulties etc<sup>4</sup>. Language development disorders can be caused by various factors, one of which is lack of interaction between children and the environment, late maturation and family factors<sup>5</sup>.

Infant development is influenced by various factors, generally divided into genetic factors and environmental factors. Environmental factors are distinguished into biological, biomedical, psychosocial, socio-cultural and socio-economic factors<sup>6</sup>.

The purpose of this study is to assess the relationships between parent's stimulation and infant's communication development at 2, 4 and 6 months of age. In addition, we adjusted for the sociodemographic of infants and their mother including maternal education, economic status, density of home contents, number of siblings and also infant's health status including nutritional and breastfeeding initiation to maximize the statistical explanatory power of the results

## Method

**Settings:** The study held in Kuantang Singingi District, Riau Province Indonesia. All participants were recruited from January to October 2017. The participants were followed up three times according to infant's age; 2- 4- and 6-months of age (times 1, 2 and 3 respectively). The study was approved by ethics committee of Faculty of Public Health, Universitas Indonesia (Approval number: 368/UN2.F10/PPM.00.02/2017).

**Participants:** We included all newborns who met the following criteria; (1) parents lived and settled in Kuantan

Singingi District, Riau Province, (2) delivered normally. Newborns with major congenital abnormalities; *labio-palatoschizis*, heart and lungs abnormalities and other abnormalities which impact infant's ability for direct breastfeeding, pathological jaundice, low birth weight and infant whose mother were smoking were excluded from this study. A sample composed of 432 subjects was calculated to give statistical power of 80%.

### Measures:

#### Parent's Stimulation:

Parents stimulation was assessed using Infant/toddler Home Observation for Measurement of the Environment (HOME) Inventory at 2, 4 and 6 months. The HOME Inventory is designed to observe parental responsiveness, acceptance of the child, organization of the environment, learning materials, parental involvement and variety within the home environment through 45 items. Score of The Inventory is obtained during a 45 to 90 minutes home visits during a time when the target infant and parent are present and awake. Observation and scoring were made by a trained observer.

#### Infant's Communication Development

Infants communication development was assessed using Age and Stages Questionnaire third edition (ASQ-3) at 2, 4 and 6 months. The ASQ-3 is a set of questionnaires about children's development consisting of communication development, fine motor development, rough motor development, problem solving and socio-personal development. We measured child communication development by adding the score of communication section in ASQ-3 at 2, 4 and 6 months. A three items Likert's scale (yes/sometimes/never) is used in scoring of ASQ-3 and scoring was made by a trained interviewer which was differ from those assessing parent's stimulation.

**Confounding Factors:** Confounding factors that appear to be related to parent's stimulation and infant's communication development were included in the models as control variables to rigorously examine the predictive effect of parent's stimulation on infant's communication development; sociodemographic features (mother's education status, social economy, density of house contents, number of siblings), birth status (birth weight, length of birth), nutritional status and early initiation of breast feeding. Information about these variables was obtained via interview to parents.

**Statistical Analysis:** All statistical analyses were conducted using STATA 12<sup>th</sup> version. First, univariate analysis of sociodemographic features, birth status and breast feeding were described as frequencies. Second, bivariate analysis using chi-square test was used to measure the association between parent’s stimulation and infant’s communication development. Third, the relationship between parent’s stimulation and infant’s communication development was analyzed using longitudinal logistic regression analysis. We accounted for confounding factors in the analysis to isolate the specific benefits of parent’s stimulation.

**Results**

The descriptive results of this study are presented in Table 1. The sample comprised of 474 infants and parents.

**Table 1. Characteristics of Study Participants**

Variable	n (474)	%
<b>Early initiation of breastfeeding</b>		
Yes	192	40,51%
No	282	59,49%
<b>Length of birth</b>		
Normal	345	72,78%
Short	129	27,22%

Variable	n (474)	%
<b>Birth weight</b>		
≥ 2500 gram	448	94,51%
< 2500 gram	26	5,49
<b>Mother’s education</b>		
< High school	185	39,03%
≥ High school	289	60,97%
<b>Number of siblings</b>		
< 3	426	89,87%
≥ 3	48	10,13%
<b>Density of house contents</b>		
Not compact	400	84,39%
Compact	74	15,61%
<b>Social Economy</b>		
High	104	21,94%
Low	370	78,06%

**Parent’s stimulation and infant’s communication development at 2 months of age:** Table 2 shows the results of longitudinal logistic regression to examine the relationship between parent’s stimulation and infants communication development at 2 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 11.1, 95% CI: 3.8-32.4).

**Table 2. Parent’s stimulation and infant’s communication development at 2 months of age**

Variable	β	SE	OR	95% CI	
				Lower	Upper
<b>Stimulation</b>					
Enough	2,406	0,547	11,089	3,794	32,412
Less			Reff		
<b>Density of house contents</b>					
Not compact	1,020	0,404	2,773	1,256	6,124
compact			Reff		
<b>Early initiation of breastfeeding</b>					
Yes	0,823	0,417	2,278	1,006	5,159
No			Reff		
<b>Length of birth</b>					
Normal	0,779	0,384	2,179	1,027	4,623
Short			Reff		
<b>Nutritional status</b>					
Enough	0,898	0,434	2,545	1,048	5,747
Less			Reff		
Cons	-5,351				



**Parent’s stimulation and infant’s communication development at 4 months of age:** Table 3 shows the results of logistic regression to examine the relationship between parent’s stimulation and infants communication

development at 4 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 2.6, 95% CI: 1.3-5.3).

**Table 3. Parent’s stimulation and infant’s communication development at 4 months of age**

Variable	β	SE	OR	95% CI	
				Lower	Upper
<b>Stimulation</b>					
Enough	0,972	0,356	2,643	1,314	5,314
Less			Reff		
<b>Exclusive Breastfeeding</b>					
Yes	0,905	0,457	2,471	1,010	6,049
No			Reff		

**Parent’s stimulation and infant’s communication development at 6 months of age:** Table 3 shows the results of logistic regression to examine the relationship between parent’s stimulation and infants communication development at 4 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 2.2, 95% CI: 1.1-4.3).

**Table 4. Parent’s stimulation and infant’s communication development at 6 months of age**

Variable	β	SE	OR	95% CI	
				Lower	Upper
<b>Stimulation</b>					
Enough	0,788	0,345	2,198	1,117	4,325
Less			Reff		
<b>Social Economy</b>					
Height	1,862	0,739	6,435	1,512	27,380
Low			Reff		
<b>Exclusive breastfeeding</b>					
Yes	1,661	0,617	5,267	1,572	17,642
No			Reff		
Cons	-6,268				

**Discussion**

Infants with enough parent’s stimulation have a higher chance for developing age-appropriate communication development than infants receiving less parent’s stimulation. The model formed in the multivariate analysis of this study proved that there was a relationship between stimulation and the development of communication. At 2 months an OR 11.1 on infants communication development, stated that enough parent’s stimulation had a good chance of 11.1 times experiencing appropriate communication development compared to

infants who did not get enough parent’s stimulation. This large OR states that there is a strong relationship between the development of infant communication and stimulation. This is in line with the research conducted in Semarang concluded that stimulation has an effect on development where one of the developments measured is the development of communication with p value 0.001 (p <0.05) which means there is a relationship between stimulation of development and the development of children aged 0-5 year in RW 8 Kalicari Urban Village, Semarang City<sup>8</sup>.

The same results were found in at the age of, 4 months and 6. The most dominant factor affecting the development of communication for 4-month-olds is stimulation with OR 2.6 meaning that infants with sufficient stimulation have an opportunity 2,6 times to develop communication according to age development compared to infants with less stimulation. At 6 months of age the model produced by stimulation with communication had OR 2.2.

Other studies in Indonesia conclude the same thing that children with low family stimulation has a risk of developing abnormal speech<sup>9</sup>. Stimulation is related to communication in line with the purpose of stimulation, namely optimizing brain function<sup>10</sup>. Communication ability (language) is an indicator of all children's development due to sensitive language skills delay or damage to other systems because it involves cognitive, sensory motor, psychological, emotional abilities from the environment around the child. Lack of stimulation will affect the development of language and the impact will interfere with cognitive and emotional development<sup>11</sup>.

Based on the evidence above, the effect of stimulation on the development of infant communication has a strong relationship, consistent with previous studies.

### Conclusions and Recommendations

This research proves that there is a relationship between stimulation and the development of communication. Infants with stimulation have a higher chance of developing communication, especially in infants aged 2 months. Therefore, it is recommended to start doing stimulation as early as possible.

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**Ethical Clearance:** This study had been approved by ethical committee of Faculty of Public Health UniversitasIndonesia 368/UN2.F10/PPM.00.02/2017.

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# Cost and Benefit Analysis of Laboratory Health and Safety Management System

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## Abstract

Laboratory safety is one aspect that must be considered. A variety of chemical materials contained in the laboratory, causing the potential for workplace accidents in high-risk laboratories. Accidents at work that occur in laboratories greatly affect the business and the community environment. The purpose of this study is to discover how much benefit in economic value of implementation of occupational safety and health in the laboratory. This research is explained about the method for cost benefit analysis of occupational health and safety in laboratory. This research was conducted at the campus laboratory. This study focuses on procuring implementation of occupational health and safety for the types of work that use chemicals in laboratory, based on government regulation in Indonesia. With effective application of occupational health and safety, the benefits that campus university perceive are reduced costs of replacing sick, sick leave, so operational costs will be lower, other disruptions in the production process will also be reduced and produce profits for entrepreneurs. Implementation of OSH of this laboratory requires adequate planning. Therefore the implementation must be coordinated by a Health and Safety team that works closely with various other professionals in the laboratory, with special emphasis on finance, management control and the human resources department.

**Keywords:** *Cost benefit Analysis, Cost of Safety, Benefit of Safety, Risk analysis of Safety Laboratory.*

## Introduction

Working in a chemical laboratory will not be separated from the various possible dangers of chemicals. Accidents of working in the laboratory related to the use of chemicals greatly affect the business and society as a whole. Not only the use of chemical substances that are dangerous, but also the equipment in the laboratory can also cause hazards that are not uncommon high risk for workers who are doing work in the laboratory, if they do not know how and procedures for the use of tools that

will be used will also increase the risk of work accidents in laboratory<sup>(1)</sup>.

Economic losses incurred due to work accidents are huge. According to Liberty Manual Insurance 2015, a total of \$ 53 trillion was spent by the company on caring for workers and paying compensation for workers who had an accident<sup>(2-4)</sup>. In Indonesia, BPJS (Social Security Administrator) noted that during 2016-2017 total claims for work accidents reached \$278. This amount is the amount of compensation that must be paid by BPJS which is very large. Calculation of losses arising from work accidents can be done from a variety of performance data such as accident statistics and work accident risk assessment. These data can provide an overview of the possible risks that should be a priority in control<sup>(4-6)</sup>.

In 2015, one of university laboratory in Indonesia had an explosion. The laboratory explosion caused

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14 injuries. All of victims were taken to the Hospital to get treatment. The injuries suffered by the victims were suture wounds around the face and neck due to glass fragments from distillation flasks. This accident certainly caused several material and immaterial losses. Occupational accidents in the laboratory are caused by the lack of knowledge and understanding of chemicals and the processes and equipment or equipment used in carrying out activities, the lack of clarity of laboratory instructions and also the lack of supervision carried out during laboratory activities, lack of guidance to students, Lack of or unavailability of safety equipment and protective equipment for laboratory activities, not following instructions or rules that should be obeyed, not using protective equipment that should be used or using equipment or materials that are not appropriate, not being careful in doing activities.

Managers should be able to provide a protection system for the safety and health of their employees through risk control analysis<sup>(7,8)</sup>. Cost-benefit analysis is a tool in making a decision process by giving a monetary value, usually in the amount of money to the costs incurred and the resulting profits making it possible to provide a comparison of quantities<sup>(7,9)</sup>.

CBA expected that companies can find out how much profit or loss obtained from a risk control in the amount of money currency and can know whether the risk control makes sense or not to be applied<sup>(2)</sup>. Cost-benefit analysis can also be a tool in decision making from the choice of work accident risk reduction options<sup>(10)</sup>. Cost-benefit analysis consists of 4 parts, namely calculating costs, calculating benefits, calculating risks and comparing costs<sup>(11-13)</sup>.

Costs are defined as things that cannot be avoided by the company as a result of efforts to increase OHS<sup>(12)</sup>. In other words, the only costs that can be incurred are those that are needed for the implementation of risk reduction<sup>(12)</sup>. Cost can take the form of engineering control such as the installation of fume hoods, administrative control such as the application of SMK3 PP 50 in 2012, or the use of PPE masks, goggles, glove.

Benefits (benefits) are gains in monetary value derived from risk reduction<sup>(12)</sup>. The value of benefits can be obtained from the avoidance of workers from fatality, accident and severity. By avoiding companies from this, companies can avoid costs for workers' compensation, cessation of production, recruitment of new workers or

damage to equipment<sup>(14)</sup>.

Risk has an important role in the calculation of cost-benefit analysis, because risk can be a benchmark if a control with certain costs can be said to be successful or not<sup>(15)</sup>.

The comparison of costs with the value of benefits and risks is the final stage of cost-benefit analysis. This can be done by comparing the total costs of an accident, injury and occupational diseases which must be borne with the costs incurred for control costs<sup>(2)</sup>.

So That, decision making in risk control must also consider the financial capability of the company which can be measured by analyzing the amount of funds that must be spent to control and the magnitude of the consequences in the financial side that arises if not carried out occupational safety and health risk controls<sup>(5,16)</sup>. The purpose of this study is to know the cost-benefit comparison of safety risks in laboratory work can be reduced by the implementation of OSH laboratory.

**Research Question:** How does the cost-benefit comparison of safety risks in laboratory that can be reduced by the implementation of OSH Laboratory?

**Objectives:** To discover the cost-benefit comparison of safety risks in laboratory work that can be reduced by implementing OSH Laboratory includes:

1. Find out the potential hazards that can be controlled by implementation OSH Laboratory
2. Find out the level of safety risks before and after the implementation of OSH Laboratory.
3. Find out how much money must be provided for the implementation of OSH Laboratory and how much benefit from the economic side.

## Method

**Study Setting:** The location of the study was conducted at campus laboratory where the incidence increased in the 2015-2108.

**Design Study:** This study is a descriptive analytic using the method mix method, with a sequential explanatory study design. In the initial stages of the study, a quantitative risk analysis will be conducted. Then do a comparison of the costs needed to reduce risk, as well as the benefits of the direct and indirect benefits obtained because the risk is reduced by the implementation

of OHS Laboratory. In this study, researchers used a simple cost-benefit comparison to determine whether a control that is feasible or not. This concept does not aim to determine the effect of a variable on other variables. This research divided into 3 steps to find the cost-benefit comparison value of Laboratory OHS implementation. The stage consists of input, process and output. The input stage, observations will be made regarding the sources of hazard for laboratory safety. Researchers will conduct a job hazard analysis to determine the hazard and risk of working in laboratory. At this stage, direct and indirect costs will be seen if the implementation of OSH Laboratory is carried out. Then in the process stage, the level of exposure and consequences can be known from the job hazard analysis process through a semi-quantitative risk analysis. Probability before implementing OSH laboratory and probability after implementing OSH laboratory can also be known from the results of risk analysis based on job hazard analysis. After knowing the level of exposure, consequences and probabilities, the researcher then determines the level of risk semi quantitatively. From This study, the researcher also calculates the ratio between the costs of procurement to implementing OSH Laboratory well as the benefits obtained due to the absence of costs incurred due to the ability of implementing OSH laboratory to reduce the risk of working with chemical substance in laboratory. In the output stage, researchers will conduct a risk comparison before and after the implementation of OSH laboratory. The results of this risk comparison will then be included in the cost-benefit analysis formula to obtain the final value of whether the OSH laboratory implementation is feasible or not.

**Quantitative Part:** Quantitative data will be collected to identify independent variables in the conceptual framework through monthly safety report documents. In addition, data were also related to the cost of implementing OSH laboratory, laboratory salary, the amount to be paid in case of an accident, data on hazard identification, risk assessment.

**Quantitative Part:** Qualitative data will be collected by conducting interviews with key informants as well as semi-structured informants.

**Data Collection:** Data collection in this study includes primary data that is direct data collection to determine the potential risks of work in the laboratory by direct observation of work processes. For data related to

costs, researchers used secondary data obtained directly from the company through the financial department of the company's department.

**Key Informant Interview:** A pre-test will be conducted to validate the interview tool, selection of informants and key informants using purposive sampling. Interviews will be conducted at the laboratory and the top management ranks where the function is as a decision maker, namely the head of the laboratory, the head of the department. Each interviewer to key informants/informants will spend approximately 1 hour and recorded with the informant's approval.

**Document Review:** The systematic review of the literature will be carried out based on the framework of the research concept. The researcher will review the document in the form of soft copy, but if triangulation is needed, the researcher will use hard copy notes.

**Data Analysis:** Qualitative data transcripts will be compiled and reviewed by at least two members of the research team. Data from interviews will be analyzed according to theme, using E-Z text software. Quantitative data will later be entered in a computer database using SPSS version 20 for descriptive analytics. The statistical test used is the proportion test. Data level of risk related to the calculation of costs and benefits in the implementation of OSH laboratory. The data that has been obtained will be grouped according to their respective variables. Data from the calculation of procurement costs for the implementation of OSH Laboratory are included in the cost category, data about indirect and direct costs that must be incurred by the laboratory in the event of an accident due to the absence included in the benefit category<sup>(17)</sup>. Then compare the risks after and before the control in percent to see whether the implementation of OSH laboratory can be used as an effort to control that is reasonable (reasonably practicable) or not. These costs and benefits are measured in a 3-year timeframe, from 2015 to 2018.

$$BC \text{ Ratio} = \frac{\text{Total accident cost (benefit)}}{\text{Total accident prevention (cost)}}$$

Furthermore, the estimated loss that can be avoided by reducing work safety risk by installing safety net can be done with the formula:

$$\frac{L0}{L1} = \frac{R0 \text{ (benefit)}}{R1 \text{ (Cost)}} \rightarrow L1 = \frac{R1 \times L0}{R0}$$

## Discussion

The CBA model allows monitoring of OSH costs and benefits. Thus, this provides a basis for assessing both the effectiveness of the application of OHS as well as specific activities to improve working conditions. The results of previous research work indicate that there is a large difference between the expected benefits and the return on investment imagined in companies<sup>(18)</sup>. In large companies, an analysis of benefits as a result of an investment project can be very useful at the departmental level because investment projects are rarely implemented to improve working conditions throughout the company<sup>(19)</sup>. The most prominent benefit of the investment project in occupational safety and health is that it improves working conditions pre-existing in high concentration companies, work stations and most operations are carried out manually<sup>(20)</sup>. Implementation of laboratory safety risk prevention requires adequate planning<sup>(21)</sup>.

## Conclusion

OSH Laboratory implementation is feasible to minimize the risk of working safety in the laboratory. Procurement of personal protective equipment is feasible. This is obtained from the results of the financial Benefit/Cost ratio showing a value of more than 1. In the UI Laboratory considered in this study, preventive measures for occupational risks at this dive height the Benefit/Cost ratio is higher than 1. In this case the company tries to increase cost effectiveness. Implementation of laboratory safety risk prevention requires adequate planning. Therefore the application must be coordinated by the Health and Safety team, which works closely with various other stakeholders in the university's organization, with special emphasis on finance, management control and the human resources department.

**Abbreviations:** OSH: Occupational Safety and Health, BPJS: Badan Penyelenggara Jaminan Sosial (Social Security Administrator), CBA: Cost Benefit Analysis

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# Association between Syphilis and HIV in the Men Sex with Men (MSM) Population in Indonesia in 2015: Secondary Data Analysis of Integrated Behavior and Biological Survey (IBBS) 2015

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## Abstract

**Background:** Each year, there are an estimated 6 million new cases of syphilis globally in persons aged 15 to 49 years. Syphilis remains a risk factor among Men Sex with Men and other groups who tend to have multiple sex partners. As is known, people who suffer from syphilis increase the risk for contracting and transmitting HIV infection to others. This is because the mode of transmission of Syphilis and HIV have in common. Syphilis among Men Sex with Men needs special attention because if it is not immediately addressed it is likely to enter the heterosexual population and the impact will be even greater.

**Method:** A cross sectional study: Integrated Behavior Biological Survey (IBBS) in 2015 is managed by the Ministry of Health every four years as part of evaluating HIV AIDS programs in Indonesia. The study was conducted in 6 selected provinces to 1,496 Men Sex with Men, behavioral data collection was done by interview while biological data in this case Syphilis and HIV were carried out by laboratory examination of blood samples

**Results:** Studies show that syphilis is a risk factor for HIV with (95% CI) RR = 2.2 (1.8 - 2.8). The combination of syphilis, education level and condom use consistently increases the risk to 2.5 (1.03 - 5.84).

**Conclusions:** There is a association between syphilis positive and HIV positive. Syphilis increases the risk of HIV cases up to 2 times among Men Sex with Men. Syphilis continues to be an uncontrolled public health problem with high rates of syphilis re-infection among Men Sex with Menpopulation in Indonesia. Prevention as a more effective approach can be done simultaneously considering that both Syphilis and HIV can be prevented in the same way

**Keywords:** HIV AIDS; Syphilis; Condom; MSM.

## Introduction

The joint United Nations (UN) program for handling AIDS (UNAIDS) noted the spread (distribution) of

Human Immunodeficiency Virus (HIV) in Indonesia reached 49 thousand or grew 16% each year. Indonesia ranks third with the largest growth in the spread of HIV among Asia Pacific countries.<sup>5</sup> In Indonesia in 2018: 640.000 people were living with HIV. As of June 2019, a total of 466,859 HIV cases were identified and 13% of them came from the MSM community.<sup>9,10,11</sup>

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HIV infection in MSM groups has increased in the last 15 years in big cities in Asia. In Indonesia, HIV infection in the MSM group has increased significantly

in recent years. IBBS data in the previous year showed a significant increase in syphilis prevalence (2017: 4.33%, 2011: 9.29% and 2015: 15.71%). The increase in syphilis prevalence was followed by an increase in the prevalence of HIV (2017: 5.35%, 2011: 8.48% and 2015: 25.80%). HIV prevalence in the MSM group increased by 2.5 times compared to previous STBP. MSM groups have a higher proportion of education and proportion. Comprehensive knowledge about correct understanding of the highest HIV prevention increased by 2.3 times compared to other risk groups.<sup>6,7</sup>

There were various reasons why MSM and bisexuals were at high risk for syphilis. The high number of sexual partners and sexual networks creates a vicious circle where the higher syphilis prevalence then leads to a higher incidence, which leads to a higher prevalence and cycles that can increase the frequency of infections.

Becoming MSM in Indonesia is not as simple as one might expect. A study conducted by Budiman and Boellstorff in 2005 showed that being gay in Indonesia was seen as a sexual deviation and had a negative influence on Indonesian culture. Such social perspectives and norms often lead to MSM stigma, discrimination, judgmental behavior, rejection and the threat of violence which ultimately leads to various things related to HIV/AIDS thereby increasing the risk of HIV infection in MSM.

### Method

IBBS is a 4-year survey, using cross-sectional design with respondent driven sampling (RDS) as a sampling method. RDS was used because MSM is a hidden population and has a very strong MSM network. IBBS for MSM was held in 6 of 34 province in Indonesia in 2015. The total number of respondents was 1.496 out of 1.500 targeted to represent MSM in Indonesia. The

inclusion criteria of the respondents were that Men who have Sex with Men (MSM) were biologically male, aged 15 years or older and had lived in the survey city for at least one month and had had sex with a man in the past year. The collection of information about behavior was done by interviews while the collection of biological data was done through venous blood collection. The syphilis examination was carried out with RPR and TP rapid while anti-HIV with rapid test. Collecting, editing and analyzing data IBBS using software STATA (v.13, Stata Corp). The effect between the independent and dependent variables in this study can be determined by Prevalence Ratio (PR) with confidence intervals (CI) 95% and estimated using Cox Regression Model in constant time. To determine the model to be used, the method used was one at a time by comparing  $\Delta PR > 10\%$  between crude PR and PR adjusted

### Results

The following was a general description of the respondent's social demographics: from a total of 1.500 targeted respondents, 1.496 respondents participated in this study. In general, 66% respondents aged >25 years with not selling sex as a main occupation (88%), 61% had higher education. The tune of 87% was single status, live with family 51% and mostly (85%) had sex at age < 25 years. Related to HIV AIDS, 83% of respondents had attended meetings or discussions related to HIV, this had an impact on the good understanding of HIV AIDS reaching 62% and knowledge about themselves at risk reaching 70%. **(Tabel. 1)** Most MSM's regular partner were male, the range was between 40-85%, while those who have a female regular partner were in the range of 17-48% and MSM rarely had a trans gender as regular partner (0.33-3.34%). On the other hand, 68% of MSM had had blood tests to determine their HIV status, but 98% of those who tested positive from this study have not taken HIV treatment.

**Table 1. Study population characteristic by inclusion status**

Variable	HIV Positive N(%)	HIV Negative N(%)	Total (1496) N (%)	PR 95% CI	P-value
<b>Syphilis</b>					
No	226 (19)	955 (81)	1.181 (85)	1.0	-
Yes	77 (38)	125 (62)	202 (15)	2.2 (1.8-2.8)	< 0.0000
<b>Age</b>					
< 25 years	95 (21)	372 (79)	467 (34)	1.0	-
>25 years	208 (23)	703 (77)	911 (66)	1.1 (0.8-1.4)	0.35

Variable	HIV Positive N(%)	HIV Negative N(%)	Total (1496) N (%)	PR 95% CI	P-value
<b>Main Occupation</b>					
Not Selling Sex	267 (22)	949 (78)	1.216 (88)	1.0	-
Selling Sex	35 (22)	129 (78)	164 (12)	0.9 (0.6-1.3)	0.87
<b>Education</b>					
Low	22 (85)	4 (15)	26 (8)	1.0	-
Moderate	82 (84)	16 (16)	98 (31)	1.0 (0.3-3.1)	0.91
High	155 (82)	35 (18)	190 (61)	1.2 (0.4-3.3)	0.73
<b>Current Living With</b>					
Family/Wife	137 (20)	553 (80)	692 (51)	1.0	-
Alone/Partner/Friend	166 (24)	526 (76)	690 (49)	1.2 (1.0-1.5)	0.10
<b>Attending a Meeting or Discussion Related to HIV</b>					
Yes	884 (78)	254 (22)	1.138 (83)	1.0	-
No	182 (80)	46 (20)	228 (17)	0.9 (0.6-1.2)	0.73
<b>Understanding of HIV AIDS</b>					
Good	187 (22)	673 (78)	860 (62)	1.0	-
Poor	116 (22)	407 (78)	523 (38)	1.0 (0.8-1.2)	0.86
<b>Consistency condom with regular partner</b>					
Yes	62 (25)	186 (75)	248 (34)	1.0	-
No	102 (20)	388 (80)	490 (66)	0.8 (0.6-1.1)	0.25
<b>Marital Status</b>					
Married	142 (79)	39 (21)	181 (13)	1.0	-
Single	264 (29)	938 (71)	1.202 (87)	1.0 (0.7-1.4)	0.98
<b>At Risk of HIV infected</b>					
Yes	207 (33)	675 (67)	882 (70)	1.0	-
No	68 (18)	301 (82)	369 (30)	0.8 (0.6-1.0)	0.08
<b>Age at The First Sex</b>					
< 25	264 (23)	919 (77)	1.183 (85)	1.0	-
> 25	39 (20)	161 (80)	200 (15)	0.8 (0.6-1.2)	0.43

We conducted stratification analysis of Condom Use Consistency and Understanding of HIV AIDS. As compared to consistency of condom use with regular partner, all respondents with positive syphilis that inconsistent using condom were significantly about 2.3 times more likely to get HIV infection (PR=2.33; 95%

CI: 1.52-3.57). As compared to understanding of HIV AIDS, all respondents with positive syphilis showed that there was not any significantly difference between respondent whose had good and poor understanding of HIV (Table 2).

**Table 2. Stratification Analysis of Associations between Syphilis and HIV Infection According to Strata of Consistency Condom Use with Regular Partner and Understanding of HIV AIDS**

Variable	PR Strata (CI 95%)		Crude PR (CI 95%)	Adjusted PR (CI 95%)	P-Value Homogeneity	ΔPR (%)
Consistency condom use with regular partner	Consistent	1.95 (1.03-3.68)	2.195644	2.198544	0.645	0.13
	Inconsistent	2.33 (1.52-3.57)				
Understanding of HIV AIDS	Good	2.29 (1.66-3.15)	2.195644	2.195567	0.675	0.007
	Poor	2.04 (1.34-3.10)				

The results showed that respondents who were syphilis positive had a risk for HIV positive 2.6 times greater than those who were not syphilis (2.6; 95% CI:1.05-6.30) p-value 0.03. After adjusting for several

variables suspected to be a confounder, the adjusted PR changed to (2.5; 95% CI:1.03-5.84) p-value: 0.04. **(Table 3).**

**Table 3. Results from the Multivariable Model**

Model	PR (95% CI)	P-Value
<b>Model 1 (Full Model):</b> Syphilis, main occupation, education, current living with, attending a meeting or discussion related to HIV, understanding of HIV/AIDS, consistency condom with regular partner, marital status, at risk of HIV infected, age at the first sex	2.6 (1.05-6.30)	0.03
<b>Model 2 (Reduced Model):</b> Syphilis, education, consistency condom with regular partner	2.5 (1.03-5.84)	0.04

This was the model used after controlling for several variables. This model showed that in addition to syphilis, the consistency of condom use and education was a determinant of the factors that most influence HIV infection. The results shown that respondents who were syphilis positive have a risk for HIV positive 2,5 times greater than those who were not syphilis PR = 2.50; 95%

CI; 1.03–5.84; p-value:0.04. Education of respondent has 0.9 times effect (prevention) on HIV infection PR = 0.9;95% CI; 0.68–1.46; p-value: 0,99. Consistency condom with regular partner has 0.3 times (prevention) on HIV infection PR=0.3; 95% CI; 0.18-0.83, p-value: 0.01. **(Table 4).**

**Table 4. Final Model Association between Syphilis and HIV**

Variable	PR (CI 95%)	P-value
Syphilis	2.5 (1.03–5.84)	0.04
Education	0.9 (0.68 -1.46)	0.99
Consistency condom with regular partner	0.3 (0.18 - 0.83)	0.01

**Discussion**

Syphilis and other sexually transmitted infections (STI) were risk factors for HIV. Both syphilis and HIV were transmitted through sexual transmission mainly due to the presence of genital and inflammatory lesions.<sup>1</sup> All people who were sexually active could be at risk for syphilis. Both men and women could get syphilis even though more cases were found in men than women. Most of the new cases reported occurred in men who have sex with men.<sup>13</sup> In people living with HIV, syphilis increased the power of infection HIV and in those who have not been infected with HIV, syphilis increase susceptibility to contracting HIV. Various studies in many countries reported that syphilis infection could increase the risk of HIV transmission by 3-5 times.<sup>8</sup> Control over syphilis remains a challenge. Similar to

previous studies, HIV-positive patients were found more often involving sexual behavior associated with syphilis than HIV-negative patients. Clinical manifestations were rather similar in the two groups, although anal chancre was most common in HIV-positive patients.<sup>2</sup>

IBBS 2011 and 2015 data revealed that syphilis rates among key populations remained high. Rates of condom use as a means of preventing syphilis and HIV has increased and condoms were becoming available at some clinics, even in Puskesmas (primary health care).Antibiotics for the treatment of syphilis (benzatin penicillin), gonorrhea (cefixime) and chlamydia (azithromycin) available at STI clinics, however sometimes the treatment was not up to standard and the handling was also not routinely carried out.<sup>6,7</sup>

Studies conducted in other countries also showed a similar trend where an increase in the prevalence of syphilis was followed by HIV prevalence. In China, the prevalence collected from HIV-syphilis coinfection across the country substantially increased from 1.4% (95% CI: 0.8-2.3%) during 2005-2006 to 2.7% (95% CI: 1.8-4.0%) during 2007-2008.<sup>4</sup> Peru also showed similar data as Indonesia. The prevalence rates of HIV and STIs, including syphilis, gonorrhoea and chlamydia were very high among MSM registered from clinics and community sites in urban Peru. HIV prevalence was significantly higher among MSM enrolled from clinics, with previously undiagnosed HIV identified in 9.1% compared to 2.6% of community participants. 15.4% of all MSM screened were infected with a curable STI of  $\geq 1$ , 7.4% with early syphilis (RPR  $\geq 1:16$ ) and 5.5% with urethral gonorrhoea and/or chlamydia.<sup>3</sup> The high level of mobility, the number of sexual partners and the high prevalence of unprotected sex and syphilis infections indicate the potential for rapid spread of HIV among MSM in Beijing. Study showed that men partner with men in a lifetime >10 times were associated with seropositivity in both syphilis (OR, 1.9; 95% CI, 1.1-3.4) and HIV (OR, 4.3; 95% CI, 1.4-13.6). In addition, HIV infection was significantly associated with syphilis seropositivity (OR, 3.8; 95% CI, 1.3-10.8).<sup>14</sup>

There were various reasons why MSM and bisexuals were at high risk for syphilis and HIV. The high number of sexual partners and sexual networks created a vicious circle of infections between syphilis and HIV.

In addition to syphilis, condom use variables with a regular partner and education were two variables that were very strong predictors on positive HIV cases. The percentage of consistent condom use with regular partners, non-regular partners, when buying sex and when selling sex were: 33%, 51%, 52% and 62% respectively. This showed that the consistency of condom use (always using condoms when having sex) was still very low. This study also showed that condoms were quite accessible both those obtained by buying or getting them for free from Field Officers. Unfortunately, even though 83% said condoms were accessible, in practice only 35% always provided condoms and only 32% always provided lubricants.

The main limitation of this cross-sectional study was concerning the temporal sequence, i.e. that we could not fully assure that the occurrence of all syphilis cases (which was hypothesized as a causal risk factors of the

HIV infection) came first before the occurrence of HIV infection.

## Conclusions

There was significant association between syphilis and HIV infection. Among MSM, having Syphilis increased the risk of HIV infection up to 2.5 times. Syphilis continued to be an uncontrolled public health problem with high rates of syphilis re-infection among MSM groups in Indonesia. Considering the serious complication/sequelae and its role in increasing the HIV transmission and thus accelerating the HIV epidemic, controlling Syphilis must be seriously emphasized with urgency. Efforts to prevent HIV and syphilis must be coordinated. Further studies to explain the behavioral and biological interactions between the two infections were needed.

**Ethical Considerations:** This study was approved by The Research Ethical Committee Faculty of Public Health Universitas Indonesia (No: 129/H2.F10/PPM.00.02/2014).

**Competing Interests:** The authors declared that no competing interests exist.

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# Social Immunity Not to Use Drugs on Youth (Case Study of the Marind and MUYU Tribes in The Border Region of Indonesia and Papua New Guinea)

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## Abstract

Marind and Muyu tribe are tribes that are still very thick with their cultural values and still have blood ties or family ties with the tribes or villages in the surrounding areas of Papua New Guinea, where these villages are still rarely touched by modernity. However, among teenagers, it was found that they often brought cannabis into Indonesian territory. This study aims to look for concepts and relationships between concepts related to family security of the Marind and Muyu ethnic groups not to use drugs and to find a picture of the socio-cultural value system of the two tribes in protecting adolescents against drugs. The design used is qualitative research with a case study approach. This research was conducted in Sota sub-district, Sota District, Merauke Regency in July - August 2017. Data collection was carried out by interview, observation and document review. Research informants are adolescents who are not narcotics, adolescent drug users, parents and other community leaders. Analysis of the data used is qualitative data analysis and triangulation to ensure the validity of the findings. The results showed that empirically teenagers did not become drug users because of the mother's message. The emotional closeness of adolescents with the mother at home naturally flows into the superstructure. Although some teenagers who are not narcotics are friends with narcotics, they do not use drugs because it can make parents embarrassed and excluded from the community life in Merauke Regency.

**Keyword:** *Social immunity, drugs, youth, Papua.*

## Introduction

Report on the development of the drug situation in the world in 2014, it is known that the estimated number of drug users in 2012 is between 162 million people to 324 million people<sup>(1)</sup>. Based on reports from the survey conducted by BNN in 2014, it was found that the number of drug cases nationally in Indonesia in the age group of 10-59 years was 3,362,527 people in 2008, 4,274,257 people in 2011 and 4,022,702 people in

2014. The results of the National Survey on Drug Abuse Prevalence in 2014 predict that in the rising scenario there will be an increase in drug abuse nationally, 4.1 million people in 2014 to 5.0 million people in 2020 and also followed by an increase in economic and social cost losses. due to drug abuse around 2.3 times or increased from 63.1 million IDR to 143.8 trillion in 2020<sup>(1)</sup>.

Data in 2015 stated that the biggest drug users in Papua based on education were high school students with 53% of the total new users totaling 334 people, followed by junior high school education of 35%. Whereas based on employment, the biggest cannabis users in 2015 in Papua were those who did not work by 43% and second were students by 31%. Through the survey results, it was also reported that the type of drug that was first used nationally, the province of Papua ranks first at 92% and for the types of drugs currently circulating in Papua is

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cannabis 99%<sup>(1)</sup>. Types of cannabis drugs are so popular in Papua because of their easy access to the Papua New Guinea border.

Marind and Muyu tribe are tribes that are still very thick with their cultural values and still have blood ties or family ties with the tribes or villages in the surrounding areas of Papua New Guinea, where these villages are still rarely touched by modernity. However, among adolescents and young people, it is found that they often bring cannabis into Indonesian territory. Based on a literature study it was found that the parents and children of the Marind tribe (all those belonging to the family) often rested while chatting on the porch of the house which was built on the front of the house. It is also used as a good time to share the tips of life with young people or teenagers in the family or advice about daily life. Parental advice and self-concept are the strength of a teenager in defending themselves from falling into the world of drugs. Parental advice, especially mothers are able to give effect to adolescents to protect themselves from drugs and self-concept which is a value or something that is believed by adolescents as something good and right not to fall into drugs.

Based on this information an initial proposition can be made that there is a value system in the tribes that inhabit the border area as a family immunity that is able to protect and prevent drug use in adolescents, through the advice of parents and adolescents self-views towards their future. If this is generally accepted, then actually teenagers in the community who inhabit villages in the border region have strong values (forms of immunity) within the family so that they can protect and prevent and avoid the influence of drug use. This needs further research to prove that the building proposition is generally accepted for people who inhabit villages in the borders of Indonesia and Papua New Guinea.

## Method

This type of research is a qualitative study using a case study approach. This research was conducted in the Sota village, Sota District, Merauke Regency, in addition to the children of the Marind and Muyu tribes who were attending or studying at the University in Merauke City in July - August 2017. Data was collected through interviews, observations and document reviews. Research informants are adolescent drug users, adolescents who are not drug users and have friends who use drugs as well as adolescents who are not drug users

and do not have friends who use drugs. In addition to adolescents, informants can also come from families (father/mother/grandfather/grandmother/housemates) and also community leaders (chiefs, teachers, priests, priests and others according to data requirements). Analysis of the data used is qualitative data analysis and triangulation to ensure the validity of the findings<sup>(2)</sup>.

**Findings:** To find out the behavior and values of non-drug adolescents in the Marind and Muyu tribes, data collection was carried out by conducting in-depth interviews and observations of 14 non-drug adolescents.

**The reason teens don't use drugs:** There are several reasons that cause the Marind and Muyu ethnic groups not to use drugs, namely the knowledge that drugs can damage nerves and organs, fear of addiction and the prohibition of using drugs (Law and Religion).

*"Tidakmenggunakannarkobakarenatakutketagihan"*  
(Informan MRT).

*"Tidakmenggunakannarkobakarenatidakbaikbagikesehatan dan dilarangkeras oleh Undang-Undang, agama dan Negara"* (Informan MUS).

Fear of addiction/addiction is a symbol of the concern of a teenager on the long-term negative effects of drugs which when trying to use are difficult to get rid of or stop. This, of course, will have its own consequences it will be difficult to become normal when they become abnormal people, then they will find it difficult to carry out social activities. In addition, they will also have difficulty in carrying out social roles. This is certainly a very heavy consequence because they will automatically be rejected in their social environment. They also think that once using drugs it will be difficult to stop.

Some teens make parents the reason parents don't use drugs.

*"Saya tidakmenggunakannarkobakarenatakutdimarahi mama. Saya seringcurhat dan ceritaapa-apasama orang tua"* (Informan SAP).

Parents, especially mothers, are someone who is personified by the mother as someone who has the power to provide reward and punishment.

**Advice received from family:** The RES informant stated that he had received advice from his parents.

*"Ada (nasihat orang tua), agar rajinbelajar, jangannakal, jangansukaringantangan (pukulteman)"*.



Mother's advice contains profound meanings for adolescents of the Marind and Muyu tribes. The content of the mother's advice that warns her child is a symbol that the child does not commit acts that violate, including falling into the use of drugs. Children are warned not to hang out at any time while being more selective in making friends.

Another informant (ASO) stated that he was often advised by his mother.

*"mama selalukasihnasihat, sekolahbaik-baik, bergaul denganteman yang baik-baik, kalau jajan-jangan macam-macam, kalau adateman yang mau main, lebih baik main kerumah dari pada keluar, dan kuliah baik-baik – baik-jangan mengecewakan orang tua".*

The contents of the advice suggest for teens not to just hang out and choose friends. The direction to call a playmate at home is a form of protection so that parents can still control the behavior of the child. The results of the study also found the fact that there are several support factors (factors - factors that support) so that adolescents do not use drugs, namely advice not to just hang out. Be careful in getting along is a symbol of efforts to fortify themselves by limiting/selective in choosing associates.

**Sources of information about drugs:** The description and knowledge of the dangers of drugs in adolescents make teens not want to use drugs. Knowledge about drugs is obtained by adolescents from counseling obtained at schools and the National Narcotics Agency (BNN) of Papua Province.

*"Di sekolah itu pernah datang orang BNN kasih penyuluhan tentang bahaya narkoba. Itu katanya narkoba bikin sakit".*

The existence of drugs around the Marind and Muyu tribes has made various parties make efforts to prevent drug use among teenagers. Teenagers get knowledge about the dangers of drugs from BNN and Schools. BNN is a government institution that specifically and aggressively undertakes efforts to prevent and deal with drugs in Indonesia, including in the Papua region. In conducting prevention efforts, BNN works closely with schools to provide students with lessons about the dangers of drugs.

**The ideals of noble teenagers:** Marind and Muyu teenagers have lofty ideals to be achieved. They assume that using drugs is something that can cause them to not be able to get the ideals they want.

*"saya tidak mau kaka. Saya mau jadi perawat. Katanya jadi tenaga itu harus sehat dan tidak boleh ada penyakit."*

The quote from the informant above shows that adolescents having drug beliefs can keep them from achieving their desired goals. Teenagers have, the aspiration to become a nurse is their desire to become a better person and make parents happy.

## Discussions

Geographically, there are several villages/tribes that live in the border areas of Indonesia and Papua New Guinea, one of which is the Marind and Muyu tribes in Merauke, Papua Province. Marind and Muyu tribes have a kinship with the people of Papua New Guinea, both those caused by blood relations, as well as social relations, such as trade relations and other social interactions. This condition can provide its own threat to drug trafficking in both tribes. The Marind and Muyu tribes are one of the areas in Merauke that are used as drug trafficking routes, both by land and river waters<sup>(3)</sup>.

Empirically, the state of Papua New Guinea is one of the countries that give citizens the freedom to use drugs with cannabis type freely. Marijuana plants can grow freely around the community and the community is free to use marijuana and the market to the community<sup>(4, 5)</sup>. In contrast to Papua New Guinea, Indonesia imposes a strict ban on the use of narcotics including in the form of marijuana. All forms of activities related to cannabis will be given strict sanctions both legally and social sanctions that develop normatively in society as a social order.

The existence of adolescents who do not use drugs in the Marind and Muyu tribes is certainly an interesting thing because among the Marind and Muyu tribes themselves many people use drugs. In addition, the location of the Marind and Muyu tribes that border directly with the State of Papua New Guinea where drugs can freely enter certainly can be a motivating factor for adolescents in the Marind and Muyu Tribes to use drugs. The cause was explored by researchers in adolescents who did not use drugs by displaying findings and analyzing the meaning of findings based on the paradigm used in this study. Teenagers will get a reward if they obey and obey the commands of parents (mothers) and the norms and rules in their environment. Whereas punishment will be received if a child violates the commands, norms and rules of the parents and the environment.

When viewed using the symbolic paradigm of Mead's<sup>(6)</sup> symbolic interaction, parents are significant others who have a big role in the process of emotional development of adolescents. A teenager who does not use drugs normatively should internalize the norms and morals of his parents through interactions that occur in their daily communication. When there is an intense interaction between parents and adolescents, adolescents will get a role model in their lives as an antidote to deviant behavior. Using Mead's symbolic interaction paradigm, children's values are built by parents as part of the child's superstructure. Parents are still a central figure that cannot be separated from teenagers who are still in the process of searching for an identity.

The family as the smallest unit in social life has a very big role in shaping one's defense against social diseases early on<sup>(7)</sup>. However, the role of parents in child care changes as the child's growth and development. Father and mother both have an important role since the child in the womb. But there is a slight difference in touch from what is displayed by father and mother. Mothers tend to foster feelings of love and love for children through interactions that involve physical touch and affection. Whereas fathers tend to foster self-confidence and competence in children through physical play activities. Parents have an important role in nurturing and fostering their children's behavior. In the development of children, parents play a role as satisfying the needs of children, child development, role models for children and forming self-concept in the family.

For the Muyu Ethnic community, there is a set of traditional rules concerning social interactions with adolescents relating to dangerous issues such as drugs. Including the procedures for promiscuity in adolescents<sup>(8)</sup>. The position of children in the family, especially boys, is a source of pride in the Muyu family. This causes parents to provide protection to adolescents so that they can become heirs in the family. According to Sharf (2010) in Sisca and Gunawan<sup>(9)</sup>, adolescents aged 15-18 years are an important period in which career choice commitments are made. At that age, teenagers have realized the importance of school for their career development. Teenagers know that they can determine their careers for their future related to career decisions. At the same time, teenagers' access to know things that can make it difficult for adolescents to achieve their goals is also greater. Teenagers as much as possible to protect themselves from things that damage their ideals.

Culture is a major force in people's lives<sup>(10)</sup>. One of the cultures of the Muyu and Marind tribes that are strongly attached to adolescents is religious life. This culture becomes a major force in binding the system of action. Religious life mediates interactions between people, interacts personalities and unifies social systems. Teenagers take good grades in every pastor's lecture and activities in the church. Religion provides teenagers with knowledge about God and the prohibitions to take actions that are forbidden by God. This becomes a system of values and norms inherent in adolescents to ward off drug use behavior.

## Conclusion

Empirically teenagers do not become drug users because of the mother's message. The emotional closeness of adolescents with the mother at home naturally flows into the superstructure. Although some teenagers who are not narcotics are friends with narcotics, they do not use drugs because it can make parents embarrassed and marginalized in the community life in Merauke Regency.

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# Psychoeducation for Improving Self Efficacy of Care Givers in Risk Coronary Heart Disease Prevention: The Study of Family Empowerment

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## Abstract

**Objectives:** This study aims was to examine the self efficacy effect on family members as caregivers in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation.

**Method:** The study was a quasi-experimental pre-post control group design on caregivers which have one risk factor of CHD in family members in Malang Regency. The sampling technique used was purposive sampling with 96 respondents (48 intervention groups and 48 control groups). The measuring instrument used is Cardiac self-efficacy questionnaire. The data analysis employed chi square test, t dependent test and independent t test.

**Results:** The characteristics of the respondents in the psychoeducation group and control group (Age, sex, relationship and family support) had no relationship ( $P > 0.005$ ). The family psychoeducation group (1.88) and the control group (1.66) had the same selective value of self-efficacy in preventing CHD among family members at risk of CHD. There was an effect in the family psychoeducation group ( $p < 0.005$ ) and there was no effect on the control group ( $p > 0.005$ ). Family psychoeducation and control groups had differences in terms of self-efficacy of caregivers in preventing CHD among family members at risk of CHD ( $p < 0.005$ ).

**Conclusions:** The groups that get family psychoeducation have better self-efficacy than those given health education (control groups).

**Keywords:** *Psychoeducation, self-efficacy, caregivers, coronary disease, Qualitative.*

## Introduction

Heart disease is one of the major causes of deaths in many countries, including in Indonesia. World Health

Organizations (WHO) predicts that by 2020, the number of heart disease cases will continue to increase until 2030. Nearly 60% of deaths related to heart disease were caused by CHD<sup>1</sup>. Indonesia is one of the countries that records the incidence of CHD. The identified symptoms are as much as 1.5%<sup>2</sup>. The results of study in 2017 conducted by the researcher at Talok village Malang Indonesia, 50 people had the risk of CHD and 40 caregivers caring for family members with the risk of CHD had less self-efficacy against the prevention of CHD risk.

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Family empowerment approach was one of the

efforts that can be done to prevent CHD<sup>3</sup>. The concept of family enlargement involves families to prevent and care for family members who are sick. In addition, family empowerment aims to improve health facilities as an effort to prevent the disease<sup>4</sup>. Family empowerment can be done by caregivers in the family independence process to monitor and maintain health. The process of family empowerment can improve the function and task of family health care<sup>5</sup>.

Family empowerment aims to increase the role of caregivers in improving psychological motivation and self-efficacy of caregivers in preventing the disease<sup>6</sup>. The role of caregivers in preventing CHD improves the function of family health, reduces the anxiety that occurs in the family, increases self-efficacy in preventing CHD and increases self-efficacy in CHD prevention process. The dominant role of the caregivers is related to self-efficacy in preventing CHD<sup>7</sup>.

Therapeutic modalities are one of the efforts for enhancing the self-efficacy of a person. The therapeutic modalities are family psychoeducation. Psychoeducation aims to provide information for improving the ability of family members, reducing recurrence and improving the function of clients and families<sup>8</sup>. Therefore, family psychoeducation can be implemented to provide education for the family in terms of knowing the disease, assisting and training the caregivers in overcoming the changing behavior of risky family members and strengthening family support and empowerment in the community<sup>9</sup>. Thus, this study identifies the influence of family psychoeducation on the enhancement of caregivers' self efficacy in the prevention of CHD in CHD family members.

This study aims to examine the self-efficacy differences of caregivers in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation. It also analyzes differences in the self-efficacy of caregivers in preventing CHD among family members at risk of CHD in family psychoeducation and control groups. Further, it analyzes the self-efficacy effect of the family in preventing the case of CHD among family members at risk of CHD after obtaining family psychoeducation.

## Materials and Method

**Study Design:** The research design of the study was quasi experimental pre-post control group design. The study was conducted from August 2017 to January 2018.

The sampling technique used was purposive sampling. Determination of CHD risk groups used Framingham 10-years estimation with a minimum inclusion criteria for a person with CHD risk is in the low risk category<sup>10</sup>. Determination of risk category of CHD by sex, Age over 35 years, someone with hypertension (> 120 mmHg) without taking hypertension medication regularly, had a history of diabetes mellitus, smokers and someone with a history of dyslipidemia. Exclusion criteria for a person who had been diagnosed with cardiovascular disease by a physician as well as someone with CHD risk but had no caregiver

**Study Area:** The data were collected in Turen District, Malang Regency. Data collection was done by conducting home visits to families with risk factors for CHD. During the visits, the researcher provided family psychoeducation to the intervention group and health education on CHD to the control group.

**Sampling Technique:** The sampling technique used was purposive sampling. The number of samples involved was 96 respondents. The sample is divided into 2 groups, namely family psychoeducation group (48 respondents) and control group (48 respondents).

**Instrument:** The instrument used was a Cardiac self-efficacy questionnaire (CSE)<sup>11</sup>. The approval for the use of the questionnaire has been obtained from the owner. CSE was translated into Bahasa Indonesia at Universitas Brawijaya's language training center. Then tested the validity of the contents of the questionnaire to someone who was competent for cardiovascular. The questionnaire comprises 15 points statement about risk factors and self-efficacy related to the risks of CHD into the family. The Likert scale was used in the questionnaire, consisting of (1) for unsure, (2) unsure, (3) sure and (4) very sure. The higher the value, the better the self-efficacy of a person. Reliability test was conducted in Bantur Village, Kabupaten Malang with 32 respondents who have the same criteria with family risk factors at CHD. The reliability test obtained Cronbach's alpha value of 0.988.

### Collection Procedure:

Caregivers in the family of psychoeducation group were given 4 interval interventions:

- (a) Session 1: Caregivers recognized family health problems in preventing CHD;
- (b) Session 2: The management of stress for caregivers

in caring among family members with risk factors of CHD;

- (c) Session 3: Caregiver load management in caring for family members who have risk factors for CHD;
- (d) Session 4: Family empowerment for preventing CHD in the community.

The control groups were given health education using CHD materials, consisting of the definition of CHD, signs of CHD, CHD risk factors, first aid and care if a member of family could have a heart disease.

Family psychoeducation was given by researchers who have competencies as mental health nurses, medical surgical nurses and community nurses. The family psychoeducation was conducted in 4 sessions. The Method of family psychoeducation and health education in the control group had differences. Family psychoeducation was done by sharing experiences about family problems while caring for family members who are at risk of CHD to family empowerment with CHD risk in the community. The duration of each session was 45-60 minutes. The control group was given intervention by researchers with a one-time frequency of encounters with a duration of 45-60 minutes of health education.

The intervention media used in the family psychoeducation group were the family psychoeducation module for CHD prevention, caregiver workbook on CHD prevention, feedback sheet on CHD materials, leaflets on CHD materials, management of family burdens and family empowerment with CHD risk factors in the Community, book on management stress consisting of progressive muscle relaxation. The control group used a Flipchart and a leaflet of CHD materials.

**Data Analysis:** The data analysis employed the Statistical Package for the Social Science software 20 (SPSS 20). Normality test data in this study using Kolmogorov-Smirnov. The decision used was probability value ( $p > 0,05$ ), so the data was normal distribution. The value of self-efficacy pre-test in the family psychoeducation intervention group ( $p = 0,571$ : 95% CI) and posttest value ( $p = 0,132$ : 95% CI), whereas the pretest control group ( $p = 0,116$ : 95% CI) and posttest ( $p = 0,116$ : 95% CI) = 0.299: 95% CI). It can be concluded that the distribution was normal.

The homogeneity test of the data in this study used Levine test. The result value of the test was the probability value ( $P > 0.05$ ) then the result had the same

variant (homogeneous). Pretest value of self-efficacy in family psycho education group ( $p = 0,571$ : 95% CI) while value pretest in control group ( $p = 0,116$ : 95% CI). The conclusions of both groups had the same variant value (homogeneous).

The Chi-square test was used to determine the difference of variables on characteristic data of respondents. The statistical test for cardiac self-efficacy within groups were used dependent t-test. Independent t-test was used to determine the difference of cardiac self-efficacy between family psychoeducation and control group.

**Ethical Considerations:** Ethical approval for the study has been obtained from the Medical Research Ethics Commission of the Faculty of Medicine, Universitas Brawijaya Malang, Indonesia with a research ethics number No.383/EC/KEPK/11/2017.

## Results

The characteristic data of the respondents consists of age, sex, family relationship and family support. The characteristic age of majority respondents in the 41-50 years age range (68.8% family psychoeducation group and 72.9% in control group). The respondent's gender was female-dominated in treating risky CHD members in two groups (54.2% family psychoeducation group and 58.3% control group). The family relations of the respondents with the most at-risk members of CHD were wives in both groups (41.7% of family psychoeducation group and 50.0% control group) and the respondent's characteristic in providing the majority medication adherence was reminiscent of the two groups (54.2% family psychoeducation group and 52.1% control group) as shown in table 1.

The family psychoeducation group (1.88) and the control group (1.66) had the same selective value difference to self-efficacy of caregivers in the prevention of CHD in members at risk for CHD. There was effect on the family psychoeducation group (dependent t-test:  $p = 0.008$ ; 95% CI) and there was no effect on the control group (dependent t-test:  $p = 0.889$ ; 95% CI) as shown in table 2. The family psychoeducation group and the control group had differences in caregivers' self-efficacy in the prevention of CHD in family members at risk of CHD (Independent t-test:  $p = 0.004$ ; 95% CI) as presented in table 3.

## Discussion

Family psychoeducation in this study is based on previous studies on the psychoeducation effect on the mental health of clients with CHD. In the previous studies, there were also sessions on CHD, stress and anxiety management and family empowerment<sup>12</sup>. The literature on family psychoeducation sessions for analyzing health problems, stress management, burden management and family empowerment in the community is also consistent with the research on psychoeducation programs on family attitudes in caring for sick family members<sup>13,14</sup>.

Session 2 of the community-based psychoeducation aims to manage stress and psychosocial problems with stress management approaches<sup>15</sup>. One of the functions of stress management is increasing self-efficacy in the prevention of CHD disease. This is in line with the research on the relationship of self-efficacy and the anxiety level of cancer patients. From the results of the study, it is found that someone who has high anxiety will have negative self-efficacy<sup>16</sup>.

Empowerment of community in families with CHD is also present in session 4 of the family psychoeducation. The purpose of the empowerment is to prevent and solve family health problems. The empowerment model can be used by the health team to seek help when experiencing health problems. The information obtained by the health team can improve self-efficacy. Empowerment can also be interpreted as a model of educational intervention for individuals or families to enhance their ability to think critically and act independently in improving self-confidence and self-efficacy<sup>17,18</sup>.

The method can also increase knowledge about the prevention of acute coronary syndrome risk factors for patients looking for the aid to the health care team if they experience shortness of breath and chest pain due to acute coronary syndrome<sup>19</sup>. So, there are different method and results between sharing and discussion method than conventional method<sup>20,21,22</sup>.

Two prior studies regarding psychoeducation illustrated some variations compared to this study, for instance number of sessions applied and outcomes achieved. Those studies explained eight sessions of the therapy which included modality therapy and assessment of mental illness stigma related to cardiac disease, but this study applied only four sessions of that. Besides, outcomes of the therapy described in those were its

effectiveness to relieve anxiety of cardiac disease sufferer and family burden of people living with mental illness. On the other hand, this study shows that family psychoeducation has develop caregivers' self-efficacy in order to prevent the risk of cardiac disease.

In this way, the improvement of caregivers' self-efficacy was influenced by the method of psychoeducation that researcher applied. Moreover, researcher also gave stress management during second session of the therapy that improve their self-efficacy. As a result, caregivers were able to empower their family members with high risk of cardiac disease so the members will have a better quality of life as the part of community. So, this method is really effective compared to conventional health education such as giving leaflet that only improve self-knowledge.

## Conclusion

There is a difference of self-efficacy of the family as caregiver in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation. Further, there are differences in family psychoeducation with the control group on self-efficacy of caregiver in the prevention of CHD among family members at risk of CHD

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# Community Experience on the Issue of BPJS (The Indonesian National Health Insurance System)

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## Abstract

**Background:** BPJS (The Indonesian National Health Insurance System) is Public Legal Entity that is directly responsible to the President and has the duty to organize National Health insurance for all Indonesian people. BPJS. Today the BPJS has experienced a 100% increase. BPJS tariff increase of 100% has an impact on community participation and BPJS services to the community.

**Method:** This research was conducted descriptively with qualitative research using a phenomenological approach using Interpretative Phenomenological Analysis (IPA). This research was conducted on 25-29 November 2019. Sampling with a purposive sampling technique. The sample size of 15 participants in this study were people aged 15-64 years. Data collection in this study was conducted by in-depth interviews using voice recorders and verbatim observation techniques. Interviews were conducted structurally using interview guidelines compiled by researchers based on response theory and psychology theory.

**Result:** There are 8 themes, namely services with positive and negative community view sub themes, BPJS types with BPJS-PBI (The Indonesian National Health Insurance System-Beneficiary Contribution) and BPJS-Non PBI(The Indonesian National Health Insurance System- Non Beneficiary Contribution) sub themes, BPJS system with positive and negative value sub-theme views, BPJS policies with sub-policies complaint themes that occur, BPJS selection with BPJS-PBI and Non-PBI BPM sub-themes, Costs with BPJS contribution payment sub-themes have an impact on BPJS views, Tariff Increase with sub-theme opinions on BPJS and Hope with BPJS improvement sub-themes.

**Conclusion:** People heard the issue of rising BPJs made them have to rethink to drop out of class, in addition they questioned the quality of services and facilities because they paid more the government is asked to be wiser in determining the increase in BPJS costs

**Keywords:** *BPJS, Society, Increase in Rates.*

## Introduction

BPJS Health is Public Legal Entity that is directly responsible to the President and has the duty to organize National Health insurance for all Indonesian people. BPJS must be owned by every Indonesian resident. BPJS users are all Indonesian people. Today the BPJS has experienced a 100% increase in tariffs. Even though BPJS is mandatory but not all Indonesian people are already registered with BPJS. As a result of the increase in BPJS, many impacts will arise related to the number of BPJS users and services<sup>1</sup>.

UU No 24 of 2011 concerning BPJS forms two Social Security organizing bodies, namely the Health BPJS and the Employment BPJS. Health BPJS is a State-Owned Enterprise that has been transformed into a Public Legal Entity assigned specifically by the government to organize health insurance for all Indonesians. This program serves various layers of the community<sup>2</sup>. BPJS Health is intended to provide protection so that all levels of society get access to health equally. Society is a human who is related (interacts) with other humans in a groups. Life a society that is always changing (dynamic) is something that cannot be avoided. Humans

as social creatures always need other humans to meet their needs<sup>3</sup>. In a broad sense, the community appoints on complex interactions of a number of people who have interests and goals together even though they do not live in one particular geographical area. Such a society can be referred to as *societas* or *society*<sup>4</sup>.

The above statement encourages researchers to examine about the 100% increase in BPJS rates with community participation and BPJS services to the community. Researchers feel interested to examine this because there has been no previous research related to it<sup>5</sup>.

## Materials and Method

This research was conducted descriptively. Qualitative research used a phenomenological approach. By using this method, researchers want to explore or express the meaning of a concept or phenomenon of experience based on awareness that occurs in some individuals. This research was conducted in November 25 to 29 November 2019. The method of selecting participants was carried out using a basic probability of sampling with a purposive sampling technique, which was considered suitable for the criteria. A total of 15 participants interviewed in this study were people of productive age, aged 15-64 years (coded as P1, P2, P3, P4, P5, P7, P7, P8, P9, P10, P11, P12, P13, P14, P15). All participants reside in the village of Kedung Pedaringan. All participants expressed their desire to provide information needed by researchers to achieve the objectives of this study. Data collection in this study was conducted by in-depth interviews using voice recorders and direct observation techniques. Interviews were conducted structurally using interview guidelines compiled by researchers based on response theory and psychology theory<sup>6</sup>. All data obtained from in-depth interviews were then analyzed using Interpretative Phenomenological Analysis (IPA)<sup>7</sup>.

## Result

The data that has been obtained is data from respondents who are homogeneous with criteria of age 15 to 64 years, residents in the Village of Kedung Pedaringan who have BPJS cards and have used BPJS.

### Theme 1: Service

The public has a view on health insurance services, especially BPJS. Community's views are positive and

negative. The community's view of BPJS services is positive in some respondents, namely:

*P3 "I took my mother to control using BPJS at the hospital clinic, the service is the same, alright"*

*p8 "BPJS is a service that I think is good and appropriate"*

*P9 "My family has been using BPJS for a long time and so far I have used it in hospitals, the service has been good"*

*P11 "In my opinion, the service of BPJS is different from the general one, why is it like that because if you use BPJS, you cannot go directly to the hospital, you must have first level health facilities"*

*P12 "This BPJS service is good"*

The negative value of society's view on BPJS services is found in respondents p1, p2, p4, p5, p6, p7, p10, p13, p14, p15 namely:

*P1 "BPJS services from the beginning until now are the same if you put them in a hospital or Puskesmas at the same time."*

*P2 ". I used to use BPJS in a hospital but it was like that, if the nurses were the same but the medicine was different, the treatment wasn't immediate "*

*P4 "BPJS is actually good but there are lots of people who use it so it's not optimal service"*

*P5 "Why do you use public and how come it's better when you use public so that it is easier than the general public."*

*P6 "If I choose, it is good for BPJS, but the service is the same, if it hurts, it will be the same medicine, but if that's the case, it won't be too long for the process."*

*P7 "The first service is like this, but who knows in the future, we don't know"*

*P10 "BPJS services are just the same as general, rather complicated there must be a reference and others."*

*P13 "The government for this BPJS if you use a lot of ma'am so the service is not so optimal"*

*P14 "The service is good but what makes it lazy is complicated sis"*

*P15 "The actual service of the BPJS is important"*

for you, if in my opinion how is that good but there is still a lack because there are many who use it as well as you”

### Theme 2: Types of BPJS

BPJS has several types such as BPJS Employment and BPJS Health (BPJS-PBI and BPJS-Non PBI). The focus of data collection is on the use of BPJS Health types. Communities who use BPJS Health with the type BPJS-PBI (Donation Assistance Assistance) are found in respondents P3, P5 and P7 with the following statements:

P3 “I am KIS from the village”

P5 “From the village do not pay”

P7 “Free from the government”

Communities who use BPJS Public Health with BPJS-Non PBI types (Not Recipients of Contribution Aid) are found in respondents p1, p2, p4, p6, p8, p9, 10, p11, p12, p13 with the respondent’s answers are as follows:

P1 “Mandiri if you are my BPJS type”

P2 “I pay every month in my family”

P4 “Mandiri”

P6 “Independent in the family every month pay through Indomaret”

P8 “Yes, pay every month, independent means yes”

P9 “Independent of my family”

P10 “Self paid type means”

P11 “Yes, pay yourself, sis, I’m independent”

P12 “Yes pay monthly to Indomaret”

P13 “I am independent”

### Theme 3: BPJS system

The BPJS system that has been running the BPJS user community has a positive and negative view. The community’s view of the BPJS system is positive in some respondents p2, p4, p5, p6, p8, p9, p10 namely:

P2 “What is the system, yes, it is good because everyone can participate, starting from those who do not have money to those who have money, all can”

P4 “Simple system is good, miss, now one of them can be online now, makes it easier too, sis”

P5 “Yes, the system is good for all Indonesian citizens without exception”

P6 “This BPJS without an age range is so good, it can last a lifetime not to think like that, sis”

P8 “If you use this BPJS the system is young, if the list is not complicated, the preparation is not like the private sector, they must have medical check-ups, etc.”

P9 “The system is good evenly distributed to all people in Indonesia”

P10 “Yes, joining this system is delicious, cheaper than joining other insurance companies, but it is reportedly going up, this is going to be hard”

The community’s view of the BPJS system is negative in some respondents p1, p3, p7, p11 namely:

P1 “There are less and more bpjs systems, if there is a lack of systems, there is a queue of classes which are not beaten flat”

P3 “This is why there are classes and why does the class only have a maximum level of up to one level, why is the system like that”

P7 “The service used to be like this now, but who knows in the future, we better not know”

P11 “There are a number of systems that are lacking in some respects, for example there are classes here and why are you limited to the grade”

### Theme 4: BPJS Policy

BPJS has a policy in carrying out its function as a health insurance under the government. Some of the respondents’ views on this matter revealed that they still did not understand this and some expressed complaints related to the policies that had been implemented as evidenced by the statements of several respondents

p1, p2, p3, p4, p5, p6, p9, p12, p15 with several statements follows: “I do not understand the details of the policy, sis, if I am ya sis, the policy is lacking because only a few items are covered by BPJS”

### Theme 5: Selection of BPJS

The data focused on BPJS Health, namely BPJS-PBI

and BPJS-Non PBI because it was from 15 respondents, during the interview session 2 respondents (p3, p8) stated that they were more likely to choose BPJS-Non PBI as evidenced by the following statement:

*P3 "If I may choose, I want free, ma'am, from the government"*

*P8 "Yes, I prefer those from the government, but I cannot from the government"*

#### Theme 6: Costs

Expensive health care costs make Indonesian people use BPJS health insurance. Type of Non-PBI BPJS with dues that have been determined in accordance with the policy. This was revealed by several respondents p1, p5, p6, p8, p11 with the following statements:

*P1 "Costs for bpjs are cheaper when sick"*

*P5 "Yes, I am really using BPJS so if it hurts, it can be used more and is more effective, but sometimes I forget to pay so I'm in arrears"*

*P6 "In terms of cost, I don't pay, so it's safe, there are no complaints, right? If you get free, sir, if you add a new class, pay"*

*P8 "Yes, if you calculate the cost of treatment, it is expensive, but with BPJS it is cheaper, I say if we are sick"*

*P11 "The cost of treatment is expensive, miss, but if you use it, it is cheaper"*

#### Theme 7: Increase Rates

BPJS according to the issues that have been circulating there will be the determination of the latest contribution rates there are tariff increases. This increase in health insurance rates makes a huge impact on society. Some respondents said that they disagree, stated by p2, p8,

*P2 "I heard that there was an increase in the tariff for bpjs per January, I did not agree why it had to go up"*

*P8 "Increase the tariff I do not agree"*

#### Theme 8: Hope

The community has future expectations related to BPJS. This expectation is expressed by p1, p3, p5, p6,

*P1 "I hope that the system can be slightly changed, miss, it's better, if you can, the tariff will still not increase, if we pay it will be expensive"*

*P3 "I hope it is better, younger, waiting time can be improved faster"*

*P5 "There is my hope for the BPJS so that the process will be faster, yes everyone, so that it can be covered so that certain people do not discover"*

*P6 "My hope is better"*

## Discussion

The first research result, namely Service, service is every beneficial activity in a collection or unit and offers satisfaction even though the results are not physically bound to a product<sup>8</sup>. This shows that the service is related to the inner satisfaction of the service recipient. The theory is in line with the results that have been obtained by researchers, namely users in BPJS services, there are negative and perceived positive sides<sup>9</sup>.

BPJS has several types of participation that can be followed by Indonesian citizens<sup>10</sup>. Hals are in line with existing provisions, according to (Perpres No. 101 of 2011) BPJS Health membership is divided into two groups, namely Participants Receiving Donation Assistance (PBI) and Participants Not Receiving Donation Assistance (Non-PBI)<sup>11</sup>.

As for other problems that arise with changes in the contribution increase. This is because the hospital feels disadvantaged by the application of the INA CBG's package system that is applied to BPJS Health patient care, so the hospital must adjust the amount of fees specified in the INA CBG's package<sup>12</sup>. There is an assumption that hospitals feel disadvantaged through the INA CBG package program, resulting in losses, even though the losses suffered by a hospital cannot be seen only by looking at cases on a case-by-case basis, but rather by seeing all cases that have been handled by the hospital<sup>5</sup>. Even though it is the hospital's obligation to provide health services and it is the community's obligation to get health services so that it can improve the welfare of the community. Occurrence of restrictions on health services performed by the hospital<sup>13</sup>

Form of authority that is determined by the hospital<sup>14</sup>. This can occur because there is no clarity in the cooperation agreement between the hospital and the Health BPJS in granting permission to limit services

to BPJS Health patient<sup>15</sup>. This is the gap between the two, besides the emergence of the problem results in losses suffered by the community as a recipient of health services and as an agent of the policy of increasing tariffs<sup>2</sup>.

### Conclusion

People heard the issue of rising BPJs made them have to rethink to drop out of class, in addition they questioned the quality of services and facilities because they paid more. the government is asked to be wiser in determining the increase in BPJS costs

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**Ethical Clearance:** Not required

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# Acute Respiratory Infection Incidence among Toddlers Around the Steel Industry in Bekasi, Indonesia (2019)

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## Abstract

**Background:** Acute Respiratory Infection (ARI) is an acute infection that attacks one part/more of the respiratory tract from the nose to the alveoli including adnexanya (sinus, middle ear cavity, pleura). This study aims to determine the description of individual characteristics and ARI events in children under five who live around the steel industry in Sukadanau Village, West Cikarang, Bekasi Regency. Acute respiratory infections in the world are the main cause of morbidity and mortality in children under five years old. ARI is a health problem with ARI prevalence in children under five in Indonesia with a diagnosis of Symptoms (DG) of 12.8% according to the Basic Health Research of the Republic of Indonesia in 2018.

**Objective:** Describe individual characteristics and ARI events in under-fives around the Steel Industry in Sukadanau Village, Cikarang Barat District, Bekasi Regency in 2019.

**Method:** The research method used is a quantitative method with a cross-sectional design. The sampling technique used in this study is proportional stratified random sampling. Data analysis was performed by univariate analysis, with a population of children aged 12-59 months living around the steel industry, with a sample of 96 toddlers. Data collection was done by interview using a questionnaire and carried out anthropometric measurements by weighing the subject's weight.

**Results:** Univariate analysis results showed the incidence of ARI as many as 36 (37.5%), male sex 63 (65.6%), the most toddlers' analysis unit at the age of 12-23 months ie 34 toddlers (35.4%) status nutrition 82 (85.4). Based on the results of the study suggested improvements

**Conclusions:** Toddlers who live around the steel industry are at risk of ARI, the unit of analysis is more on male sex, age 12-23 months and normal nutritional status of toddlers.

**Keywords:** *Individual characteristics, acute respiratory infections, around the industry.*

## Introduction

Sources of air pollution come from sources that

move (motor vehicles) and sources that do not move (industry). The steel industry is a part of the basic metal industry, which includes the upstream industry, which is a strategic industry in Indonesia (Media Indonesia, 2008). Pollutants are a public health problem, including particles. Particles that have a diameter greater than 5.0 microns will stop and accumulate mainly in the nose and throat. Although these particles can partly enter the lungs but are never farther from the air sacs or bronchi, they can even be removed immediately by the ciliary movement. Particles with a diameter of 0.5-5.0 microns

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can accumulate in the lungs to the bronchiole and only a small portion reaches the alveoli. Most of the particles collected in the bronchiole will be removed by cilia within 2 hours. Particles with a diameter of fewer than 0.5 microns can reach and stay inside the alveoli. The removal of these tiny particles from the alveoli is very slow and imperfect compared to the larger channels. Some particles that remain in alveoli can be absorbed into the blood<sup>[1]</sup>. In Sukadanau Village there is a Steel Industry, which in its production process emits which can pollute the environment. Emissions issued by industry are one of the steel industry and high cases of ARI in the working area of the Telagamurni Health Center, based on this research interested in examining the effect of PM<sub>10</sub> exposure on ARI incidence in toddlers around the steel industry.

Acute respiratory infections in the world are the main cause of morbidity and mortality in children under five years old. In Nepal, ARI is considered the number one killer, in the city of Gorkha, the prevalence of ARI in children under five is found to be 21.5% <sup>[2]</sup>. In 2018, the prevalence of ARI in Indonesia under-fives with a diagnosis of symptoms (DG) is 12.8%, whereas with a diagnosis of health workers (D) of 7.8%. In the province of West Java, the prevalence of ARI through diagnosis and symptoms was 8.2%, while with a diagnosis of 14.7% <sup>[3]</sup>. The incidence of ARI is one of the main diseases with high patient visits in Puskesmas (40% -60%) and hospitals (15% -30%). <sup>[4]</sup>

In Bekasi District, the pattern of Puskesmas disease first ranked was ARI disease, 32.50%. Sukadanau Village is in the West Cikarang District and is a working area of the Telagamurni Health Center. The number of children under five in Sukadanau Village in 2019 is 3,695 children under five, 1855 boys under five and 1840 girls under five. From the report of the top 10 diseases in Telagamurni Health Center, ARI ranks first. In 2018, children under five with ARI 21.6%. And from January to August 2019 37.6% were diagnosed with ARI <sup>[5]</sup>.

In general, in the West Cikarang Sub-district, Bekasi Regency, West Java Province is one of the industrial areas where there is one steel factory that is included in the category of large steel industry companies. The conditions surrounding the factory are resettlement which should be by Government Regulation Number 35/M-IND/PER/3/2010 concerning technical guidelines for industrial estates, that the ideal settlement is at least 2 (two) Km from the location of industrial activities<sup>[6]</sup>

Conditions in the field around the steel industry are densely populated settlements, with several 3,695 toddlers where the steel industry is located <sup>[7]</sup>. Following these conditions, this research is important to do to know the description of individual characteristics and ARI events in toddlers living around the steel industry in the region.

One of the acute respiratory infections that need attention is influenza because influenza is a disease that can cause epidemics under the Minister of Health Regulation No. 1501/Menkes/Per/X/2010 regarding Specific Infectious Diseases that Can Cause Plague and Mitigation Efforts.

Some of the similar studies that have been carried out are research in the State of Nigeria by using the 2013 Nigeria Demographic and Health Survey to assess individual and environmental risks in the North-Western Province and Sout-Southern Province communities and see the relationship with ARI symptoms. Descriptive findings showed that the prevalence of ARI symptoms was significantly higher in preschoolers in North-Western Province (5.7%) than in South-Southern Province (1.4%) (p <0.001). In addition to regional differences, the multilevel logistical model further showed that the increased likelihood of children suffering from ARI symptoms was significantly associated with the dry season (aOR 1.42; 95% CI: 1.02-1.97)<sup>[8]</sup>. The results of research at Garut District General Hospital in 2014 showed that 58% of boys suffer from ARI and boys are more at risk of getting ARI 1,839 times compared to women and children aged 1-3 years more at 1.77 times more than children ages 3-5 years<sup>[9]</sup>. This research focuses on toddlers aged 12 to 59 months around the steel industry because toddlers are more susceptible to disease.

## Method

The research design used in this study was cross-sectional. Research locations around the steel industry Sukadanau Village West Cikarang District Bekasi Regency West Java Province Indonesia. Univariate analysis using a frequency distribution table by describing individual characteristics (sex, age, nutritional status and incidence of ARI based on symptoms) in the form of proportions. Data collection for ARI events, sex, age and nutritional status was carried out by interviewing a research questionnaire with toddlers or under-fives and anthropometric measurements of toddlers weighing

toddlers' weight. The population is toddlers aged 12 - 59 months with a large number of samples used with the sample formula and obtained a sample of 96 samples research location at Sukadanau Village, West Cikarang District, Bekasi Regency. The study was conducted in 2019. With the inclusion criteria of selected households who have toddlers aged 12-59 months,

**Results**

Based on interviews with 96 mothers or under-fives and anthropometric measurements on 96 under-five children, the incidence of ARI was based on the symptoms of 36 children under five (37.5%). of 96 toddlers with male gender are 63 toddlers (65.6%), the most age at 12-23 months is 34 toddlers (35.4%), good nutritional status 82 toddlers (85.4%) (Table 2).

**Table 1: Distribution of Frequency of Respondents by Gender**

Type of Sex	Frequency	Percentage
Female	33	34.4
Male	63	65.6

Table 1 shows the sex of men 63 toddlers (65.6%) and women 33 toddlers (34.4%). Gender influences the incidence of ARI as in the study in Iraq, the majority of cases in Erbil Hospital, boys are more susceptible to ARI than girls<sup>[10]</sup>, according to the results of Iskandar, Tanuwujaya and Yuniarti in 2015, as many as 58 % of boys suffer from ARI <sup>[9]</sup>.

**Table 2: Distribution of Frequency of Respondents Age by age**

Age	Frequency	Percentage
12-23 months	34	35.4
24-35 months	19	19.8
36-47 months	18	18.8
48-59 months	25	26.0

From table 2 it can be seen that the distribution is more in the 12-23 month age group that is equal to 34 toddlers (35.4%). Acute Respiratory Infection (ARI) is associated with significant morbidity and mortality worldwide, especially in children under 5 years of age. Nearly 2 million children die from ARI each year and most of them come from developing countries. The prevalence and correlation of pathogens in ARI is poorly understood, but it is very important to improve the prevention, treatment and management of cases <sup>[11]</sup>. The results of basic health research in 2018 aged 12-

23 months based on a diagnosis of 9.4% and based on diagnosis/symptoms 14.4% <sup>[3]</sup>.

**Table 3: Distribution of Respondent Frequencies by Nutrition Status**

Nutritional Status	Frequency	Percentage
Normal	82	85.4
Less	14	14.6

Table 3 shows that the nutritional status of toddlers around the steel industry based on BB/U is more on the indicator of normal nutritional status as many as 82 toddlers (85.4%) and less on the indicator of undernourished nutrition of 14 toddlers (14.6%). Nutritional status is a picture of the consumption of nutritious food for toddlers. Toddlers who consume food with adequate nutrition every day will have a good nutritional status but vice versa if toddlers do not consume enough nutritious food every day it will lead to nutritional problems namely poor and poor nutrition<sup>[12]</sup>. Toddlers who have less nutrition are at risk for ARI, children who have undernourished children have a risk of 1.561 times greater than toddlers who have good nutrition<sup>[13]</sup>.

**Table 4: Distribution of Respondent Frequencies According to ARI Occurrence**

ARI Event	Frequency	Percentage
No ARI	60	62.5
ARI	36	37.5

Table 4. Distribution of toddlers based on ARI events around the steel industry, namely 60 toddlers (62.5%) who did not experience ARI and 36 toddlers (37.5%) had no ARI. In this study, more toddlers did not have ARI, but toddlers whose ISPA had a greater percentage than the national rate of ARI based on 2018 basic health research data, according to Diagnosis (D) 7.8% and according to diagnosis and symptoms (DG) 12.8 % <sup>[3]</sup>. The incidence of ARI is one of the main diseases in patient visits at the Puskesmas at 40% -60% and the largest hospital visits 15% -30%<sup>[14]</sup>.

**Conclusions**

Toddlers with ARI incidence of 36 toddlers (37.5%) exceed national figures. The unit of analysis is more male sex, age 12-23 months and normal nutritional status of toddlers. ARI is more common in children with the category of toddlers compared with the age of the baby because due to the immune system of toddlers



and the development of toddlers who socialize more with friends and people around it so that transmission is possible. Seeing the magnitude of the impact of pollutants the Bekasi District Government of West Java Province should relocate settlements in the area or innovate to reduce these impacts.

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**Ethical Approval:** This study uses the unit of analysis is Toddler. The ethical approval number drawn up by the Ethical Research Committee is provided in this study, namely the Ethical Research Commission and the Public Services Faculty of the Public Health University of Indonesia. The number is 669/UN2.F10/PPM.00.02/2019 valid until December 2020.

**Competing Interest:** The author states there is no conflict.

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# Suitability of Fertility Indicators between Smart Fert and Indonesia 2010 Population Census

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## Abstract

Fertility is one of the main indicators in population development, especially the control of the population quantity. Fertility indicators such as Crude Birth Rate (CBR), Total Fertility Rate (TFR), General Fertility Rate (GFR) and Gross Reproductive Rate (GRR) are often unavailable in many districts/cities level. The purpose of this research is to develop “Smart Fert” information technology which produces fertility indicators that are valid, practical, easy to apply in districts/cities level. This research is an explanatory action research that is aimed to test hypothetical research the compatibility between the result of “Smart Fert” and Indonesia 2010 Population Census data. this research showed that fertility indicators result with “Smart Fert” was not different with result of Indonesia 2010 Population Census.

**Keywords:** *Fertility Measurement, Information System Technology, Smart Fert Application.*

## Introduction

The term fertility is the same as birth but is different from fecundity. Fertility is a clue to reproduction that results in a live birth, whereas fecundity is a clue to a woman’s physiological and biological abilities. Measure of fertility is always associated with the number of live births with a certain population. A birth is called born alive when at birth there are signs of life such as breathing, heart throbbing, crying, moving and so forth<sup>(1)</sup>.

Fertility indicator is one of the main indicators in population development, especially controlling population quantity<sup>(2)(3)(4)(5)</sup>. Along with the enactment of regional autonomy, population affairs become one of the authority of the district/city. One of the obstacles faced by district/city governments is the availability of

fertility indicators. the cause of the unavailability of indicators is the very limited resources and method/tools to measure fertility indicators in districts/cities. As a result, the population planners and staff in carrying out their activities are usually only oriented to the process and output of activities. They pay less attention to outcome indicators that are usually measured by fertility indicators such as Crude Birth Rate (CBR), Total Fertility Rate (TFR), Age Specific Fertility Rate (ASFR), General Fertility Rate (GFR), Gross Reproductive Rate (GRR).

Crude Birth Rate (CBR) is useful to know the number of births every 1000 population. Total Fertility Rate (TFR) is useful for knowing the average number of children born to women during reproduction. Age Specific Fertility Rate (ASFR) is useful for knowing the number of births for each age group of mothers. Gross Reproductive Rate (GFR) is useful for knowing the average number of births for every 1000 women of reproductive age and knowing the average number of girls born by women during their reproductive period.

Demographic data plays an important role in determining policy, development planning and evaluation of development outcomes. Moreover, demographic data is strategic information and is needed by various parties

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(6) in fact, various fertility calculation method have been found by many demographers and population institutions with various approaches (7)(8)(9)(10)(11)(12). But for the district/city level, felt the method was less applicable in the field due to various limitations, especially the limitations of tools (applications), data, method and capabilities of officers. The presence of a fertility information system application that is practical and easily applied is expected to be present at the district/city level.

Until now, there has been a software or application for the calculation of fertility indicators developed by international institutions, for example Mortpak for Windows (13) and Eas Wes Pop (14). To calculate fertility indicators by Mortpak, we usually using FERTPF and FERTCB modules. Number of children born alive and Age Specific Fertility Rate are needed. Both indicators are only available for each population census which is conducted every 10 years. Therefore, the availability of fertility indicators every year in districts/cities is still a problem. Meanwhile, East West Pop software still uses DOS, so at the district/city level are less familiar.

System development is the preparation or replacement of a system that has been implemented with a new system, either a complete replacement or only with repairs. The reason for the development of the system is because of the problems that arise in the old system. This problem can be caused due to intentional fraud, intentional or unintentional mistakes, or because of violations of management policies that have been implemented, inefficient operations. Other problems that arise are due to organizational growth, where organizations need more complex information due to increased data processing volumes, these changes need to be made to support management needs (15).

Therefore, the development of fertility application as a tool to calculate fertility indicator where is practical, easy to apply, in accordance with the available data input is very feasible to be made. The app will be named "Smart Fert" which means a useful tool for calculating simple, easy to apply.

## **Material and Method**

This research is a design research with approach of DRM (Design Research Methodology) which is explanatory research that aims to test hypothetical

research. Hypothesis in this research is fertility indicators by Smart Fert are appropriate with Indonesia 2010 Population Census. Unit of analysis is 38 districts and cities in East Java. The material used in this research is a set of Smart Fert applications result based on indirect method calculation, result of Indonesia 2010 Population Census with direct method and use independent t test to assess the suitability of Smart Fert result with 2010 Population Census result.

When using the direct method, TFR is calculated from sum of total births which broken down by women's age group (ASFR). One indirect method of calculating TFR is "rele" method. Main data input for "rele" is Child Woman Ratio (CWR), where data on infants and women of childbearing age can be obtained up to the district level each year.

In the indirect method, GFR in the Smart Fert application is calculated using the association method, using CWR and TFR data from the "rele" method. This data input is easily obtained because the data collection of infants and women of childbearing age has been done routinely.

When using the direct method, CBR is calculated from the number of births divided by 1000 inhabitants. It should be noted that up to now routine reporting on the number of births annually has not been good. In the indirect method, the CBR in the Smart Fert application is calculated using the association method.

The procedure of this research is Clarification covering identification of availability problem of indicator, identification of indicator requirement and analysis of literature of fertility measurement technique; Then Stage 2: Descriptive Study 1, which includes identification of population data input, Manual fertility calculation and idea of designing Smart Fert application; stage 3: Prescriptive Study, including Application Planning, application system analysis, application design and application implementation.

**The Authenticity of Research:** The authenticity of this research is Development of Smart-Fert fertility information system Technology is a new, practical, valid, easy to apply tool suitable for population data condition in Districts/Cities. Modules in this application can be opened and executed more than one at the same time.

Research Framework	Activity
<b>Stage 1:</b> Research Clarification	<ul style="list-style-type: none"> <li>Identify the availability of indicators</li> <li>Identify the needs of indicators</li> <li>Analysis of fertility measurement technique literature</li> </ul>
<b>Stage 2:</b> Descriptive Study 1	<ul style="list-style-type: none"> <li>Identification of population data input</li> <li>Manual fertility calculation</li> <li>The idea of designing a Smar Fert application</li> </ul>
<b>Stage 3:</b> Prescriptive Study	<ul style="list-style-type: none"> <li>Application Planning                             <ul style="list-style-type: none"> <li>System identification</li> <li>Preparing the module to be created</li> </ul> </li> <li>Analysis of application systems                             <ul style="list-style-type: none"> <li>Analysis of input data, process, output</li> </ul> </li> <li>Application design                             <ul style="list-style-type: none"> <li>Physical design</li> <li>Menu design</li> </ul> </li> <li>Implementation of the application                             <ul style="list-style-type: none"> <li>Testing system</li> <li>System repair</li> </ul> </li> </ul>

### Results

To find the compatibility between the results of the Smart Fert application and the results of the 2010 Population Census, a statistical test between the results of the two method was conducted. Indicators to be compared are indicators *Total Fertility Rate (TFR)*, *General Fertility Rate (GFR)* dan *Crude Birth Rate (CBR)*.

Figure 1: Research Framework

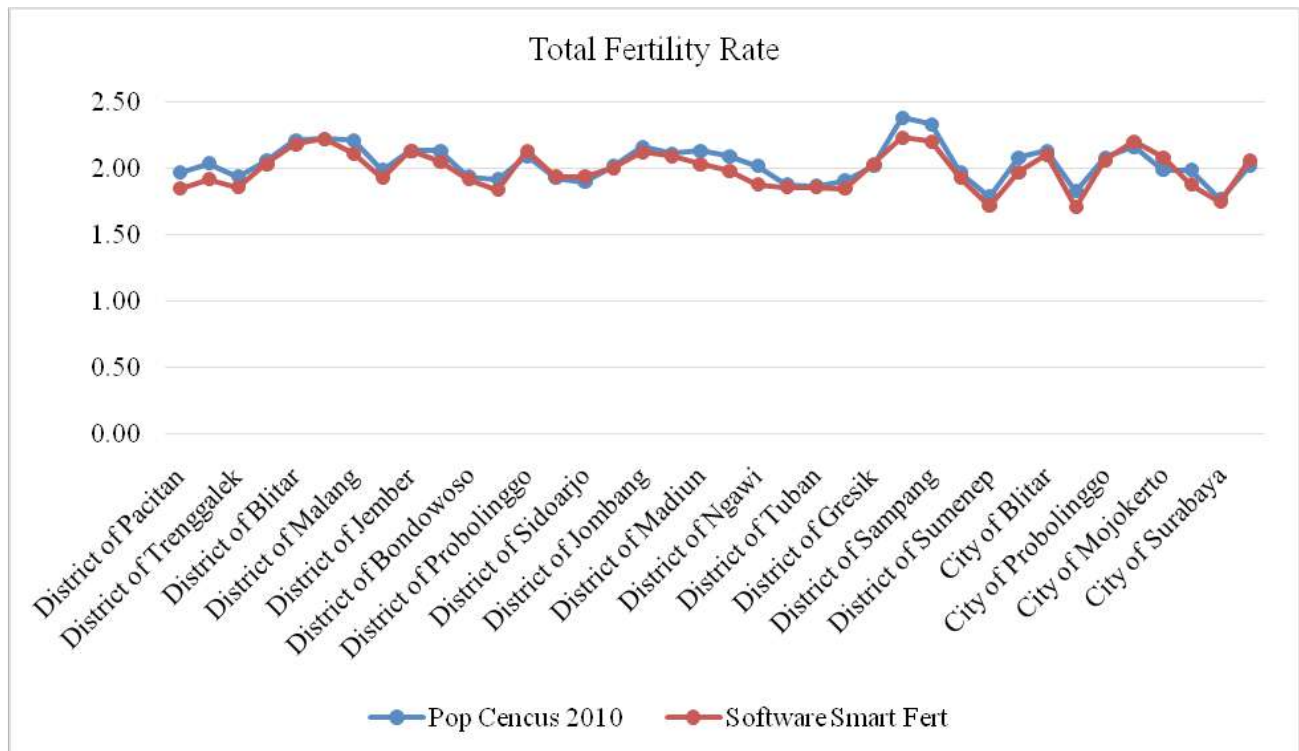


Figure 2. TFR result between Smart Fert and 2010 Population Census

Based on the independent t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.132). Its show that there were no significant differences between the two TFR calculation method.

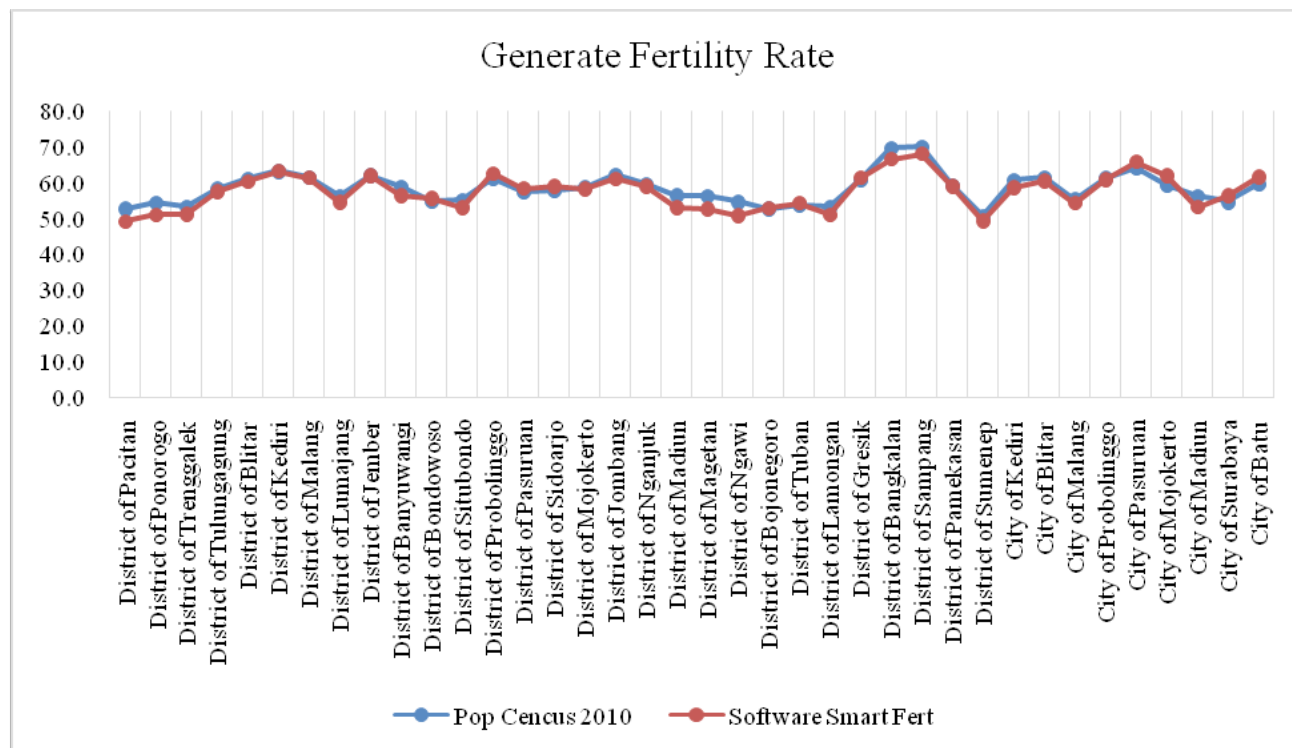


Figure 3. GFR result between Smart Fert and 2010 Population Census

Based on the t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.423). Its show that there were no significant differences between the two GFR calculation method.

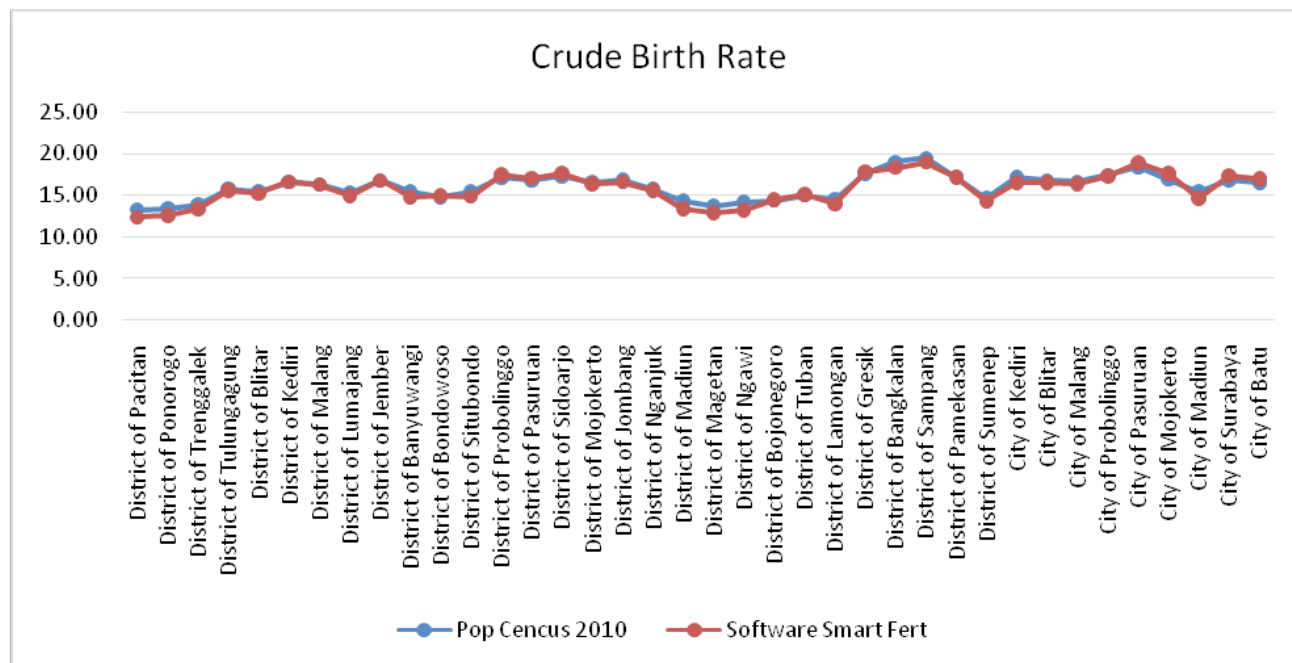


Figure 4. CBR result between Smart Fert and 2010 Population Census

Based on the t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.575). Its show that there were no significant differences between the two CBR calculation method.

**Table 1. Statistical analysis using Independent T-test**

Indicators	Statistical Test	P-Value	Conclusion
TFR	Ttest	0.132	No difference
GFR	T test	0.423	No difference
CBR	T test	0.575	No difference

From the statistical test of the three fertility indicators mentioned above, it can be concluded that the application of Smart Fert is not significantly different with the results of the 2010 Population Census. Thus, the use of Smart Fert application can be used to calculate the fertility indicator every year.

**Discussion**

Results of statistical analysis show that there is no significant difference between the two method of calculation of TFR, GFR and CBR. Both using indirect method by Smart Fert or using direct method like population census. Thus, Smart Fert application can be used to calculate fertility indicators every year in districts/cities in Indonesia.

Needs to noted is population data in the districts/cities should be first checked feasibility before use and input to Smart Fert. For the age structure of the population can be checked first with “join index” or “myersindex” formula. If it is found that the age structure is not good, neatness of age structure must to do with “graduation” formula. Age and sex according to the age structure is always available in any surveys like such as population census, inter-census population survey, and national social economic survey.

After obtaining good age structure according to demographic criteria, data entry is applied to in module 3 Smart Fert application. Ease of module 3 is using “rele” method, where the main data input is Child Woman Ratio(CWR), data of toddler and woman in fertile age can be obtained up to the district level every year. After obtained the value of CWR and TFR, it can be directly used to calculate GFR and CBR. The main advantage of this method is its simplicity, because it requires only the age distribution of the population and the estimated

death. Based on the composition of population according to age and sex can be generated mother-to-child ratio. By knowing a rough estimate of life expectancy at birth, this amount can be converted to estimated TFR. Data requirements are limited to the population distribution by age and sex, as well as indications of mortality rates in the form of life expectancy at birth. To obtain life expectancy data in module 3 Smart Fert can be obtained from the official publication of Central Bureau of Statistics (BPS) every year at the district level.

If the CWR data input is not good enough because of the limitations of population data, to calculate fertility indicator in Smart Fert can use module 6, through CBR data input. This CBR data can be obtained from the table 4 health profile table on the system developed in the Health Department. For now, the CBR rate of this profile is better than the CBR number from birth registration reporting from the Administration of Population Administration System(SIAK) Population and Civil Registry of the districts/cities because the birth data in SIAK is the one taking care of the birth certificate so that it tends to be less than the actual birth rate.

**Conclusion**

This result show that Smart Fert Fertility Information System Technology can be used as a valid, practical and easy to implement fertility measurement tool at the districts/cities level and even at the sub-district level in accordance with existing data input. Available data and Smart Fert generated indicators can be annually available, without waiting for the results of the Population Census once every 10 years.

Suggestions from the results of this study are as follows, the need for technical guidance on the integration of fertility indicators in development planning and calculation techniques so as to facilitate the planners and implementers of population programs in urban districts. In the guidelines it is necessary to describe various fertility calculation techniques, both direct and indirect method and the introduction of fertility applications including Smart Fert applications that are proven to be valid, simple and easy to implement. The need for demographic technique training, especially periodic fertility measurement techniques for population program managers in urban districts because in addition to upgrading the demography sciences also because there are often mutations or personal changes of population program managers in districts/cities.

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**Ethical Clearance:** This study was approved by Ethical Commission of Health Research, number 304/EA/KEPK/2013, Faculty of Public Health, University of Airlangga, Surabaya.

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# Depression and Cyber-Victimization among Middle School Students in Morocco

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## Abstract

**Background:** Cyber-victimization is a real health problem worldwide. It has a negative impact on middle school students' mental health.

**Objective:** To evaluate the depression score among cyber-victimized middle school students in Morocco.

**Method:** It's a cross-sectional study based on an anonymous self-report questionnaire about cyber-victimization and depression during the last twelve months. Data were collected in 44 middle schools in the urban area of three Moroccan zones. A total of 3785 students aged between 12 and 16 participated in the study. Cyber-victims refer to students who were cyber-victimized twice or more in the past twelve month. In our sample 72,3% (n=2736) were cyber-victims. We used a hierarchical multiple Regression to examine the relationship between independent variables and depression.

**Results:** In the past twelve months 49,4% (n=1351) of cyber-victim participants were depressed and the difference between girls and boys was significant: (51,4% (n=732) vs 47,2% (n=619)) respectively  $p=0,03$ .

The most important predictor of depression score was cyber-victimization score  $\beta=0,17$   $t=10,98$   $p<0,001$ . The cyber-victimization score variable explained 3 % of variation to the depression score among middle school students and  $p<0,001$ . Age is a strong positive predictor of depression ( $\beta=0,10$ ,  $T=6,59$ ,  $p<0,001$ ). both cyber-victim adolescents and depressed cyber-victim ones spoke little of their experience of cyber-victimization.

**Conclusion:** Cyber-victimization is a real problem among middle school students in Morocco. It is the main cause of depression. Hence action needs to be taken to face this problem.

**Keywords:** Cyber-victimization, adolescent, middle school, depression, coping, Morocco.

## Introduction

Cyber bullying is a growing problem among adolescents in middle school<sup>1</sup>. Most of the existing

research concerned young adolescents because the problem is very widespread among this category<sup>2</sup> anywhere and at any time<sup>3</sup>. Currently, several definitions have been used. Smith defines cyber bullying as "an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself"<sup>4</sup>. While, Hinduja defines it as "voluntary and repeated damage caused by the use of computers, cell phones and other electronic devices"<sup>5</sup>. In general, cyber-bullying rate prevalence ranges between approximately 2,3% and 72%<sup>5</sup>.

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Regarding cyber-victimization, individuals who received cyber bullying behaviors are considered cyber-victims. Researches on the effect of gender on cyber-victimization showed no difference between girls and boys<sup>6</sup>. Others have demonstrated that girls are more cyber-victimized than boys<sup>7</sup>. Regarding the effect of age on cyber-victimization, some studies found no correlation between age and cyber-victimization<sup>8</sup>. Others revealed that cyber-victimization increases with age<sup>7</sup>.

Cyber-victimization causes many psychological problems among adolescents especially depression<sup>9,10</sup>, suicide and suicidal ideation<sup>11</sup>, social anxiety, low self-esteem<sup>12</sup> and addictive tendency<sup>13</sup>. Besides cyber-victimization has a negative impact on academic performance<sup>14</sup>.

The current study aims to investigate moderator effects of gender, age, type of school and cyber-victimization on depression among middle school students and their coping strategies.

## Materials and Method

**Study Population:** This is a cross-sectional study conducted from 1<sup>st</sup> November 2017 to 30<sup>th</sup> March 2018 in three.

Moroccan zones (North, East and South). The 3785 Participants were randomly taken from 44 middle schools in urban areas.

The inclusion criteria were middle school students aged between 12 and 16 and had regular access to internet. The exclusion criteria were either students' or parents' refusal to participate or participants who did not answer all questionnaire items.

### Stage of the research:

**1<sup>st</sup> Step:** The Ethics Committee for Biomedical Research of Mohammed V University in Rabat has approved the study protocol (IORG0006594). The study was approved also by the ministry of education, the regional education academy and schools' principals. Parents received a written letter of consent which included information about the study, explanations about their child's participation and a reply coupon. In addition, the students were informed of the anonymous and confidential nature of the study. What is more important is that no investigation was done before getting students' verbal consent.

## 2<sup>nd</sup> Step

### Measuring Tool:

**Cyber-victimization:** The study used a self-report questionnaire based on the Hinduja one<sup>11</sup>. The questionnaire included 20 questions exploring the socio-demographic context, the practices of information and communication technology (ICTs), and seven items on cyber-victimization during the last twelve months. The seven items are: 1-receive unpleasant texts messages, 2-show others embarrassing photos or videos online without permission, 3-Log in to someone's IM account without his permission and pretend to be him, 4-Take someone's personal mail without permission and publish it, 5-Hack someone's personal data, 6-Insult someone online, 7-Block and exclude someone from the online group (Alpha coefficients for this scale was 0,88). The questionnaire was evaluated according to the seven variables of the Likert scale: never happened (coded 0), once (coded 1), twice to three times a month (coded 2), once a week (coded 3) and several times a week (coded 4). A total score is calculated by summing the seven items (scores range from 0 to 28). We can't talk of cyber-victimization unless the student was cyber-victimized twice or more.

### Depression Questionnaire:

The risk of depression was measured using the self-administered adolescent questionnaire (ADRS) 10 item patient version<sup>15</sup>. For each item, the student answered yes (coded 1) or no

(coded 0). The total ADRS score was between 0 and 10. Indeed, the identification of the risk of depression is when the score falls below the threshold of 4. (Alpha coefficients for this scale was 0,70)

## 3<sup>rd</sup> Step:

**Statistical Analysis:** The data were analyzed using SPSS software version 23.0. The results expressed as mean  $\pm$  standard deviation for the quantitative variables and frequency for the qualitative variables. We performed Hierarchical multiple regression analysis. The effect of gender, age and type of school were tested independently as control variables before examining the effect of cyber-victimization on the depression score. The confidence interval of 95% was considered statistically significant at 5%.

**Results**

**Prevalence of depression and cyber-victimization:**

Our study showed that depression prevalence among cyber-victim participants were 49,4% (n=1351). There was a significant gender difference: 51,4% (n=732) were girls and 47,2% (n=619) were boy *sp*= 0,03. The difference was significant between the depressed cyber-victim participants aged between 15 and 16 years and those aged between 12 and 14 (56,7% (484) vs 46,1% (867)) *p*<0,001. 52,9% (1092) were public school students and 38,5%(259) were private school ones.

**Effects of gender, age and type of school on depression score:** The Hierarchical multiple regression revealed that age, gender and type of school contributed significantly to the regression model, *F*= 29,55 *df* =3 *p*<0,001 and accounted for 2,2 % of the variation in depression score. Age is a strong positive predictor of depression ( $\beta = 0.10, t = 6.59, p < 0.001$ ). This means that students aged between 15 and 16 years were more likely to be depressed than students aged between 12 and 14.

Girls were more prone to depression than boys ( $\beta = 0.06, t = 3.69, p < 0.001$ ) (table 1).

**Cyber-Victimization and Depression:** The cyber-victimization score variable explained 3 % of variation to the depression score and this change in *R*<sup>2</sup> was significant, *F*= 53,02, *df* = 4 *p*<0,001.

The Interaction Effects of gender,age and type of school with Cyber-Victimization.

The most important predictor of depression score was cyber-victimization score  $\beta=0,17 t = 10,98 p < 0,001$ . The addition of gender\*cyber-victimization score, age\*cyber-victimization score and type of school\*cyber-victimization score to the regression model has no significant effect on the depression score. In other words, the interaction between each of the four variables: age, gender, type of school and cyber-victimization. Neither add any change to the variation of the depression score nor were significant predictors of depression score (table 1).

**Table 1: hierarchical multiple regression using depression as dependant variable**

	Unstandardized Coefficient		Unstandardized Coefficient	t value	CI
	B	SEB	$\beta$		
<b>Variables</b>					
<b>Model 1</b>					
Gender	0,28	0,07	0,06***	3,69	[0,13-0,44]
Age	0,58	0,08	0,10***	6,59	[0,40-0,75]
Type of school	0,46	0,09	0,08***	5,02	[0,28-0,65]
<b>Model 2</b>					
Cyber-victimization	0,07	0,007	0,17***	10,98	[0,06-0,09]
<b>Model 3</b>					
Gender*cyber-victimization	0,001	0,014	0,004	0,077	[-0,027-0,029]
Age*cyber-victimization	0,016	0,015	0,055	1,037	[-0,014-0,046]
Type of school*cyber-victimization	0,005	0,018	0,022	0,296	[-0,029-0,040]

Model 1, adjusted for gender, age and type of school, *R*<sup>2</sup>= 0,022, *df*= 3, *f*=29,66.

Model 2, adjusted for cybervictimization, *R*<sup>2</sup>=0,052, *df*= 4, *f*=53,02.

Model 3, gender\*cybervictimization, age\*cybervictimization, type of schoo\*cybervictimization, *R*<sup>2</sup>=0,052, *df*=7, *f*=30,47.

*n*= 3785. \*\*\**p*<0,001\*\**p*<0,01; \**p*<0,05.

**Behavior Reaction:** In our sample generally cyber-victimized adolescents didn't talk about their cyber-victimization to someone. However, most of the participants who reported talking about their experience talked about it to foreign person 32,2% (n=882) or to their friends 28,5% (n=780). Few adolescents informed their families or their teachers about their cyber-victimization.

The difference was not significant between the depressed cyber-victim adolescents and those who were not concerning the fact of talking about their cyber-victimization (table 2).

**Table 2: Students' reaction to cyber-victimization**

	Cyber-victims n=2736				
	Depressed Participants				
<sup>b</sup> Variables:	Yes n=2736	Yes n=1351	Not n=1385	X <sup>2</sup> <sup>a</sup> p-value	CI
Talking about cyber-victimization					
foreign person	882(32,2%)	436(49,4)	446(50,6)	0,002	[-0,15-0,16]
With parents	235(8,6)	107(45,5)	128(54,5)	1,522	[-0,43-0,10]
With siblings	219(8,0)	106(48,4)	113(51,6)	0,091	[-0,31-0,23]
With teachers	46(1,7)	29(63,0)	17(37,0)	3,495	[-0,03-1,17]
With friends	780(28,5)	374(47,9)	406(52,1)	3,118	[-0,01-0,31]

Note: <sup>a</sup> P-value by X<sup>2</sup> test, \*\*\*p<0.001; \*\*p<0.01; \*p<0.05.

<sup>b</sup>Effectif (percentage)

**Discussion**

Our results showed that half of cyber-victim participants were depressed and that the more students are cyber-victimized the more they become depressed. This result is consistent with that found by previous studies<sup>7,16</sup>.

Regarding age, our results showed that participants aged between 15 and 16 years developed depression more than younger adolescents. This result was in line with previous studies<sup>17</sup>.

According to previous studies cyber-victimization, which is the major predictor of depression, increases with age<sup>7</sup>. This is probably why older adolescents were more likely to be depressed. It may be caused by the fact that they are more isolated. They believe that they can solve their problem by themselves. Moreover, they get less help or inappropriate one from adults.

Considering gender effect, girls were more likely to be depressed than boys. This finding was consistent with the previous studies<sup>17,18</sup>. This tendency to depression in girls would be linked to variations in hormonal secretions

especially during the puberty, more dissatisfaction with their bodies and low self-esteem than boys<sup>19,20</sup>

The effect of type of school was more important. Public school cyber-victims were more likely to develop depression. Unfavorable conditions in public schools: crowded classes as well as the low socioeconomic level of pupils would be among the causes of the differences between private and public schools. Students in private school probably have more knowledge about the risks of inappropriate use of ICTs. Some studies showed that adolescents from low socioeconomic background and those with a low level of education are more vulnerable to cyber-victimization and depression<sup>21</sup>.

Regarding the Strategy of dealing with cyber-victimization, we found that most of the cyber-victims preferred not to confide. Few cyber-victim participants talked about their suffering. Those who do, prefer to talk to foreign people or friends. As previously reported, cyber-victim adolescents have a tendency to confide especially to their friends<sup>22</sup>. This is due to the fact that friends or foreign people have no power on adolescents and therefore they won't be punished. Few of those who confided spoke to their family (parents (less than 10%),

sibling) or to their teachers. Those results were in line with previous researches<sup>23,24</sup>. May be adolescents just resort to silence for fear of being punished by adults by depriving them of internet access or supervising them more. Besides, they seek independence from their families:

Furthermore, depression has no impact on adolescents' behavior. In other words talking about cyber-victimization is not influenced by the fact of being depressed or not

Despite the interesting results obtained, many difficulties were encountered. As we used a self-administered questionnaire, the answers could be over or under estimated by the respondents. However, the strength of this study is the large sample and the use of validated scales. The responses related to events that have occurred in the past. Their impact could change over time. There by, longitudinal researches were needed to assess the impact of cyber-victimization on mental health.

### Conclusion

In conclusion, the current study suggests that Cyber-victimization is a real problem among middle school students in Morocco. Adolescents involved in cyber-victimization are at increased risk for depression. Moreover, cyber-victimized girls are more prone to depression than boys, though none of them tend to talk about it. Hence, prevention programs should include teachers and families intervention in order to show them the importance of social support. Undoubtedly, parent teachers-adolescents communication is the important point to prevent cyber-victimization and its negative impact.

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# Application of Health Impact Assessment in Development of Sustainable Community-Based Tourism Strategies, Krabi Province, Thailand

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## Abstract

This article presents the development of sustainable community-based tourism strategies (SCBTS) by using Health Impact Assessment (HIA). This study followed four steps of HIA. Data were collected from 50 participants including of 10 local communities, 15 officers from the community-based tourism (CBT) development committee, 10 delegates from governmental and private agencies, 10 members from local organizations and 5 concerned people, using literature review, observations, semi-structured interviews and focus group discussions. Descriptive analysis was used to analysed data. The results indicated that the SCBTS' goal was "healthy community" with five strategies. Strategy One was to promote skill and competency of local people; Strategy Two was value-added to community products and services, as well as developing to be the learning model of CBT; Strategy Three was to develop the management of CBT marketing; Strategy four was to develop the management mechanism and networking; Strategy five was to develop happiness and well-being indexes of local people and tourists. Finally, it was recommended that the strategy should be focused to control the number of tourists especially in the sensitive tourist attractions.

**Keywords:** Health impact assessment; community-based tourism; strategies; Krabi Province, Thailand.

## Introduction

Krabi is one of the provinces in Southern Andaman Sea of Thailand, which has a great deal of tourism potential both nationally and internationally. There are exactly millions of tourists visiting Krabi each year, resulting in a very large number of tourism incomes ranked in one of the top tourism provinces in Thailand. Krabi Provincial Statistical Office reported that 6.05 million tourists travelled to Krabi in 2017, which increased by 4.4% from 2016. In terms of incomes,

Krabi earned 96,973 million Baht in 2017, which was 9.7% more than incomes in 2016.<sup>1</sup> It could be seen that tourism made more incomes in Krabi. Meanwhile a lot of tourism activities could affect people, society and environment; such as, pollution from transportation and construction, waste and sewage, destruction and decrease of natural resources, as well as concerns for climate change impacting health.<sup>2</sup> Moreover, Bennett et al. (2014) found that the adaptation of communities on the Andaman Sea coast to coastal resources management and conservation was at low level.<sup>3</sup>

From the above mentioned data, community-based tourism (CBT) could be a choice of tourism model, based on sustainable development. CBT process included seeking for equality among conservation of existing resources and developing for mutual social justice.<sup>4</sup> The development plan of Krabi's mass tourism has thus been revised and continuously enhanced. However, this CBT development plan could not fully

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efficiently stimulate much investment and community potential to apply to tourism activities. Bann Tam Suea and Lam Sak in AoLuk district, Krabi province are the first two communities of CBT development, which have high potential of geography and ecological diversity including history and ancient civilization.

Health impact assessment (HIA) could be a tool for sustainable development in CBT strategies. It is a process for people to mutually learn to assess empirical facts which can be support a decision on developing a healthy public policy. It can result in community strength based on health care.<sup>5</sup> In addition, HIA can assist policy determiners to have evident facts for a policy in dimensions of economy, society and cultures and environment. Therefore, it could be good for health, well-beings, less inequality, cooperation promotion between government, private and people sectors.<sup>6</sup>

### **Literature Review:**

#### **Application of HIA in Development of SCBTS:**

HIA is a tool which can be used to assess in two method: firstly, an assessment and approval for a project together with environmental impact assessment; and, secondly, the development of public policy.<sup>7</sup> HIA employed various tools in order to assess impacts from policy, plan, project, or activity. It could attribute to the change of health factors and health impacts on people<sup>8</sup>. HIA Procedures were determine into six steps: Public Screening, Public Scoping, Assessing, Public Review, Influencing and Public Monitoring and Evaluation.<sup>9</sup> For this research, SCBTS could developed by using HIA procedures to create healthy public policy.

**Community-Based Tourism (CBT):** Community-based tourism means to travel with consideration natural resources, environment, society and cultural sustainability. This tourism is managed and operated by community for community, considered as community-based innovation. Suansri and Nitikasetsoontorn mentioned that there are ten principles for success CBT: a community as an owner, villagers participating in decision and determination, support for being proud of themselves, enhancing life quality, environmental sustainability, conserving local identity and culture, learning among people in diverse cultures, respect for diverse culture and human-being, fair benefits for local people and income distribution to community.<sup>10,11</sup>

### **Research Methodology**

This research was conducted at two voluntary communities promoting competency of tourism communities for well-being project since 2016- Ban Laem Sak and Ban Tham Suea Tourism Community, AoLuek District, Krabi Province in Southern Thailand. Data were collected by using the review of literatures, observations, semi-structured interviews and focus group discussions. There were 50 participants comprising ten of local communities, fifteen officials from the CBT development committees, ten delegates from governmental and private agencies, ten members from other local organizations and five concerned people. The data were analysed by using descriptive analysis. Triangulation was used to ensure that the results would be gained in the study from different perspectives.

**Four steps of HIA were conducted to collect data, as the following:**

**Step One, Screening:** The reviewed literature was used to screen a CBT strategy, program, plan and project in various levels including community, provincial, regional and national. The data extraction sheet was used to compare the similarity of each format to develop the first draft of SCBTDS' guideline.

**Step Two, Public Scoping:** The focus group discussion was carried out to set the scope of issues for developing strategies by using the results from screening step as input for the discussion.

**Step Three, Assessing:** The focus group discussion was carried out; as well as, semi-structured interviews and three observations (participatory and non-participatory) in order to know about actual situations in regions and strategy issue. Then, SCBTS draft was developed.

**Step Four, Public Review:** The SCBTS draft was reviewed by three experts for comments and suggestions. Then, it was adapted and standardized by public participants.

### **Results**

The results revealed that the communities determined the mature goal of CBT to be "healthy community" under the five following strategies.

**Strategy One:** To promote skill and competency of local people.

**Goals of the strategy:**

- (1) Local people in communities gain knowledge about CBT and standard service provision.
- (2) Tourists are satisfied with this tourism.
- (3) Courses development for developing CBT personnel.
- (4) Personnel are developed to be lecturers and consultants for nationally and Asian community-based tourism.
- (5) Government and private sectors know and understand about CBT.

**Strategy:**

- (1) To develop CBT knowledge gained from wisdom teachers and outside experts about CBT and suitable services for tourists according to community context.
- (2) To encourage and cheer up local people to develop their tourism through activities to become knowledge exchange and learning of cultural and natural diversity.
- (3) To develop short-term and long-term courses of CBT and push on utilization of the courses for community personnel development.
- (4) To manage human capital of CBT in order to promote and support the operation of CBT.
- (5) To develop local people, lecturers, researchers and academics to have ability to teach and provide CBT knowledge for members of ASEAN countries.

**Strategy Two:** Value-added to community products and services, as well as develop to be the learning model of CBT

**Goals of the strategy:**

- (1) Value-added to products and services to be more highly standardized.
- (2) Promote a number of tourism communities which have standards and suitably quality for tourists.
- (3) Increase a number of learning model communities for CBT development and management.

**Strategy:**

- (1) To promote communities located in tourism spots

to develop themselves and become CBT based on the community capital as well as their notability and identity of mixed cultures among Thai, Chinese and Muslim.

- (2) To promote communities in order to appropriately add value of products and services in CBT: food, costumes, folklore activities; such as Peranakan culture, Rong Ngeng dance, Patik painting and local fishing
- (3) To promote communities to have tourism operation according to the CBT standard in order to be accepted by tourists and international quality regarding community potential.
- (4) To promote development of public utilities and suitable facilities for CBT.
- (5) To develop CBT learning centers in for the tourism learning exchange and prevention of sensitive areas from tourism; such as, nursery grounds for wild orchids, lady's slipper orchids and local aquatic animals.

**Strategy Three:** To develop the management of CBT marketing by balancing the happiness between local people and tourists

**Goals of the strategy:**

- (1) Supporting incomes from tourism in order to reduce social inequality, income distribution of CBT and incomes fairly earned to the local people
- (2) Providing tourists perception and understanding of CBT

**Strategy:**

- (1) To promote information collection and develop CBT marketing database
- (2) To develop and support community participation in CBT marketing promotion by community for quality tourists
- (3) To study and create CBT marketing image

**Strategy Four:** To develop the management mechanism and networking. The management system should be planned and linked between the public and private networks

**Goals of the strategy:**

- (1) Strengthen the CBT network in Thailand



- (2) Amount of CBT management systems with unity at any level

**Strategy:**

- (1) To install system and networking mechanism of CBT with unity at any level
- (2) To develop the database of communities managing CBT
- (3) To develop CBT management to have standard based on community potential
- (4) To have measurements and promotion mechanism and support CBT

**Strategy Five:** To develop happiness and well-being indexes of local people and tourists

**Goals of the strategy:**

- (1) Number of communities having happiness indexes between communities and tourists
- (2) At least 85 percent of communities' satisfaction
- (3) At least 85 percent of tourists' satisfaction
- (4) Number of cooperation in CBT among ASEAN countries and mutual activities

**Strategy:**

- (1) To create happiness indexes of tourism for communities and tourists
- (2) To evaluate happiness in tourism communities
- (3) To promote operation of CBT in ASEAN countries

**Discussion**

The strategies of CBT in AoLuek district, Krabi province have been developed by the determination of the economic, social and environmental balance based on the concept of sustainable development. According to Action Plan on Development of Sustainable and Creative Community-based Tourism<sup>12</sup>, tourism development in local areas related and similarly directed to the National Sustainable Development Concept focused on the following five strategies:

Strategy One: Promotion of quality, skills and competency of human resources in communities as well as focus on raising good awareness of tourists and local people in communities according to Sustainable Development paradigm; that is, resources are sustainably used and cultural capital of communities is preserved.

Regarding Ely (2013), responsible tourism was developed in order to raise awareness of tourists who can realize value and be part of cultural, historical and natural resources conservation.<sup>13</sup>

Strategy Two: Value-added to community's resources capital and development to be a learning model; that is, the value of products and services emphasized on identity in communities is added. The examples of outstanding identity are diversity of three cultures—Thai, Chinese and Muslim, food traditions, costumes and community way of life. Moreover, local people in communities are developed to enhance tourism services internationally in order to have satisfaction of tourists and repetition of their trips. This is related to tourism development of Kampung Jayengan community in Indonesia that finds out its identity of such things as food, cultures, arts and colonial buildings. Meanwhile, value of products in the community is added by designing its own products and industrially enhancing them under the concept of creativity by community and promote local people in the community to be owners.<sup>14</sup> In terms of being a learning model, sensitive areas; such as, nursery grounds for wild orchids, lady's slipper orchids and aquatic animals are highlighted on knowledge development and exchange among local people in a community, tourists and interested people in order to simultaneously have natural resources conservation in the areas.

**Strategy Three:** The management of CBT marketing; marketing is one of important business activities for the success of CBT. Communities should be supported to participate in marketing management. Ngo, Hales & Lohmann (2019) stated that CBT marketing should be performed in a form of collaborative marketing and potential stakeholders should also take part in this activity.<sup>15</sup> In addition, Carr et al. found that CBT marketing should be focused on the balance between commercial viability and community development.

Strategy Four: Development of the management mechanism and networking which is united, secure and sustainable; that is, community-based tourism is used for the management mechanism and the management format is developed and operated by all related authorized public and private sectors. Tolkach, Pearlman & King<sup>16</sup> found that CBT management by professionals can be helpful to build a CBT network in and outside the countries. Furthermore, the committee should be established in order to play a role in coordination with all related

sectors, especially the government sector which is an essential network for determining measurements, rules and regulations appropriate to the areas. Networks of education should be built to develop potential of students and tourism personnel; a network of private sectors; such as, tour agencies should be built to provide tour programs. Importantly, NGO should take part in CBT network in order to provide suggestions and follow up tourism operation.

**Strategy Five:** Development of happiness and well-being indexes of local people and tourists as well as development to be the ASEAN learning center; that is, the government sector should specify goals of sustainable CBT development which is economically, socially, culturally and environmentally balanced. If tourism development is performed together with good quality of life, a community can be well affected on increasing employment, local products and services, developing local education and promoting health and environmentally friendly tourism<sup>17</sup>

### Conclusion

The SCBTS from this study should be operated simultaneously with the development of well-being in local people. Since the natural resources conservation and environmental management are closely related and beneficial to the well-being of people, local people should be educated to aware and their skills and competency for managing the limited natural resources should be then developed. These resources should be worthily used and value-added to create products and services that appropriate with the community contexts. For the marketing management, local people should be developed in public relations skill and marketing tactics. Local people with such skills will make fair balance of income distribution in their community and lead them to have well-being. Regarding the natural resources, it is recommended that the strategies should be focused to control the number of tourists to the sensitive tourist attractions; such as, the agreements at local aquatic animal care and mangrove reforestation among local people and tourists.

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# Molecular Characterization of Virb4 Coding Gene: A Virulence Factor on Brucellosis as Zoonotic Disease

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## Abstract

*Brucella abortus* is a zoonotic pathogen bacteria which can cause brucellosis commonly known as undulant fever in human and abortion in cattle. VirB4 is one of the virulence factor that cause these bacteria became pathogen during infection period. Molecular characterization was performed by using *Polymerase Chain Reaction* (PCR) for further understand within antigens involved in the virulence or the immune system, genetic and immunologic characterization of a VirB4 protein which play role as virulence factor. Local isolate of *B. abortus* that were already obtained were cultured on *Brucella* agar media. Subsequently, the PCR results were performed running in a 1% of agarose gel and can be visualized with the aid of UV transilluminator. DNA sequencing of VirB4 protein *B. abortus* of local isolates was performed using PCR and primer products that were positive in amplification. The examination results showed that encoding genes of the VirB4 protein using PCR molecular examination had positive bands with an 1600 bp amplicon length. This present study are expected to provide scientific information on the characterization of VirB4 protein as virulence factor of *B. abortus* local isolates in the medical field and can be developed and applied as a diagnostic kit for controlling brucellosis.

**Keywords:** *Brucellosis, Identification, PCR, Zoonosis.*

## Introduction

Brucellosis is one of the most common bacterial zoonotic disease and endemic in many countries, particularly in developing countries, such as Indonesia. Brucellosis is caused by intracellular bacteria from the genus of *Brucella*. Currently human can be infected by *Brucella abortus*, *Brucella melitensis* and *Brucella suis*. Although control program has been done using the S19 and RB51 vaccination, the incidence of brucellosis remain relatively high.<sup>1</sup> Some pathological manifestations of brucellosis in human are meningitis, endocarditis and arthritis. Brucellosis mostly infect farm animals even male and female with asymptomatic clinical signs. In pregnant ruminant, the target organ of *B. abortus* infection is placenta because it has erythritol compound which lead to placentitis and abortion. If the abortus does not occur, bacteria can be excreted into the placenta, fetal fluids and vaginal discharge. Mammary glands and lymph nodes may also be infected and this

bacteria is excreted into the milk. *Brucella* infection also occurs through inhalation, ingestion, or congenital of the infected organism.<sup>2,3</sup>

Intracellular pathogenic bacteria have developed ways to evade host defenses or bacterial degradation system, such as controlling the maturation of phagocytic cells and transforming them into a nutrient-rich environment so that the bacteria can replicate.<sup>4</sup> *Brucella* entering host cells directly go to the vacuolar traffic in phagocytic cells by avoiding endocytosis and inhibiting phagosome-lysosome fusion. *Brucella* transits in cells via *Brucella Containing Vacuole* (BCV). BCV's next interaction with the membrane of the endoplasmic reticulum (ER) allows the bacteria to undergo the process of maturation and replication so that the bacteria can multiply within intracellular.<sup>5</sup>

*Brucella* has displays unique virulence characteristics since there are many determinants of the

virulence, including the secretion system of type I, II, III and IV. Due to the many virulence factors of *Brucella* so that virulence mechanisms underlie to be used by *Brucella* remains unknown.<sup>6</sup> Research on virulence factors states that VirB is known to be an important persistent factor. The VirB protein is homologous to type IV secretion systems (T4SS) of other types of bacteria involved in intracellular survival. VirB is also induced in macrophages, required for the transport of *Brucella* in the process of maturation. Characterization of protein coding genes that affect the survival of *Brucella* will provide more information about the functions and roles of VirB as virulence factor.<sup>7</sup> Therefore, this study was aimed to investigate the molecular characterization of the VirB4 protein encoding genes which contained in the local isolate of *B. abortus*.

## Material and Method

**Isolation and identification *Brucella abortus*:** This study was conducted at the Bacteriology Laboratory, Faculty of Veterinary Medicine, Universitas Airlangga. The research also took place at the Laboratory of Molecular Biology of the Faculty of Veterinary Medicine, Universitas Airlangga and ITD (Institute of Tropical Disease) Surabaya. The sample used was local isolate of *B. abortus* obtained from the Balai Besar Veteriner (BBV) Maros, South Sulawesi. The sample was collected and grown in *Brucella* Agar Media (BAM) (Oxoid) by a streak and then incubated at 37°C in a CO<sub>2</sub> incubator. The growth of the bacterial colony could be seen after 3 days of incubation. The colonies of bacteria grown in BAM were observed and identified by using Gram staining technique and biochemical tests using catalase, urease, indole and citrate.

**DNA Amplification and Electrophoresis:** *B. abortus* that had been successfully cultured in the media were then extracted and the DNA was isolated. A total of 2µl of DNA sample was mixed with the primers (1µl of BAMH1F, 1µl of BAMH1R)(Gen Bank: AF226278.1), 7µl of NFW (Nuclease Free Water) and 10µl of PCR master mix into tubes of a PCR bead so that the total volume of PCR tubes containing beads became 25µl. The PCR tubes were then inserted into a PCR thermocycler machine that had been programmed. The PCR thermocycler program was made with the sequence: the initial denaturation process for 45seconds at a temperature of 95°C followed by denaturation for

30 seconds at a temperature of 95 ° C, annealing for 60 seconds at a temperature of 52°C and extension for 60 seconds at 72°C. The thermocycling cycle was run 35 times and ended with a final extension for 7 minutes at 72°C. The electrophoresis used 5-7 ml of *B. abortus* DNA added 2µl of loading buffer, then was entered in 1% agarose well containing 1 µg/ml of red gel for running processes. The results were visualized by ultraviolet light at a wavelength of 302 nm by using a UV transilluminator.<sup>8</sup>

**DNA Sequencing:** Cycle sequencing was performed on GeneAmp PCR System 2400 (Perkin Elmer, CT) under the following conditions: denaturation 96°C for 10 seconds, annealing 50°C for 5 seconds, 60°C extension for 4 minutes, performed 25 cycles. The results were precipitated with ammonium acetate and absolute ethanol, then electrophoresed and the result readings were performed with Automated DNA Sequencer ABI PRISM 377 (Perkin Elmer, CT). The sequenced results were then analyzed on the basis of nucleotide sequences.<sup>9</sup>

## Results

The colonies of *B. abortus* bacteria were described as round, smooth, yellow and shiny like honey. The results showed that *B. abortus* bacteria were Gram-negative, shaped like coccobacillus and clustered or in pairs. The biochemical tests on *B. abortus* were showed positive results on catalase and urease respectively. While citrate and indole test were showed negative results. Further more Triple Sugar Iron Agar (TSIA) media showed butt and slant results that were alkaline, marked with red color on the top and the bottom of the media and did not form gas.

The results of the PCR electrophoresis in this study referred to the VirB4 target gene by using a primer BAMH1. That primer could be used to detect the gene that encoded a VirB4 specific protein on the *B. abortus* species with an amplicon length of 1600 bp. DNA sequencing of VirB4 protein from *B. abortus* local isolates was performed using PCR and primer products that were positive in amplification. The length of the DNA amplicon in the VirB4 protein *B. abortus* local isolate is 1600 base pairs. DNA sequencing of VirB4 protein *B. abortus* local isolates obtained in the study can be seen in the table 1.

**Table 1. Sequence of VirB4 gene from B. abortus local isolate.**

1	GCACCTACGCACAAGCGTTTCGACCCCTGCAAGAACCTGAAGATGGGATCCAAGATCCTTG
61	AAGACTGCTACCGTCGGGGCATCGTGAAGATGCCCGGTCAGGAACAAGGCGCGCTTCGCG
121	CCGCATTCTCCTGTTACTACGCCGGCAACTTTACGGGCGGCTTCAAGACGAAGCCCGGCA
181	GTCCCAGCTACGTGCAGAAGGTCGTGGCAAGCGCCGACGTGACCACAAAGCCGATTGTTG
241	TCGTGCCCATGATCCGAAAACGCCGGATGCGGGCAGCAGTAGCTGCCCCAGTAAAAA
301	AACGACAGCCGGCTGATCGTAATTCTGTTCTTGTTCGATCTGCATCCATCATCGCAGTCGA
361	TGCCAGCCACCGGCACGGCGAACGCGCCTGTAAGGCTGAAGACAGAGCAGCCGGCGACAA
421	CCGATGCGCCGCCAGGGAAGGATAATACGGACGGCGTAGTTGTTTTCTAACCCATCATCC
481	GATCAGGCACGCATATAAAATTGATGATGGTGGAGGGTCCGAACAGGACTGGGAAGGTTA
541	TAGCGGCGGGCGGCGACGATAGGAGGCAGTCGCACACCATAGACGCATCTGCGATCTGGA
601	GCATTTCCATTTTATTGAGCCCTTAGAGGTGCTCTATCCATTTGTTTGAAGCGCATCTT
661	GCGCCGAGAACTATGCACTCTTTTGAGGATGCGCTCTAACTCAACGCAGAGCAGGCATA
721	AGCAAGTAAATTACATGCTGTAATATGGTGTCTCCGGTAATCTCGGTGCAACGCCACCA
781	GCCGACTGGTGCCGAAATGCAGTCTGCTAGACAATTGTTTGAAGCAACCAAGTTGAATAG
841	ACATTGAGTGTGCAGACCGTGTGAAATCCAGGTCTAGTCGTCGTCGCATAAGTAATAG
901	AGATCATGATAACCGCTTCGCCCAGCAAGAAGCCGCTATCGCGGATAGTAGCTCACTTAC
961	TGCTGGCGCTGATAGTCTGCATCGCTGCAATCGGGCCTAAGCTGGCGCACGCCGACGGTG
1021	GCCTCGATAAGGTAAATACATGCATGCAGAAAGTGTGGACTTGCTAAGCGGCGTATCGA
1081	TCACCATCGTTCCCATAGCCATCATCTGGTCCGGTTACAAGATGGCATTCCGGCACGCCC
1141	GCTTCATGGATGTAGTGCCGGTGTGGGCGGCGCCCTGGTGGTTGGCGCTGCCGCCGAAA
1201	TTGCCTTTACCTGCTTAGGTAAAGGGACACAGATCATGACAACGGCACCACAGGAATCC
1261	AACGCACGAAGCGCAGGTTATCGCGCGATCCAATATTCAAGGGCTGTACACGGCCAGCCA
1321	TGTTGTTTGGGGTTCCCTGTGATCCCCTTGTTCATCGTTGGCGGCAGCATCGTTCTCTTAT
1381	CGGTCTGGATTTCCATGTTTCATATTGCCGCTGATCGTACCAATCGTGCTGGTCATGCGGC
1441	AGATCACGCAGACTGACGATCAGATGTTCCGCCTGCTCGGCCTGAAGGCGCAATTCGCC
1501	TGATCCAATTCAACCGCACCGGGCGCTTCTGGCGGCATCCGCTATAGCCCGATTGCCT
1561	TCACAAAGCG

**Discussion**

Brucellosis diagnosis cannot be determined based on clinical symptoms because the symptoms shown by the patients are relatively similar to the other infectious diseases such as leptospirosis, trichomoniasis and toxoplasmosis. Laboratory tests using bacteriological and serological method are essential to identify cases of brucellosis.<sup>10,11</sup> Immune response for eliminating brucellosis involve between humoral and cellular immune response. Humoral immune response shaped by antibody which induce by limfosit B and cellular immune response is immunity system which induce by limfosit T.<sup>12,13</sup> *Brucella* has lipid component known as lipoprotein. That lipid component can change or modified which play role in pathogenicity of *Brucella*. The lipoprotein can induce cytokine and has direct impact with non specific immunology reaction.<sup>14,15</sup>

*B. abortus* has a potential virulence factor of VirB protein. In the class of smooth colonies, *Brucella* can enter into the host cell through the interaction of cell

surface that is composed of lipid bonds. The bond contains most of the glycosylphosphatidylinositol, glycolipids and cholesterol that are believed to have an important role in the process of infection and bacterial replication in cells.<sup>16</sup> Observations in cellular interactions and the inclusion of *Brucella* bacteria in macrophages have shown that these bacteria are associated with the phagosome acid system. These acid conditions are important for the stimulation of virulence expression of the VirB protein associated with the emergence of the *B. abortus* type IV secretion system.<sup>17</sup> *Brucella* is an intracellular pathogen bacteria in many wild and domestic animals that can cause zoonotic disease in humans. *Brucella* can survive in the phagocyte cells of the host and is able to avoid the normal mechanism of bacterial degradation by altering the vacuoles intracellular pathway. *Brucella* ability can avoid fusion of phagosome with lysosomes requires *VirB* proteins that allow bacteria to live in the vacuoles of the endoplasmic reticulum, thereby enhancing survival and bacterial replication. *Brucella* bacteria in macrophage

cells can perform oxidative reactions then can infect other macrophage cells that can not mechanically explain the exact process. *VirB* protein expenditure interacts with the endoplasmic reticulum that causes the pH to be neutral, the nitrate ion is used for anaerobic respiration, so *Brucella* can multiply intracellularly.<sup>13</sup>

*VirB4* protein is known to be inside Type IV Secretion System (T4SS) and it can be used as a reference for classification purposes. *VirB4* protein attach in inner membrane and divide into one or three segment or directly bind with membrane in random way through interaction with other protein component of T4SS. Purification of *VirB4* protein known to have variation in oligomerisation condition depend on membrane and solution in monomer, dimer and hexamer form.<sup>4</sup> Several different classification schemes have been proposed to T4SS of phylogenetic analysis. Phylogenetic classification is largely based on the analysis of homologous genes with *VirB10*, *VirB4* and *Vir D4*. *VirB10* has not been found in Gram-positive bacteria, so it can only help in defining the functions of T4SS on Gram-negative bacteria. *Vir D4* is found in most T4SS but less appropriate as homologous reference when compared with *VirB4* due to higher sequence variability.<sup>18</sup> T4SS usually has three special ATPases that form a center of secretion energy. ATPase is a protein composing the secretion system called *Vir D4*, *VirB11* and *VirB4*. These proteins are essential for the secretion system in Gram-negative bacteria. *VirB11* and *VirB4* are also required for the biogenesis process of T4SS pilus (known as the T-pilus on the bacteria *A. tumefaciens*). *Vir D4*, *VirB4* and *VirB11* proteins interact with each other as ATPase. Therefore, these proteins tend to form large complex ATPase which supplies substrate transport energy from the cytoplasm through the mechanism of translocation. The complex structure and the contributions of each of ATPase in the secretion system or pilus biogenesis is not widely known. *VirB10* interacts directly with *VirB4* and *Vir D4* involving domain near the central area of the two proteins that are in or near the inner membrane.<sup>19</sup>

The ATPase role in T4SS also needs to be studied further. *Vir D4* acts as a receptor that brings the substrate for translocation. *Vir D4* may also act as a molecular motor to provide the substrate through the system. *VirB11* and *VirB4* are necessary to transfer substrates across the membranes and may function in a coordinated manner with *Vir D4*. *VirB11* and *VirB4* also play a role in the formation of the core of T4SS. The protein mechanism of *VirB4* and *VirB11* coordinates the functions with

*Vir D4* to transfer substrates and has an independent function in the assembly of the secretion system directly which is basically unknown. T4SS on Gram-negative bacteria and in some Gram-positive bacteria lack of *VirB11*, while *VirB4* always exists and is a T4SS core subunit on all species of bacteria. *VirB4* has a tendency to have an important role in strengthening the function or formation of T4SS.<sup>20</sup>

## Conclusion

This study concludes that the molecular characterization of *VirB4* gene can be considered when confirming *B. abortus* at species level as it can differentiate *B. abortus* wild strains from vaccine strains. Furthermore, it can be used during the waiting period for culture and identification as the *VirB4* is able to identify *B. Abortus* from local isolate specifically compared to culture identification which can take up longer periods.

**Conflict of Interest:** The authors declare no conflict of interest in this study.

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**Ethical Clearance:** All relevant ethical guidelines have been followed; any necessary or ethics commite approvals animal use and ethic commite from Faculty of Veterinary Medicine Universitas Airlangga have been obtained.

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# The Relation between Self-Efficacy and Quality of Life of Patients with Type 2 Diabetes Mellitus in Pelamonia Hospital Makassar

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## Abstract

**Objective:** The purpose of this study was to determine the relationship between self-efficacy and quality of life of patients with type 2 Diabetes Mellitus at Pelamonia Hospital Makassar.

**Method:** This Quantitative research using correlation design with a cross-sectional study approach. The sample in this study was 54 respondents who met the inclusion criteria.

**Result:** The results showed that there was a relationship between self-efficacy and quality of life of patients with type 2 diabetes mellitus ( $p = 0.006$ ).

**Conclusion:** This finding suggests to nurses for educating their patients about self-efficacy. Nurses have to enhance their patient's self-efficacy so that they help patients improve their quality of life better.

**Keywords:** *Self-efficacy, quality of life, diabetes mellitus.*

## Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder with the characteristics of hyperglycemia. Various complications can arise due to uncontrolled blood sugar levels, such as neuropathy, hypertension, coronary heart disease, retinopathy, nephropathy and gangrene.<sup>1</sup>

The reported prevalence of diabetes mellitus in Indonesia based on the physician's interviews and diagnoses at 1.5%. DM was diagnosed by a physician and the symptom at 2.1%. The highest prevalence of

diagnosed diabetes mellitus was found in DI Yogyakarta (2.6%). South Sulawesi was the third-highest prevalence of DM in diagnosed or symptomatic 1.6%.<sup>2</sup>

Patients with diabetes mellitus in Indonesia are large in number. They need treatment from all health teams and have to involve individuals with diabetes mellitus themselves. Diabetes mellitus is a chronic disease that will sustain for a lifetime. Diabetes mellitus has an impact on the quality of human resources and a considerable increase in health costs. Management of diabetes mellitus must be arranged by physicians, nurses, nutritionists and other health workers. The role of patients and families becomes very important.<sup>3</sup>

People with diabetes mellitus must have efficacy about the conditions they experienced and all recommended therapies. According to Bandura (1994), efficacy is self-assessment, whether a person can do well or poor actions, right or wrong, able or unable to work according to what is required. This efficacy is different

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from aspirations (ideals) because ideals describe something ideal that should be (achievable), while efficacy describes self-worthiness assessment.<sup>4</sup>

One study over 85 respondents found that 67 respondents of diabetes mellitus had a poor quality of life.<sup>5</sup> In general, respondents felt their lives were not satisfied due to physical changes experienced. A small scale study stated that most respondents were very satisfied with the current treatment, duration of patient treatment of diabetes mellitus. The results collected from the impact and concern of respondents were having poor sleep quality.<sup>6</sup>

A recent study reports that most respondents have no complications, moderate anxiety and low quality of life. There was a significant relationship that affects the quality of life of DM patients. The World Health Organization (WHO) predicts that Indonesia will experience an increase in the number of people with DM from 8.4 million in 2000 to around 21.3 million in 2030. International Diabetes Federation (IDF) also predicts in 2009 to be 12.0 million in the year 2030. Based on the data obtained it is concluded 2-3 times in 2030.<sup>4</sup>

Increased cases of DM also occur at the district level, especially in Makassar. Diabetes mellitus occupies the fifth-ranked out of ten main causes of death in Makassar in 2007 with a total of 65 cases. Based on data from the Makassar Health Office, the incidence of diabetes mellitus in 2011 was 5700 cases. In 2012 the incidence of DM cases increased to 7000 cases.<sup>7</sup> Based on data collected from Pelamonia Hospital Makassar, 228 cases were diabetes mellitus in the last three months. People with DM had uncontrolled blood glucose.

Patients behave a negative attitude towards diabetes mellitus, will have complications and eventually lead to death. Interventions needed to maintain quality of life and avoid complications in patients with diabetes mellitus. Based on these descriptions the researchers need to examine how self-efficacy affects the quality of life of patients with diabetes mellitus.

### Method

This research was conducted in June-September 2018 at Pelamonia Hospital Makassar. This study used quantitative research by correlation design with a cross-sectional study approach. This was intended to gain an overview relation between two or more research variables.

The population was all Diabetes Mellitus patients treated at Pelamonia Makassar Hospital. The population was infinite. The sample in this study comprised 54 respondents who meet the inclusion criteria. The sampling technique is accidental sampling.

Data collection was carried out in two ways, namely primary data and secondary data collection, primary data collected by direct observation of patients using the self-efficacy questionnaire. the quality of life data collected using standard questionnaires adapted from the diabetes self-efficacy scale<sup>8</sup> which comprises 15 questions with the Likert scale.

Data analysis was intended to answer the research objectives and examine the research hypotheses to determine the association of independent variables toward the dependent variable by using a statistical test with a significance level ( $\alpha$ ) = 0.05. The statistic test used was Chi-square with an alternative is the Fisher exact test (if the expected value of one or more cells less than 5).

### Results

Univariate analysis in this study aims to see an overview of frequency distribution based on the characteristics of respondents (age, gender, education level and occupation).

**Table 1. Characteristic of respondents**

Characteristics	Frequency n=54	Percent
<b>Gender</b>		
Male	18	33,3
Female	36	66,7
<b>Age Group</b>		
40-50 years	1	1,9
51-60 years	2	3,7
61-70 years	15	27,8
71-80 years	36	66,7
<b>Education Level</b>		
Not school	2	3,7
Elementary	8	14,8
Yunior high school	9	16,7
Senior high scholl	22	40,7
Higher education	13	24,1
Occupation	32	59,3
<b>Unemployed</b>		
Private sector	9	16,7
Civil servant	13	24,1

It is apparent from Table 1 that the majority of

respondents were female 36 subjects (66.7%), most of the respondents aged 71-80 years were 36 subjects (66.7%), with the highest level of education was senior high school or equivalent level, there were 22 subjects (40.7%) and most of them were unemployed by 32 subjects (59.3%).

**Table 2. Characteristics respondents based on variables**

Variables	Frequency n=54	Percent
<b>Self-efficacy</b>		
High	43	79,6
Low	11	20,4
<b>Quality of life</b>		
High	39	72,2
Low	15	27,8

As Table 2 shows, from 54 respondents participated in this study, 43 respondents (79,6%) showing had high self-efficacy dan 39 respondents (72,2%) revealed a high in quality of life. This result shows that most of the subjects in this study dominantly experienced high self-efficacy and high in quality of life.

Evaluation of the relationship between self-efficacy and quality of life in patients with diabetes mellitus in this study carried out by data analyses using Chi-square statistical tests with a significance level 95% ( $\alpha=0.05$ ) or confidence interval  $p<0.05$ . The result of data analysis can be seen in Table 3 below:

**Table 3. The Relation between Self-efficacy and Quality of life patients with Type 2 Diabetes Mellitus**

Self-efficacy	Quality of life				Total		p
	High		Low		n	%	
	n	%	n	%			
High	35	81,4	8	18,6	43	100,0	0,006
Low	4	36,4	7	63,3	11	100,0	

Based on the analysis results of the relationship between variables self-efficacy and quality of life in Table 3 above, it shows that out of 43 subjects with high self-efficacy, 35 respondents (81,4%) had a high quality of life and 8 others subjects had a low quality of life. Besides, out of 11 respondents with a low quality of life, 4 respondents (36,4%) still had a high quality of life, while 7 respondents (63,3%) presenting a low quality of life. Referred to the Chi-square test, the analysis of the results shows a significant relationship between self-efficacy and quality of life among type 2 Diabetes

mellitus patients in Pelamonia Hospital Makassar ( $p=0,006<\alpha 0,05$ ).

### Discussion

An overview of the self-efficacy of type-2 diabetes mellitus patients at Pelamonia Hospital Makassar based on the analysis results found that 43 respondents (79.6%) had high self-efficacy and 39 respondents (72.2%) with high quality of life. Among the respondents who had high self-efficacy, 35 respondents (81.4%) had a high quality of life. The results of the statistical analysis using the Chi-square test in this study showed a significant relationship between self-efficacy and quality of life toward type-2 diabetes mellitus patients ( $p = 0.006$ ) in Pelamonia Hospital Makassar. The higher the self-efficacy of patients with diabetes mellitus, the higher the quality of their life, while the lower the self-efficacy of patients with diabetes mellitus, the lower the quality of their life.

Based on the theory<sup>9</sup>, self-efficacy according to social cognitive theory by Albert Bandura states that self-efficacy is a person’s belief that he will be able to carry out the required behavior. Self-efficacy can be formed and developed through four processes, specifically cognitive, motivational, affective and selection. The cognitive process of patients with diabetes mellitus required in determining the treatment to maintain blood sugar levels within normal. Patients should set their goals to be achieved for preventing complications in this case to get a normal life. Patients have to perform some preventive intervention by checking their sugar levels, choosing foods that are right according to diet diabetes, able to maintain ideal body weight, regular exercise and taking medication according to physician regiments.

The cognitive function allows people with diabetes mellitus to predict events that will affect the future. People with diabetes mellitus have the confidence to improve their lives by being able to meet the needs in normal life activities. The impact of illness on the quality of life associated with their disease appropriately can be improved. For achieving a high quality of life, patients need to do several activities according to daily needs such as enjoying and feeling life more meaningfully, being able to do activities well, accepting their body image, having the opportunity to reflect, sleeping well, feeling comfortable and satisfied with his abilities.

Respondents with low self-efficacy tend to have a lower quality of life. This is because some respondents

do not have confidence and motivation for themselves in their ability to perform something for achieving a goal. This statement is also supported by Bandura stated that self-efficacy can be influenced by several functions including the cognitive function. Strong self-efficacy will affect a patient's personal goals. Motivational function explains that a person will motivate themselves and guide action by using thoughts about the future, therefore, the individuals will form beliefs regarding what they can do.<sup>9</sup>

Most of the respondents aged 71-80 (66.7%), wherein this period, it easier to receive and participate in programs to improve health, therefore their confidence is higher. The results of the interview on respondents showed that they were more careful in setting patterns to eat, participate in healthy activities such as Prolanis gymnastic, diligently control sugar levels in the nearest health service. The more mature age the higher their self-efficacy and the higher the quality of life be. In addition, the education level of a person supports high self-efficacy and a high quality of life. This can be seen that the majority of respondents were graduated from high school education/equivalent as many as 22 respondents (40.7%) and higher education as many as 13 respondents (24.1%). Education is not the main point in increasing self-confidence in patients with diabetes mellitus but the impact of respondents with higher education will be easier get an information and knowledge about everything that needs to be performed in keeping the blood sugar level stable and prevent complications of diabetes mellitus, therefore patients with diabetes mellitus can undergo daily activities normally and have high self-efficacy in improving their quality of life.

Based on the study results, there were 8 respondents (18.6%) with high self-efficacy while low in quality of life. Most of the respondents were female as many as 36 respondents (66.7%). Gender factor has no influence on the improvement of self-efficacy, but there were other determinants due to female respondents who tend to have engaging activities and easily stressed make them would be difficult to regulate diet, control blood glucose levels in the normal range. If this occurs continuously in a long period of time, this can result in unhealthy behavior that affects their self-efficacy who contribute to improving their quality of life.

Based on the results of interviews randomly. Respondents with high self-efficacy but have a low quality of life due to other factors that influence for

example a person has the confidence to achieve a goal but lack of support from family or closest people so that it will affect their quality of life. Likewise, conversely, the respondents who have low self-efficacy but have a high quality of life due to the lack of confidence and motivation in themselves to do something besides the support and caregivers of the family or from the closest person.

Behavioral change will only occur if any changes in efficacy in the individual concerned. Someone with high self-efficacy will encourage taking action to achieve success so that it can strengthen the efficacy of a person.<sup>9</sup> Self-efficacy will regulate one's emotions in several ways. Someone who believes they will be able to manage threats will not be easily pressured by themselves, but vice versa if someone has high efficacy, it can reduce stress and anxiety. A person performs an action and a suitable environment will help establish themselves and achieve goals.

Based on the above research result, this study is supported research<sup>10</sup> about the relationship of self-efficacy with quality of life in patients with type II Diabetes mellitus in Labuang Baji Hospital Makassar, the study showed a significant correlation between self-efficacy and quality of life ( $p=0.001$ ). A small study<sup>11</sup> in PKU Muhammadiyah Yogyakarta Hospital showing that there was a significant relationship between self-efficacy and quality of life ( $p=0,000$ ) with a correlation value ( $r=0.745$ ). The results of this study are also in line with the research<sup>12</sup> showing a significant relationship between self-efficacy, adherence, education level and depression with quality of life in patients with Diabetes mellitus where self-efficacy affected the quality of life significantly ( $p=0.005$ ).

Based on the results of studies, theoretical reviews and previous studies, the researchers concluded that there was a relationship between efficacy and quality of life in patients with diabetes mellitus in Pelamonia Hospital Makassar. Respondents who have high self-efficacy, have a high quality of life and respondents with low self-efficacy have a low quality of life.

## Conclusion

Based on the results of research and discussion that have been conveyed previously in this study, to determine the relationship between self-efficacy and quality of life patients with diabetes mellitus in Pelamonia Hospital Makassar, the researchers conclude

that most respondents have high efficacy and a high quality of life. There was a relationship between self-efficacy and the quality of life patients with diabetes mellitus in Pelamonia Hospital Makassar.

Respondents are expected to increase their knowledge about diabetes mellitus, maintain a healthy lifestyle based on a given diabetic diet, maintain good physical activity in achieving a fit condition, control blood sugar levels to keep in the normal range and prevent complications to improve quality of life. Pelamonia Hospital Makassar, as a health service provider, is expected to maintain and improve the quality of nurse services provided especially towards patients with diabetes mellitus by increasing the health education program.

**Conflict of Interest:** There was no conflict of interest regarding this study and publication.

**Ethical Clearance:** This study has been ethically approved and allowed by the Regional Investment and Coordination Board of South Sulawesi in Makassar.

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# Nasal Versus Oral Feeding Tube Placement: Selected Outcomes among Preterm Infants

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## Abstract

**Background:** Enteral feeding tubes for preterm infants may be placed via either the nose or mouth. Nasal tube placement may compromise respiration, however, orally placed tubes may be more prone to displacement.

**The Aim:** The aim of the current study was to determine the effect of nasal versus oral placement of enteral feeding tubes on weight and the incidence of adverse events among preterm infants.

**Method:** A descriptive comparative study design was utilized.

**Sample:** A convenient sample of sixty physiologically stable preterm were assigned to two equal groups within six months (between July 2018 – Jan. 2019). They were recruited from neonatal intensive care units of both Kasr Alainy and El-Monira Pediatric Hospitals-Cairo University.

**Tools:** Three tools were developed by the researchers: preterm infant's characteristics, observational checklist for incidence of adverse events and recording sheet for daily weight and time to sustain full oral feeding.

**Procedure:** The researches recorded preterm infant's characteristics, any adverse events, weight and time to sustain full oral feeding in the morning shift twice a week for two weeks.

**Results:** Orogastric tube feeding was statistically significant different compared to nasogastric tube feeding regarding displacement. There was no difference among two groups in weight gain, time to reach full feeds and frequency of adverse events. Orogastric tube feeding group had lesser duration of hospital stay than nasogastric and orogastric tube feeding group reached to full oral feeds quickly compared to nasogastric with no statistical significant differences.

**Recommendation:** Further researches with a larger population would probably be required to know the significance of this outcome.

**Conclusion:** This study concluded that no differences were found between both orogastric and nasogastric tube feeding on preterm infants' weight, incidence of adverse events and time to sustain full oral feeding.

**Keywords:** *Nasogastric tube, orogastric tube, Preterm Infants, outcomes.*

## Introduction

When preterm infants are too immature or unwell to suck feeds they can receive their milk through a feeding tube passed via either the nose or the mouth. The establishment of safe oral feeding in preterm infants may be delayed because of poor co-ordination of sucking and swallowing, neurological immaturity and respiratory

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compromise. Enteral feeds may be delivered through a catheter (feeding tube) passed via the nose or via the mouth into the stomach or upper small intestine<sup>(1)</sup>.

Neonates are obligate nose breathers. Feeding tubes placed via the nose can cause partial nasal obstruction, increased airway resistance and increased work of breathing<sup>(2,3)</sup>. This increase in energy expenditure may potentially affect growth and development. Nasogastric intubation through the larger nare may increase airway resistance as the preterm infant is forced to breathe through an airway of smaller calibre. In addition, individual differences in nasal size may be acquired secondary to the effects of nasogastric tubes <sup>(4)</sup>.

Incorrect placement, or subsequent displacement, of feeding tubes into the lower oesophagus or into the lung can lead to aspiration, respiratory compromise and increased energy expenditure<sup>(5)</sup>. Orally placed tubes may be easier to displace as they can loop inside the mouth. Repetitive movement of the orally placed tube may result in mucosal trauma and may increase the incidence of apnea and bradycardia due to vagal stimulation <sup>(6)</sup>. There is not enough data to make any recommendation regarding the superiority of either routes of feeding <sup>(7)</sup>.

**Aim of the study:** To determine the effect of nasal versus oral placement of enteral feeding tubes on weight and the incidence of adverse events among preterm infants.

**Research Question:** What are the differences between nasal and oral placement of feeding tube on weight and the incidence of adverse events among preterm infants?

## Material and Method

**Research Design:** A descriptive comparative study design was utilized.

**Participants:** A convenient sample of 60 preterm infants were assigned to two equal groups within six months (between July 2018 – Jan. 2019).

**Tools of Data Collection:** Three tools were developed by the researchers after extensive review of related literature: preterm infant’s characteristics, observational checklist and recording sheet for weight and time to sustain full oral feeding.

**Tool Validity and Reliability:** Data collection tools were submitted to three panel of experts in the field of high risk neonates to test the content validity. Reliability was done by cronbqch’s alpha test and the result was 0.82.

**Procedure:** After the preterm infants had initial physiological stable state, they assigned to receive either nasogastric or orogastric feeding, the researchers’ recorded preterm infant’s characteristics once from admission sheet using tool I. They assessed any adverse events such as apnea, displacement and injury (trauma) in the morning shift twice a week for two weeks using tool II. All infants were weighed each morning, naked, before feeding and bathing, on one same time and time to sustain full oral feeding was recorded for all preterm infants using tool III.

## Results

It was evident from table (1) that there were no statistically significant differences between orogastric and nasogastric groups regarding their gender, diagnosis and gestational age ( $p > 0.05$ ).

**Table (1): Characteristics of Preterm Infant’s Characteristics For Both Groups In Percentage Distribution (N=60)**

Preterm infant’s characteristics	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
<b>Gender</b>					
- Male	17	56.7	13	43.3	
- Female	13	43.3	17	56.7	0.219

Preterm infant's characteristics	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
<b>Diagnosis:</b>					
- RDS	27	90	25	83.3	
- M.A	3	10	3	10	
- Sepsis	-	-	2	6.7	0.729
<b>G.A</b>					
- <32 Weeks	9	30	13	43.3	
- 32-37 Weeks	21	70	17	56.7	0.284

**Note:** RDS = Respiratory distress syndrome M.A = Meconium Aspiration, C.S = Cesarean Section NVD = Normal Vaginal Delivery, G.A: Gestational Age

It was revealed from table (2) that there were no statistically significant differences between orogastric and nasogastric groups regarding their hospital stay ( $p > 0.05$ ).

**Table (2) Hospital Stay For Both Groups In Percentage Distribution (N=60)**

Hospital stay:	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
- One-<two weeks	1	3.3	-	-	
- Two-<three weeks	6	20	3	10	
- Three-<four weeks	2	6.7	5	16.7	
- Four weeks and more	21	70	22	73.3	
Mean±SD	41.27±18.984		41.47±17.190		0.346

It was illustrated from table (3) that there were no statistically significant differences between both groups regarding their daily weight at the four measures.

**Table (3) Daily Weight At 1st, 2nd, 3rd And 4th Measures In Percentage Distribution (N=60).**

Daily weight	Groups		P
	Orogastric Mean±SD	Nasogastric Mean±SD	
1 <sup>st</sup> measure	1699.17±340.018	1606.50±354.951	0.190
2 <sup>nd</sup> measure	1693.83±332.586	1621.33±357.247	0.598
3 <sup>rd</sup> measure	1724.00±329.897	1693.00±351.027	0.211
4 <sup>th</sup> measure	1740.00±327.246	1712.00±337.062	0.270

It was represented from table (4) that there was no statistically significant difference about time to sustain full oral feeding for both groups ( $p > 0.05$ ).

**Table (4) Time To Sustain Full Oral Feeding For Both Groups At 1st, 2nd, 3rd And 4th Measures In Percentage Distribution (N=60)**

Time to sustain full oral feeding	Groups				P
	Orogastric		Nasogastric		
	N	%	N	%	
-< a week	2	6.7	4	13.3	
-Week-<two weeks	11	36.7	9	30	
-Two weeks-<three weeks	4	13.3	2	6.7	0.287
-Three weeks-<four weeks	3	10	7	23.3	
-Four weeks and more	10	33.3	8	26.7	



## Discussion

There was limited data available on the effect of the nasal versus the oral route for placing feeding tubes in preterm or low birth weight infants.

In relation to preterm infant's characteristics. The current study revealed that more than half of the preterm infants were males in the orogastric group, while more than half were females in nasogastric group. This findings goes in the same line with <sup>(8)</sup>, who reported that more than half of preterm infants in both orogastric and nasogastric groups were males. While <sup>(9)</sup> contradicted these findings and reported that more than half of nasogastric group were males, while in orogastric group, a relatively high percentage of preterm infants were females.

The result of the current study revealed that more than three quarters of preterm infants were diagnosed with RDS in both groups. This study goes in the same line with <sup>(10)</sup>, who found that more than two thirds of neonates had RDS.

Regarding gestational age, <sup>(8)</sup> who studied Mode of gavage feeding: does it really matters, reported that the highest percentage of preterm infants in both orogastric and nasogastric groups their gestational age were  $\geq 30$  -  $< 32$  weeks and this contradicted with the result of the current study which revealed that more than two thirds of orogastric group and more than half of nasogastric group preterm infants were born between 32-37 weeks of gestation with no statistically significant differences of both groups.

Hospital stay was slightly longer in nasogastric group than orogastric group but with no statistically significant differences among both groups, as mean duration of hospital stay was 41.47 days in orogastric group and 41.47 days among nasogastric group. This result contradicted with the study of <sup>(9)</sup>. Who revealed that there was no much difference among two groups. Mean Duration of hospital stay was 35.38 days with standard deviation of 7.60 among Nasogastric tube feeding group and 37.54 days with standard deviation of 9.45 among Orogastric tube feeding group.

Preterm infants in orogastric group gained weight more than those in nasogastric group at 1<sup>st</sup>, 2<sup>nd</sup> measures, 3<sup>rd</sup> and 4<sup>th</sup> measures. As mean of weight were (1699.17, 1693.83, 1724.00 and 1740 respectively) in orogastric group and (1606.50, 1621.33, 1693.00 and 1712.00 respectively) in nasogastric group but there was no

statistically significant differences. This findings supported by <sup>(9)</sup>, who demonstrated that mean time to regain birth weight was 19.38 days among Nasogastric tube feeding group and 19.23 days among Orogastric tube feeding group. Also <sup>(11)</sup>, who studied continuous feeding promotes gastrointestinal tolerance and growth in very low birth weight infants, reported no statistically significant difference in the time taken to regain birth weight.

Regarding adverse events of both orogastric and nasogastric tube placement, the results of the current study delineated that, there was no statistically significant differences between both orogastric and nasogastric groups about injury at the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> measure. This findings supported by <sup>(9)</sup>, who concluded that there were no significant differences among two groups to frequency of adverse effects.

Concerning displacement, the current study illustrated that there was statistically significant difference between both orogastric and nasogastric groups at the 2<sup>nd</sup> measure ( $p = 0.050$ ), while there were no statistically significant differences between both groups about displacement of the feeding tube at the 1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> measures. This findings supported by <sup>(8)</sup> who reported that the episodes of non-intentional removal and displacement are more in OGT group and it statistically significant ( $p = 0.012$  and  $p < 0.0001$  respectively). Also, <sup>(9)</sup>, reported that frequency of tube displacement was more common among Orogastric tube feeding compared to Nasogastric tube feeding. Which was statistically significant with a p-value of 0.001, mean difference of -0.4462 times/day.

In the matter of apnea, the results of the current study showed that there were no statistically significant differences between both orogastric and nasogastric groups about episodes of apnea at the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> measures. This findings goes in the same line with <sup>(8)</sup>, who reported that episodes of apnea, bradycardia, desaturation and oxygen requirement are more in NGT group as compared to OGT group but statistically Insignificant OGT versus NGT ( $p = 0.86$ ).

For time to sustain full oral feeding, the highest percentage of both orogastric and nasogastric groups reach to full oral feeding by one week to less than two weeks from starting oral feeding. There were no statistically significant differences about time to sustain full oral feeding for both orogastric and nasogastric

groups. This finding was in agreement with<sup>(8)</sup> who found that orogastric tube group neonates required (6.18±0.61) days as compared to Nasogastric tube group neonates as they required (6.47±0.59) days to achieve full feeding but it is statistically insignificant (P =0.368).

Based on clinical observation. The differences between both groups in terms of outcome measures like duration of hospital stay, time to reach oral feeds were not statistically significant which may be due to small sample size and there is need of larger samples and also further continuation of this study to know the significance of these outcomes.

### Conclusion

This study concluded that no differences were found between both orogastric and nasogastric tube feeding on preterm infants' weight, incidence of adverse events and time to sustain full oral feeding.

**Ethical Clearance:** Acceptance of ethical committee at faculty of nursing, in Cairo University was gained. All studied neonates' parents were informed about the aim, procedure, benefits and nature of the study and the written consent was obtained from them. The confidentiality of information was assured.

**Conflict of Interest:** the authors declare that there is no conflict of interest.

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# Law Enforcement on Tobacco Control and Smoking among Youths in the Northeast of Thailand

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## Abstract

Thailand has imposed strong tobacco control policies to reducing smoking. The effectiveness of those measures towards reducing smoking especially among youths still unknown. This study aimed to determine the effectiveness of law enforcement on tobacco control among youth in the Northeast of Thailand. This cross-sectional study was conducted among 1,147 youths who were recruited by using a multistage random sampling from 6 universities in the Northeast of Thailand. A self-administered structured questionnaire was used to collect the data. The Generalized Linear Mixed Model was used to determine the association between law enforcement on tobacco control and smoking when controlling for other covariates. The results show that 20.1% were current smokers. Law enforcement on tobacco control and smoking that were significantly associated with smoking among youths were had low level of awareness on tobacco raising price, anti-smoking campaign, smoke-free in public areas, not showing pack, price and brand of cigarette at point of sale product, pictorial health warnings and not distributing cigarette with tax avoidance/tax evasion. The other covariates were male gender, alcohol drinker, had low level of attitude on not smoking, had smokers close friend and had smoker father. One-fourth of youths in the Northeast of Thailand were current smokers. Legal measures had influence on youths' smoking as well as gender, family and friends.

**Keywords:** *Law enforcement, Smoking, Tobacco Control, Youths.*

## Introduction

Cigarette smoking is harmful to the health of both smokers and non-smokers. The burdens of tobacco-related illness and death are very high. The figures in 2008, indicated that cigarettes killed more than 5 million people or 1 person every 8 seconds, which was more than the deaths from infectious diseases. The global situations estimated that there will be 150 million smokers with increasing trends, especially among female teenagers. Most of the smokers start to smoke before the age of 18 and a half of them will die prematurely<sup>1</sup>. In 2019, half

of the tobacco users were killed, of which more than 8 million were killed annually. In addition, more than 7 million of those deaths were the result of direct tobacco use, whereas around 1.2 million were non-smokers being exposed to second-hand smoking, especially those with low and middle incomes<sup>2</sup>. Furthermore, tobacco use contributes to poverty by diverting household spending from basic needs such as food and shelter to tobacco.

The tobacco consumption situation of Thai people aged 15 years and older between 1991 and 2015 had been decreasing. The prevalence of smoking was continually decreasing from 32% in 1991 to 20.7% in 2009. However, between 2009 and 2014 the smoking rates were unclear. The rate of smoking was increased to 21.4% in 2011, then was dropped to 19.9% in 2013 and increased again to 20.7% in 2014. It was slightly decreased to 19.6% in 2015. Among youths the smoking rate during 2004-2015, were increased from 6.6% to 7.9% with the average age at first smoking of 17.8 years

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old<sup>3</sup>. The Global Youth Tobacco Survey (GYTS) survey observed that the rate of smokers in Thai schools was 11.7%, which was higher than the average global figures of 9.5% among 140 countries. It was also higher than the average rate of 5.9% among the South East Asian countries<sup>4</sup>.

Thailand has developed and enforced strong measures on tobacco control for almost 3 decades. Laws and regulations have been issued and enforced. Two acts were developed as the essential foundation of tobacco control measures, they were the Tobacco Product Control Act 1992 and the Non-Smoking Health Protection Act 1992<sup>5</sup>. In addition to the laws, Thailand has guidelines for tobacco control based on the “Framework Convention on Tobacco Control” of WHO<sup>6</sup> and the National Tobacco Control Strategy Plan 2010–2014<sup>7</sup>. Concerning tobacco control among youth in Thailand, the control measures starting from controlling manufacturing industry and smoking behaviors<sup>3</sup> followed by legal measures. From 2007, the prevalence of smoking in people aged 15 to 24-year-olds trends have been increasing. This was reflecting that despite strict tobacco control measures, smoking among youths were still problems. Therefore, this study aimed to describe smoking behaviors and perceived law enforcement on tobacco control as well as to determine the association between tobacco control law enforcement and smoking among the youth in the Northeast of Thailand.

## Material and Method

**Study Design:** This cross-sectional study was conducted among 1,147 participants who were recruited by using a multistage random sampling from 6 universities in the Northeast of Thailand. The inclusion criteria were being undergraduate students, aged 18 to 24-year-old, currently studying in 6 universities in the Northeast of Thailand and voluntarily to join the study. Those who absence on the time for data collection and having critically illness were excluded. A self-administered structured questionnaire was used to for data collection on demographic and socioeconomic factors, knowledge and attitude towards smoking, perceived law enforcement on tobacco control and smoking behaviors.

**Data Analysis:** A simple logistic regression was used to identify association between each independent

variable and smoking. The independent factors that had p-value <0.25 were processed to the multivariable analysis using the generalized linear mixed model (GLMM) to identify the association between perceived tobacco control law enforcement and smoking when controlling the effect of other covariates. We used 6 universities as random effects. The magnitude of association was presented as adjusted odds ratio (Adj. OR), 95% confidence interval (CI). P-value <0.05 was a statistically significant level.

## Results

Among the total of 1,147 youths, 52.9% were female with the average age 20.32±1.51 years old. About one-third were second year undergraduate students. The average monthly income was 6,991.28 ± 2219.50 baht. Almost all did not work part time (88.4%). Almost 40% staying with friends or were alone and 44.7% lived in rental room of dormitory. About one-fifth of the youths were current smokers (20.1%; 95% CI: 18-21-23.34). Almost One-fourth of the respondents start smoking at the age of 11-13 years old. At present 10.1% smoked 6-10 rolls per day and 15.2% smoked at less 7 day a month. More than one-fourth were current drinker. Most of the participants had high level of awareness on tobacco control’s law enforcement concerning increase tobacco prices (69.9%), anti-smoking campaign (71.0%), smoke-free in public areas (58.0%). About half and lower well aware of quite smoking service (51.1%), pictorial health warnings (47.5%), not distributing cigarette with tax avoidance/tax evasion (41.2%). However, less than one-third had high level of awareness on legal measures about not showing the pack (29.4%), price (33.8%) and brand (31.5%) of cigarette at point of sale product displays.

The GLMM indicated factors that were significantly associated with smoking among youths in the Northeast of Thailand were had low level of awareness on tobacco control’s law enforcement on increased price of tobacco products, anti-smoking campaign, smoke-free in public areas legal measure, not showing pack, price and brand of cigarette at point of sale product displays, pictorial health warnings, quit smoking services and not distributing cigarette with tax avoidance/tax evasion. The other covariates were being male, current drinkers, had low level of attitude toward no smoking practices, had smoker father, had close friend smoker when controlling the effect of universities (Table 1).

**Table 1. The multivariable analysis of factors associated with smoking among youth in the Northeast of Thailand using the GLMM. (n= 1,147)**

Factors	Number	% Smoking	Crude OR	Adjusted OR	95% CI	p-value
<b>Awareness on tobacco raising price</b>						<0.001
High	802	14.3	1			
Average	181	21.0	1.59	1.14	1.02-2.57	
Low	164	47.6	5.42	4.73	2.96-6.51	
<b>Awareness on anti-smoking campaign</b>						<0.001
High	815	14.5	1			
Average	134	29.1	2.43	1.95	1.13 – 3.29	
Low	198	37.4	3.53	2.87	1.49 – 3.59	
<b>Awareness on smoke-free in public areas</b>						<0.001
High	666	8.7	1			
Average	307	27.7	4.01	2.37	1.38 – 4.80	
Low	174	50.6	10.73	5.63	4.18 - 9.02	
<b>Awareness on not showing pack</b>						<0.001
High	338	11.2	1			
Average	433	16.4	1.55	1.11	1.01 –2.68	
Low	376	32.4	3.79	2.43	1.94 –3.86	
<b>Awareness on not showing price</b>						<0.001
High	388	4.9	1			
Average	482	23.0	5.81	4.58	2.91 –8.35	
Low	277	36.5	11.15	7.23	5.12 - 8.68	
<b>Awareness on not showing brand</b>						<0.001
High	361	7.2	1			
Average	404	24.0	4.07	2.68	1.37 –4.91	
Low	382	28.3	5.08	3.15	2.12 –5.09	
<b>Awareness on pictorial health warnings</b>						<0.001
High	545	11.6	1			
Average	338	18.3	1.72	1.34	1.09 –2.96	
Low	264	40.2	5.13	4.17	2.78 –5.87	
<b>Awareness on quit smoking services</b>						<0.001
High	586	12.1	1			
Average	362	19.9	1.80	1.45	1.16 –2.93	
Low	199	44.2	5.75	3.21	1.96 –6.45	
<b>Awareness on not distributing cigarette with tax avoidance/tax evasion</b>						<0.001
High	472	6.1	1			
Average	368	25.3	5.16	3.97	2.46 –7.33	
Low	307	35.5	8.41	4.19	3.28-8.15	
<b>Gender</b>						<0.001
Female	607	4.9	1			
Male	540	37.2	11.404	6.74	4.60 – 9.12	
<b>Alcohol Use</b>						<0.001
No	715	4.1	1			
Drinker	432	32.5	8.93	5.59	3.16-7.98	

Factors	Number	% Smoking	Crude OR	Adjusted OR	95% CI	p-value
<b>Attitude toward not smoking</b>						<0.001
High	882	11.8	1			
Average	138	17.4	1.58	1.27	1.03-2.95	
Low	127	41.1	3.21	5.64	3.73-8.56	
<b>Smoker Father</b>						<0.001
No	444	10.4	1			
Used to smoke/Quit	514	22.6	2.52	1.83	1.24-3.29	
Yes	189	36.5	4.975	3.28	2.14-5.92	
<b>Smoker Close friend</b>						<0.001
No	1,000	13.9	1			
Yes	147	62.6	10.36	4.95	2.29-8.56	

### Discussion

Our study observed that about one-fifth of youth aged 18-24 years old studying in undergraduate programs of universities in the Northeast of Thailand were current smokers. This finding was in line with a study of the National Statistical Office in 2017 reported 20.7% of young aged between 20-24 years old were smokers<sup>8</sup>. The study indicated that youths with low level of awareness on tobacco control law enforcement measures including; raising price, anti-smoking campaign, smoke-free in public areas, pictorial health warnings, quit smoking services, not distributing cigarette with tax avoidance/tax evasion, not showing the pack, price and brand of cigarette at point of sale product were more likely to smoke when compared with those with average or high level of awareness. Increased price of tobacco products could help reducing smoking among youth. The possible reason was that they were young and relied on families for financial supports, they were less likely of afford that much expensive cigarette<sup>9</sup>. Advertisement play importance role on youth behaviors especially smoking. Display in sealing spots as well as media could initiate and stimulate youth smoking practices<sup>10</sup>. In the past, misleading of information that stated that cigarette is soft with light flavor as well as create enjoy friendship atmosphere leded many youths into smoking. The law and enforcement on information of health have been widely perceived by youth. The pictorial health warnings on the packaging of cigarette is a policy which aimed to educate about the harmful effects of cigarettes on health, to motivate for quitting smoking and to prevent the youth from experimenting with smoking from their fear of severe health consequences as well as deterioration

of their beauty and appearances. After implementing the pictorial health warnings label, the results vary according to the policy of each country. For example, Australia’s pictorial health warnings label occupied 90% of the image area at front of the envelope and 30% of the area behind the envelope, while China’s pictorial health warnings label is an image type only 30% of the area on both the front and back of the envelope<sup>11</sup>. As some as some studies showed that pictorial health warning label content is associated with greater awareness of smoking-related risks and toxic tobacco constituents<sup>12-14</sup>. Smoke free areas have influences on smoking behaviors. Many countries such as Ireland set a policy intervention in population level with smoke-free law which can achieved the public health goals as well as achieving a high level of acceptance among smokers<sup>15,16</sup>. This study also reported that young males had 6.74 times higher chances of smoking than young females. This finding was similar to a cross sectional study among GYTS reported smoking rates among Vietnamese aged 13-15 years old males were 6 times higher than female teenagers<sup>17</sup>. This study also observe that those who drank alcohol were more likely to smoke which was similar with other previous studies<sup>18,19</sup>. This may be due to Thai culture that more open to males than females. Therefore, females are cultivated to prohibition of both smoking and drinking<sup>20</sup>. However, when compared to the results of teen smoking in Europe, some countries report similar smoking rates among male and female adolescents<sup>21</sup>. In addition, among Scandinavian countries, female teenagers had higher smoking rates than male<sup>22</sup>. Environment especially family and friends had influencing on youths’ smoking behaviors. Youth who had smoker close friends or smoker father were 4.95

and 3.28 times more likely to smoke than those who have close friends and father smokers. It might be that youths usually follow the practices of their idols get acceptance as well as to form their images and personalities. This finding is supported by many studies which stated parental smoking associated with smoking<sup>23-26</sup>.

### Conclusion

One-fourth of youths in the Northeast of Thailand were current smokers. Law enforcement had high impact on reducing smoking among these youth especially the legal measures on price, display, advertisement, anti-smoking campaign, smoking-free areas, health warning as well as gender, influence family and friends. Systematic measures to increase awareness of youths concerning tobacco and smoking legal control measures are essential especially among vulnerable groups, male youths with poor attitude on not smoking and lived in high risk environment of having father and friend smokers.

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# Workers Involvement in Improving the Effectiveness OSH in PT. Wijaya Karya (Wika) Beton Makassar (Case Study the Pettarani Elevated Toll Contruction Project)

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## Abstract

Work accidents that occur in the world of construction in 2017-2018 have increased, so the government requires all company management to improve the OSH Management System (OSH). All work accidents are seen and felt by workers. The implementation of the Occupational Safety and Health Management System based on ISO 45001: 2018 . The purpose of this study is to obtain in-depth information about the processes and factors that influence worker involvement in improving OSH effectiveness. This research uses descriptive qualitative method. Qualitative data collection is done through observation, interviews and document review. There are three informants in this research, they are the SHE Manager, Safety Officer and WikaBetonLayang Toll Project Worker. The results of the study were obtained that the work engagement process starts from safety induction, safety talk and toolbox meetings, the next process is implementation, where the implementation starts from the prevention of work accidents, environmental pollution, work-related diseases, reporting of hazardous situations and delivery of information. After the implementation phase, the next stage is consultation with workers both in terms of OSH program planning and changes in OSH implications. And the final process is the granting of authority, roles and responsibilities to workers. For the factors that influence the involvement of workers is first the organization, the vision and culture of the organization. Second is management and leadership, meaning communication techniques and techniques to provide feedback to workers.

**Keywords:** *Work Accidents, Construction, OSHMS, ISO 45001, Work Involvement and OSH Effectiveness.*

## Introduction

Infrastructure development is one of the priorities of the Government of Indonesia, seeing its very strategic role in driving the pace of economic growth.<sup>1,2,3</sup> To carry out the construction of the infrastructure required reliable construction services sector<sup>1</sup>, while the reliable construction services sector itself is highly influenced

by various aspects, one of which is the safety aspect in the implementation of construction projects<sup>4,5,9,10</sup>. The construction industry is one of the industries most at risk for worker safety. The International Labor Organization (ILO) states that one in six fatal injuries in the workplace occur at construction sites. Furthermore, no less than 60,000 fatal accidents occur at construction sites around the world each years<sup>6,7,9</sup>. This counts as one fatal accident in ten minutes. In 2015, 2,375 people died in work accidents. According to Juan Somavia, ILO Director General, the construction industry was among the most vulnerable to accidents<sup>(6)</sup>.

The construction sector shows 3.8 times higher rates of severe accident incidents and 12 times higher rates of fatal accident incidents than all industry levels.

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According to the annual report the labor inspectorate stated that in the construction sector in Serbia contributed a lot of fatal work accidents in 2016. The main cause of fatal accidents is falling from a height. Other causes are electric shock, falling objects, moving machinery parts, buried in the ground, sinking, explosion, choking and others<sup>(4)</sup>.

In the records of the Ministry of Public Workers and Public Housing, the Directorate General of Construction of Indonesia there have been 15 work accident incidents between 2017-2018. The work accident caused casualties from falling from a height to falling down. This is a warning to relevant parties regarding safety and work accident aspects<sup>(8)</sup>.

The high number of accidents requires all management of a company to pay serious attention to the program and implementation of Occupational Safety and Health (OSH) in the company's environment through the existing Occupational Safety and Health Management System (SMOSH) by always monitoring and evaluating its performance<sup>(1)</sup>.

In the previous research, where a construction company had a commitment that was implemented by the leadership of the company in an effort to prevent occupational accidents namely the OSH Policy in writing but the application was not carried out optimally because not all were involved in its formation<sup>(12)</sup>. Yet according to Minister of Public Works Regulation Number 05 of 2014<sup>(12)</sup> and Republic of Indonesia Government Regulation Number 50 of 2012<sup>(14)</sup> that before the OSH policy is prepared it must first involve and consult with workers.

The involvement of workers in OSH effectiveness is very much needed and is one of the company's obligations in increasing OSH effectiveness. This is in accordance with research RahmiYuningsih (2014)<sup>(15)</sup> one of which influences the formulation of a policy is human resources (HR). Actors and/or human resources in the process of policy formation can be divided into two groups, namely the cast and official and the cast as well as unofficial. Included in the cast as well as the official are those who have powers that are legally recognized by the constitution and are binding. Meanwhile, those included in the cast group as well as unofficial, are parties who do not have legal authority.

This is also in line with the most recent ISO 45001: 2018, where in this ISO adds one thing that can affect

SMK3 running well so that the effectiveness of OSH is increased namely leadership and worker participation. ISO 45001: 2018 emphasizes the obligation to implement labor participation and consultation. The obligation to carry out participation and consultation is not only at the managerial level, but is also required at the lowest level (workers). For the participation of Non-Managerial Workers<sup>(7)</sup>.

## **Method**

This type of research used in this research is a qualitative descriptive design. According to Burhan Bungin qualitative descriptive design can also be called quasi qualitative or pseudo qualitative design. That is, this design is not yet truly qualitative because its shape is still influenced by quantitative tradition, especially in placing theory on the data obtained. This research is an in-depth study of certain social units, the results of which provide broad and in-depth overview of certain social units<sup>(5)</sup>. With data collection techniques with in-depth interviews, observation and documentation. As for this study, researchers used 3 types of informants. research informants included three types namely key informants (Manager SHE), key informants (18 Field Workers) and supporting informants (4 Safety Officers)

## **Result**

The process of employee involvement means that here is a systematic step or a clear stage in involving workers at all levels of the organization. Based on the results of in-depth interviews about the involvement of workers, obtained information about the initial process of employee involvement is safety induction. In this case before workers are involved in construction, it is necessary to provide safety guidance that must be known and OSH policies owned by the company.

Then followed by a safety talk and toolbox meeting. Where workers must follow this activity in order to inform more deeply about the work to be done today, the occurrence of unsafety at the work site and remind workers to always pay attention to safety and health at work. The next stage of employee involvement is implementation. In this case the implementation is related to work accident prevention problems, prevention of environmental pollution, prevention of occupational diseases, reporting of hazard situations and delivery of information. Where workers apply OSH rules and policies.

After the implementation phase, the next process of employee involvement is the consultation stage with the worker, for example the planning of the OSH program and changes to the implications of the OSH. Where workers are involved in finding solutions to OSH problems, in this case the company asks the workers what to do in improving construction OSH. The final

process in the involvement of workers is the granting of authority, roles and responsibilities to workers who in the sense that management gives the role of authority to admonish, remind and terminate work temporarily if the worker and someone whose position is above him (top management) violates OSH rules or takes action unsafely.



**Picture 1: Process of Worker Involvement**

**Factors That Influence Worker Involvement:**

Based on in-depth interviews and field observations obtained results that can be an influence in the involvement of workers first is the Organization. An organization can bring about involvement in workers because of the organizational culture, vision and values adopted by the organization. Then the second is Management and Leadership. The consistency of leaders in guiding workers can create employee involvement,

organizational leaders are expected to have some skills such as communication techniques, techniques to provide feedback and good job appraisal techniques for their employees. Next to the third and the last is Personal Resources. In terms of worker characteristics, what the researchers found was that there were two characteristics that influenced the involvement of workers, namely experience and knowledge and caring attitudes.



**Picture 2: Factors That Influence Worker Involvement**

## Discussion

Based on the results of in-depth interviews, document review and observations found that the process of employee involvement starts from safety induction. Where this is done at the beginning of the worker after being hired on this project. In safety induction, things related to OSH are conveyed. After safety induction is done, then the process also takes place in the field, where WikaBeton organizes a program called TBM (Toolbox meeting) and Safety talk. TBM or commonly called toolbox meetings are held every day in the morning before starting work, this is done in the work area. According to information obtained from all informants<sup>5</sup>, TBM was run every morning. However, there was some information and field observations found that there were times when TBM was not implemented because workers arrived late and workers were lazy to follow TBM. It was also found that those who attended TBM were only unskilled workers<sup>2</sup>, implementers and foremen did not participate in this TBM, even though their opinions as workers' representatives were needed, where as workers expressed their appreciation to the foreman or executor. Furthermore, there is the name of safety talk, disafety talk containing OSH evaluation submissions about what happened in the previous field and a prohibition against repeating the same thing. The safety talk is held every Monday morning and the SHE coordinator is the direct manager<sup>11</sup>.

For the prevention of work accidents, wika concrete workers in the Pettarani elevated toll road project are good enough to participate in its implementation, although sometimes there are still workers who do not use PPE, especially working at the high. For the prevention of environmental pollution, it was found that all informants stated that the prevention of environmental pollution has been categorized as being implemented well.

According to all informants that the delivery of information usually focuses on safety talk and toilet meeting. Whereas in the implementation of hazard reporting, according to informants both the main informants, supporting informants and key informants they stated that workers were included in hazard reporting. It is also known that the management has attached a hazard reporting procedure at each gathering point and there is a safety officer number that can be contacted. As for the investigation itself, the management included workers in the work accident investigation<sup>9</sup>.

These perceptions complement the more objective,

job-oriented characteristics and worker differences as it is focused at the level of the operatives and supervisors in relation to their work environment<sup>(9)</sup>. Where if it is related in this research, safety induction, safety talk and toolbox meetings are in the stages of knowing, implementation both in the OHS policy, delivery of information and reporting of hazards are included in the stage of conducting, while for consultation entering in the stage of making decisions, as well as granting authority, the roles and responsibilities are in the influencing stage.

According to Mc Brain, organization is one of the factors that influence worker involvement. In this case the culture, vision and values adopted by an organization influence the involvement of workers<sup>(11)</sup>. The organization has an important role in facilitating the involvement of workers to be involved in increasing the effectiveness of OSH. Based on ISO 45001 that consultation and participation of workers, and, if any, worker representatives, can be a key success factor for the OSH management system and about that must be encouraged through the process established by the organization. In WikaBeton the Pettarani overpass toll project does not yet have values and visions that prioritize the involvement of workers in each line. This can be seen from the fact that ISO certification has not yet shifted. WikaBeton has not yet switched to 45001: 2018 certification. Where this ISO is an ISO that is centered on consultation and participation of workers.

Based on ISO 45001 states that leadership and commitment from top management of the organization, including awareness, responsiveness, active support and feedback, is very important for the success of the OSH management system and achieving desired results<sup>(7)</sup>; therefore, top management has specific responsibilities that they need to be personally involved or that they need to direct. The top management of the Wika Concrete Layang Pettarani Toll Road project lacks communication techniques and the technique of providing feedback to workers. This can be seen from the courage of workers giving input to top management related to OSH, workers are only pressured to obey the rules even though it is their indirect emphasis. For example, a worker who used to work in oil and gas or in the sense of experience related to OSH problems has a lot, where OSH in oil and gas and OSH in the construction world are very different. In oil and gas (Oil and Gas) pay more attention to the issue of OSH than in the construction world<sup>(11)</sup>. At WikaBeton the organization's leaders do not reward workers if they succeed in implementing good OSH. The

management only gives punishment to workers if they break the rules. Though it should be noted that reward and punishment are a form of positive reinforcement in changing behavior.

Personal Resources or personal resources is a positive evaluation related to excitement and leads to individual feelings of their ability to control and positively impact their environment<sup>(2)</sup>. Based on observations and in-depth interviews, researchers found that Personal Resources also influences their involvement in everything. Personal Resources here, means knowledge and caring attitude. Worker involvement can increase organizational effectiveness depending on the degree to which employees have the knowledge needed to make good decisions and a caring attitude to take immediate action as possible. In the world of construction, including this project has a different Personal Resources.

### Conclusion

The employee involvement process is divided into several sections namely

1. Safety induction: is carried out by PT WikaBeton to inform the OSH rules and jobdesks of each worker.
2. Safety talk and Toolbox meeting:
3. Implementation: The implementation here is divided into five namely implementation of work accident prevention, implementation of prevention of environmental pollution, implementation of prevention of occupational diseases, implementation of reporting of hazard situations, implementation of information delivery.
4. Consultation is divided into two, namely OSH program planning and OSH implications. In this project workers are not involved in the planning of the OSH program because the OSH program was in place before the project started.
5. Granting Authority, Roles and Responsibilities..

**The factors that influence the involvement of workers in improving the effectiveness of OSH are:**

1. Organization: The organization here sees the culture and vision that exists in the company.
2. Management and Leadership: Management and leadership here are seen from work assessment, communication and feedback techniques.
3. Personal Resource: Personal Resource in this case is

knowledge and attitudes of caring workers.

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# The Association of Perceived Neighborhood Environment Factors and Methamphetamine Use among Drug Addicts in Northern, Thailand

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## Abstract

**Background:** Neighborhood environment factors influence health-related behavior, including substance use. Many researches have focused on the effect of neighborhood factors with drug use in general population; a few studies have focused on vulnerable group like drug addicts. This study aimed to investigate the association between neighborhood environment factors and methamphetamine use among drug addicts.

**Method:** This cross-sectional study was conducted among 364 drug addicts at drug treatment center in Northern Thailand. The data collection by using structured interview, including substance use and perceived neighborhood environment, which conducted by standardized interviewers. Multivariate logistic regression was applied to interpret the neighborhood environment factors related with methamphetamine use.

**Results:** The results revealed that most of respondents (65.4%) used methamphetamine and 34.6% used other illicit drugs. The greater of perceived neighborhood crime (adjusted OR= 2.99, 95% CI: 1.64, 5.49) and stigma of addiction (adjusted OR= 2.23, 95% CI: 1.23, 4.05) were associated with increased risk of methamphetamine use. Drug addicts who were male, unemployed and had peers or family used drug were more likely to use methamphetamine.

**Conclusions:** The neighborhood factors influence methamphetamine use. Thus, the better understanding of neighborhood context is important to developing prevention and intervention to reduce substance use health-related behavior.

**Keywords:** *Methamphetamine; Crime; Neighborhood; Thailand.*

## Introduction

Methamphetamine make up the group of drugs

known as amphetamine-type stimulants (ATS). In 2016, the United Nations Office on Drugs and Crime estimated 34.2 million ATS users worldwide<sup>1</sup>. In Thailand, Methamphetamine epidemic remains a steadily. In 2011, an estimated 125000 Thais had ever used methamphetamines<sup>2</sup>. The government began a “compulsory drug treatment” in an attempt to control this epidemic. From 2015 to 2016, the people who use drugs (PWUD) were treated in compulsory drug detention centers (CDDCs) from 108638 to 66271 cases and 90% of PWUD were methamphetamine users. Northern Thailand remains the main regions for methamphetamine trafficking and approximately

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67% of all PWUD reported using methamphetamine<sup>3</sup>. Besides, the high relapse rates as a major problem in drug treatment, which found that about 20 % of PWUD relapsed within 2 months and 96.3% of injecting drug users relapsed within 1 week after released from CDDCs<sup>4-5</sup>. Because of they are released to their neighborhoods which have predisposing factors such as high crime rates, remained stigma of addiction and greater availability of drugs and drug users<sup>6-7</sup>, then some of them returned to use drugs. Therefore, neighborhood environment factors may influence residents' substance use.

The social epidemiology studies found that neighborhood environment factors play an important role in determining substance use. Much research has considered with negative neighborhood factors (e.g., neighborhood disorganization, perceived neighborhood crime and stigma of addiction) were related with increasing of substances use<sup>7,8</sup>. Regarding, perceived neighborhood crime was important indicators of the residential social environment. Prior study suggests that neighborhood with social disorganization including crime, violence and drug dealing may lead to substance use via stress and also perceived crime were chronic environmental stressors<sup>9-10</sup>. Thus, residing in greater disorganized neighborhoods with crime can lead to stress, then substances may use to cope with stressful environments<sup>9</sup>. In term of addiction stigma, some studies illustrated that after rehabilitation, then individuals return to their community with remains the stigmatized attitudes and be labeled toward people with substance abuse as bad, weak and dangerousness. These attitudes make them feel worthless, discriminate and social condemn may induced them at risk of relapsing<sup>7,11</sup>.

In Thailand, prior researches of social factors influence of substance use focused more on individual, peer and family factors than neighborhood environment characteristics<sup>12</sup>. Also, to date, there have no studies examining the association of neighborhood environments factors with substance use among drug offender population. Thus, these represent a gap in the literature. This current study the primary exposures of interest were two neighborhood factors (e.g., perceived neighborhood crime and stigma of addiction) and we hypothesized that methamphetamine use would be influenced by neighborhood factors. These findings may be useful to develop prevention or intervention approaches to reducing drug addiction by consider with neighborhood environments in their community.

**Objectives:** This study aimed to investigate the association between neighborhood environment factors and methamphetamine use among drug addicts.

## Materials and Method

**Study Population:** A cross-sectional study with 364 drug addicts who were treated in two compulsory drug detention centers located in northern (Chiangmai and Maehongson provinces), that operated by Ministry of Public Health of Thailand during January 2017-May 2018. The eligible drug addicts were enrolled into treatment during the study period, resided in Northern provinces at least three months and willingness to participate in this study and excluded if any response is not completed. A consecutive sampling technique was used to select participants who met the eligibility criteria.

We adapted the socio-ecological model which is a multi-level framework for understanding the interactions between individuals and environment factors that shaped their behaviors that we focused on the interplay among individual, interpersonal and neighborhood-level variables<sup>13</sup>. The data were collected by structured interviews administered by 8 trained standard interviewers from two centers. After explaining the study information, all respondents obtained informed consents and were interviewed in private room.

**Measurements:** The structured interviews questionnaire was developed based on literature review, which composed of socio- ecological factors and types of substance use.

The individual-level variables included sex, age, educational, occupational status and monthly income. The interpersonal-level variables assessed by 2 items reflecting the extent of peers and family illicit drugs used. All of these variables were classified as dichotomous variable. Both of individual and interpersonal variables were potential covariates which were adjusted in the analysis of this study.

Neighborhood-level variables were assessed individual's perception of their neighborhoods in past 3 months prior to detention. Perceived neighborhood crime was measured by questionnaire adapted by Rosenberg et al.<sup>14</sup> and Martinez et al.<sup>15</sup>, included two parts such as (i) concern about crime (9 items) and (ii) neighborhood crime problems (9 items). The responses of concern about crime ranged from "strongly disagree" to "strongly agree" (1-4) on a 4-point scale and possible



responses of neighborhood crime problems ranged from 1 (rarely/not worried) to 10 (frequency/very). The response scores were summed across all eighteen items (rang 18-126), with higher scores represented high perceived neighborhood crime (Cronbach alpha, 0.85). The stigma of addiction was assessed using a scale of addiction stigma for Thai population; developed by Kanato and Leyatikulm<sup>16</sup> which summed rating scale comprised 30 items with the 5 dimensions of familiarity, perceptions of dangerousness, fear, social distance and community responsiveness. The total scores were created by summary across all items (rang 16-120), with higher scores indicated a greater perceived stigma of addiction (Cronbach alpha, 0.81). The overall scores of perceived neighborhood crime and stigma of addiction were categorized into three groups (low, moderate, high) based on tertiles of its natural distribution.

The primary outcome of this study was illicit substance use. The respondents were asked whether or not they had used of 9 illicit substances in last 3 months including methamphetamine, cannabis, inhalants, heroin, cocaine, kratom (or *Mitragyna speciosa*), ecstasy, ketamine and opioid. We divided substance use into two categories; (i) methamphetamine use (MET-AMP), (ii) other illicit drugs use (OID).

**Data Analysis:** Descriptive statistics were applied to analyze all socio-ecological factors. Next, binary logistic regression was conducted to estimate strength of association between neighborhood-level variables, each of the covariates and MET-AMP use. A series of models was developed. First, in model 1 included only neighborhood-level variables. Then, in model 2, the individual-level variables were entered in model 1. Finally, in model 3, we add all individual-level and interpersonal-level variables into model 1 that examined the association between neighborhood-level variables and MET-AMP use after adjusted for all covariates. All of models, a reference group of outcome variable was OID. The statistical significant level was  $p\text{-value} < 0.05$  and SPSS software was used to conduct of all statistical analyses.

## Results

Almost all subjects (55.2%) were male and age average was 27.36 years old (standard deviation, 9.17 years). About half (51.9%) of drug addicts had completed primary school or lower, 53.3% were unemployed, 53.6% had monthly income less than 6000 Thai baht

(200 US\$) and had peer (61.8%) or family (56.0%) used drugs. Regarding substance used, the most frequently (65.4%) was MET-AMP and 34.6% was OID. Bivariate models, in both the moderate to high levels of perceived neighborhood crime and stigma of addiction were significantly associated with increased MET-AMP use. Respondents who were male, unemployed and those whose peer or family used drugs were more likely to use MET-AMP. Multivariate models, in model 1 revealed that a higher likelihood of MET-AMP use was related with moderate to high levels of both perceived neighborhood crime and stigma of addiction. In model 2, adjusted for individual-level covariates, the results showed similar associations of perceived neighborhood crime and stigma of addiction with MET-AMP as in model 1. Finally, in model 3, perceived neighborhood crime and stigma of addiction were remained significantly related with increased MET-AMP use after adjusted for all covariates. Its effects stronger among respondents who reported higher levels of both perceived neighborhood crime (aOR= 2.99, 95% CI: 1.64, 5.49) and stigma of addiction (aOR= 2.23, 95% CI: 1.23, 4.05). Also, male sex, unemployment and reporting drug use by peers and family appeared to increase MET-AMP use.

## Discussion

The results showed that residents who indicated greater perceived neighborhood crime was associated with an increase of MET-AMP. This finding consistent with those of Shareck and Ellaway<sup>10</sup> and Looze et al.<sup>17</sup>. It possible that the disordered neighborhood environment such as high crime rates or perceived neighborhood crime and drug use and dealing as stressors in neighborhood<sup>9</sup>. Also, stress is one of the strongest predictors of drug using or relapse, residents who exposed to a greater of stressors in their neighborhood may use substances as a coping mechanism for stressful conditions<sup>9,18</sup>. One possibility is neighborhood surrounding with drug activity may be initiate drug abuse behaviors by increasing access to drugs, expanding drug user network and increasing likelihood of relapse<sup>19</sup>. Nevertheless, our findings inconsistent with those of Yabiku et al.<sup>20</sup> and Kepple and Freisthler<sup>21</sup> showed that neighborhood crime was no significantly related with substance use. These inconsistent may be difference in study population and neighborhood measurements. Regarding, stigma of addiction, the results indicated that living in higher perceived stigma of addiction neighborhoods was more likely to use MET-AMP. Consistent with findings of Tomori et al.<sup>7</sup> and Livingston et al.<sup>11</sup> reported that a

higher of substance use influenced by stigmatization and the illicit drug use is more highly stigmatized than other health conditions. The possible explanation is drug users were stigmatized and labeled in their neighborhoods that remained negative attitudes toward them as bad, weak, dangerousness and unreliable, which contributes to negative effects such as social alienation, delayed recovery and risk of substance use<sup>7,22</sup>. Moreover, people who experienced stigma may be continue or increase their used of drugs for coping with stigma or turned to their peer who use drugs for social support, because of they had similar experiences and better understand what they were on going through, which increases the likelihood of drug use as well<sup>22</sup>. Covariates such as male, unemployed, peer and family substance use were related to MET-AMP. This result consistent with those of Galea et al.<sup>23</sup> and Henkel<sup>24</sup> showed that male had higher rates of substance use. It is possible that male greater exposure to opportunities to try drugs, which probability to progress to actual use<sup>25</sup>. Moreover, unemployed persons were more likely to use drug, because of the increasing of distress and psychosocial problems related with losing jobs. They may be more likely to use drugs in response to cope with these problems<sup>24</sup>. In addition, peers and family influences on substance use; in particular, peer network affect substance use behavior through promote and share drug use, share social network norms towards substance use and acceptance of drug use<sup>23,26</sup>. Furthermore, previous studies showed that addictive behaviors higher among the families with members using substances<sup>23,27</sup>; specifically, parent's substance abuse habit that might be negative modeling behavior and members may be learning the substance use as a usual family pattern<sup>27</sup>.

The limitation, our cross-sectional study used acting for causality or temporal relationships cannot be inferred from our findings. The subjects were recruited from 2 CDDCs in only Northern of Thailand. Thus, the results cannot be generalized. Although with limitations, this study has strength of controlling for a wide range of covariates and provides better understanding of negative neighborhood factors influence on drugs use among hard-to-reach groups. Future longitudinal research is need to evaluate the potential causal link between neighborhood factors and substance use and should be recruit samples from multi-center for representative of drug abuse population.

## Conclusion

In conclusion, this study provided that neighborhood environment factors were associated with MET-AMP use. The understanding these neighborhood contexts and how they influence of illicit drug use is important to establishing prevention and intervention to reduce substance use.

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**Ethical Clearance:** This ethical study was approved by the Research Ethics Boards of Khon Kaen University and the Princess Mother National Institute on Drug Abuse Treatment (ref no. HE581318).

**Conflicts of Interests:** The authors have no conflicts of interest associated with the material presented in this paper.

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# Medication Adherence in Patients of Diabetes Mellitus Type 2: Status of Depression and Working Status

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## Abstract

The development of the era into this modern era, people's lifestyles are now shifting towards the less good, causing more consumptive people and lead unhealthy lives. This triggers the emergence of non-communicable diseases in Indonesia, one of which is Diabetes. Most Diabetes patients will obey and follow the advice and advice of doctors when they feel unwell and if they feel they are in good condition will tend to be disobedient. The method used in this research is analytic observational with cross sectional design. The sample in this study amounted to 76 respondents taken by accidental sampling technique. The study was conducted at the Mojo Public Health Center in Surabaya by giving respondents questionnaires. The analysis used in this study is descriptive and count of prevalence ratio. The results showed that there was a relationship between work and medication adherence ( $p = 0.009$ ), age ( $p = 0.368$ ), sex ( $p = 0.518$ ), education (0.560), knowledge ( $p = 0.619$ ), duration of illness ( $p = 0.513$ ) and the tendency for depression (0.326). Tendency of depression indicates no relationship with medication adherence. The conclusion of this study is that there is a relationship between work and medication adherence. Patients with diabetes who do work have risk of being disobedient to treatment than patients who no work. Although depression and adherence to treatment did not show a meaningful relationship, but the results of the study showed that most of the medication adherence groups were depression

**Keywords:** *Depression, Medication adherence, Working Status, Diabetes Mellitus Type 2.*

## Introduction

The development of the era into this modern era, people's lifestyles are now shifting towards the less good. Society is increasingly consumptive and many individuals lead unhealthy lives. These things trigger the emergence of non communicable diseases in Indonesia, even though the problem of infectious diseases has not yet been resolved. One of the non communicable diseases whose prevalence is increasing every year is diabetes.

Diabetes prevalence in Indonesia in 2019 was 6.7%. Nearly 79% of adults with diabetes were living in low- and middle- income countries <sup>(1)</sup>. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputations <sup>(2)</sup>.

Most diabetes patients will obey and follow the advice and advice from health workers when they are hospitalized or in hospital. When they are at home and carry out their routine as usual, they tend to return to their previous lifestyle, forget their previous physical condition, feel healthy so they don't get routine medical treatment, so the pain can recur even worse <sup>(3-5)</sup>. Adherence to treatment can be influenced by several factors, including age, sex, level of education, type of work, duration of illness and depression experienced.

## Material and Method

This research is an analytic observational research using cross sectional research design. The study uses

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secondary data in the form of data on the visit of Diabetes Mellitus 2 patients who seek treatment at Mojo Puskesmas Surabaya and primary data in the form of a Beck Depression Inventory (BDI) given to respondents. The population in this study were all type 2 Diabetes Mellitus patients in Surabaya Mojo Health Center. The sample used is part of the population, which is 76 respondents. The way to take sample in this research is accidental sampling. Variables are analyzed descriptively and analytically using a prevalence ratio.

### Result and Discussion

Compliance with respondent’s medication adherence can be seen from the routine of whether the respondent visits a health facility. It is said routinely if the respondent visits a health facility at least once a month. The age of most respondents is the elderly is 47 respondents (61.8%). Awodele’s research shows that most respondents are 61-70 years old (6). The sex of most respondents is the female. Patients with female sex tend to be more obedient compared to male sex (7). The education level of the most respondents was the level of higher education of 40 respondents (52.6%). The level of knowledge of most respondents is good category with 42 respondents (55.3%). Most respondents were in the category of not working with 57 respondents (75.0%).

Result of this research known that the most respondents was adherence (90.8%). Adherence to treatment can be influenced by the side effects of drugs such as lactic acidosis, nausea(8). The duration of illness for most respondents was in the category  $\geq 5$  years with 48 respondents (63.2%). Most respondents’ tendency of depression is non-depression category (94.7%).

Respondents who were the most compliant to seek treatment were the adult 3 (100%). Medication

adherence of diabetics is the same between men and women. The level of education that is routinely treated most is middle level. Medication adherence from respondents is the same between poor and good knowledge. Respondents who did not work had more compliance with treatment. Respondents who are not depressed have more compliance with treatment. The results showed the incidence of depression in the group that did not routinely seek treatment more than depression in the group that routinely treated. Salinero-Fort dan Madkhali dalam penelitiannya menyatakan bahwa depresi merupakan hal yang sangat umum ditemui di pasien DM tipe 2 sehingga penting untuk mendeteksi depresi pada pasien tersebut dan diperlukan penerapan dari manajemen diri DM untuk menjadi komponen rutin perawatan DM (9-10). Gemeay in his study stated that of 37.9% of research respondents who were diagnosed with type 2 DM experiencing depression and most of the respondents did not comply with glucose checks and diet compliance(11).

**Table 1: Health Characteristics of Respondents**

Health Characteristic	Frequency (n)	Percentage (%)
<b>Duration of illness</b>		
< 5 year	28	36,8
$\geq 5$ year	48	63,2
Total	76	100,0
<b>Depression</b>		
Depression	4	5,3
No Depression	72	94,7
Total	76	100,0
<b>Medication adherence</b>		
Noadherence	7	9,2
Adherence	69	90,8
<b>Total</b>	<b>76</b>	<b>100,0</b>

**Table 2: Risk Factors Affecting Medication Adherence**

Risk Factor	Non -Adherence n (%)	Adherence n (%)	Total n (%)	P value
<b>Age</b>				
Adult	0 (0,0)	3 (100,0)	3 (100,0)	0,368
Elderly	5 (10,6)	42 (89,4)	47 (100,0)	
Old	2 (7,7)	24 (92,3)	26 (100,0)	
<b>Gender</b>				
Male	2 (7,4)	25 (92,6)	27 (100,0)	0,518
Female	5 (10,2)	44 (89,8)	49 (100,0)	

Risk Factor	Non -Adherence n (%)	Adherence n (%)	Total n (%)	P value
<b>Level of education</b>				
Middle	3 (8,3)	33 (91,7)	36 (100,0)	0,560
High	4 (10,0)	36 (90,0)	40 (100,0)	
<b>Level of knowledge</b>				
Poor	3 (8,8)	31 (91,2)	34 (100,0)	0,619
Good	4 (9,5)	38 (90,5)	42 (100,0)	
<b>Type of work</b>				
No work	2 (3,5)	55 (96,5)	57 (100,0)	0,009
Work	5 (26,3)	14 (73,7)	19 (100,0)	
<b>Duration of illness</b>				
< 5 year	3 (10,7)	25 (89,3)	28 (100,0)	0,513
≥ 5 year	4 (8,3)	44 (91,7)	48 (100,0)	
<b>Depression</b>				
Depression	1 (25,0)	3 (75,0)	4 (100,0)	0,326
No Depression	6 (8,3)	66 (91,7)	72 (100,0)	

The results of the statistical analysis that showed significantly correlated were working status ( $p = 0.009$ ) with medication adherence, while those not related were age ( $p = 0.368$ ); gender ( $p = 0.518$ ); education level ( $p = 0.56$ ); level of knowledge ( $p = 0.619$ ); duration of illness ( $p = 0.513$ ); depression ( $p = 0.326$ ) in type 2 diabetes patients.

The results of the analysis of age distribution according to adherence to type 2 DM treatment showed that the age category that was not routinely treated was the elderly age category and the age category that most routinely treated was adults. The relationship test results obtained results that there is no relationship between age and compliance with treatment in patients with type 2 DM. Bezie stated that younger ages tend to be disobedient compared to older ages<sup>(12)</sup>. This is supported by Zhang, stating that there is no relationship between age and adherence to type 2 DM patients with  $p$  value of 0.274<sup>(13)</sup>.

In the group of men and women mostly adhered to treatment. The results showed that there was no relationship between sex and medication adherence ( $p = 0.518$ ). The results of Alsous's research show that there is a relationship between female gender and medication adherence<sup>(14)</sup>. This contrasts with Srikartika, who in his research said that there was a relationship between sex with adherence to DM type 2 patients with a  $p$  value of 0.011<sup>(13)</sup>.

In research that has been done shows that the most non-routine treatment is the work category while the most routine treatment group is the non-working category. The test results of the relationship between work with medication adherence obtained results that there is a relationship between work with medication adherence in patients with type 2 diabetes. In the Zhang research stated that there is relationship between the type of work with adherence to treatment of patients with type 2 diabetes with a  $p$  value of 0.001<sup>(15)</sup>.

In the research that has been done, it is known that group of higher education category show not routinely seek treatment while group of middle education level were routinely treated. The results of the test of the relationship between education and treatment adherence showed that there was no relationship between education with medication adherence in patients with type 2 diabetes. Bagonza stated that health education can also increase compliance in treatment<sup>(16)</sup>.

Both people with poor and good levels of knowledge are mostly obedient to treatment. The results of this study stated that there was no relationship with medication adherence. This is different from the results of the National Health Research which states that there is an influence of knowledge on medication compliance<sup>(17)</sup>. Knowledge is very important for adherence because by having good knowledge patients can take care of themselves<sup>(18)</sup>. In the research that has

been done shows that in the group that is not routinely the duration of illness is the long duration of illness duration <5 years while in the group that is routinely treated for the duration of illness duration  $\geq 5$  years. The results of the analysis test between the duration of illness and respondent compliance showed that there was no relationship between the duration of illness with adherence to treatment in patients with type 2 diabetes. Guénette states that patients with illness duration of more than one year are less likely to be obedient compared to patients who have just been diagnosed <sup>(19)</sup>. Elsous in his study stated that the long duration of illness was also a predictor of medication adherence. The results did not show statistical significance between long duration of illness and medication adherence with a value of  $p > 0.05$  <sup>(14-15)</sup>.

The results of the statistical analysis that showed significantly correlated between depression and medication adherence ( $p = 0.326$ ) in type 2 diabetes patients. This is not in line with Gonzales research which states that depression is significantly associated with non-compliance with diabetes treatment <sup>(20)</sup>. The results showed depression was not related to medication adherence. This happens because the respondent is a Diabetes Mellitus patient who has not experienced complications.

### Conclusion

Job status which is significantly related to medication adherence in patients with type 2 Diabetes Mellitus. There is a relationship between the tendency of depression with adherence to treatment in patients with type 2 Diabetes Mellitus in Surabaya Health Center because patients in health centers tend to have no other disease complications compared to patients in hospitals that tend to be high in patients who have other disease complications. It is recommended that the puskesmas establish a program of routine visits to Diabetes Mellitus patients at least once a month so that these patients can avoid complications of other diseases.

**Conflict of Interest:** In carrying out this research, researcher do not have conflict of interest with research informants and between participants

**Source of Funding:** This research was conducted with self funds

**Ethical Clearance:** This research was conducted on the awareness of respondents as volunteers in filling

out the questionnaire. Before the study, respondents were given an explanation and signed informed consent.

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# Potential Hazards of Antibiotics Resistance On Escherichia Coli Isolated From Cloacal Swab In Several Layer Poultry Farms, Blitar, Indonesia

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## Abstract

**Objective:** The study was isolated Escherichia coli from cloacal swab of layer poultry farms in Blitar area to investigate their antibiotic sensitivity pattern.

**Materials and Method:** Fourty swab cloacal samples were collected from 8 farms where located in Blitar for 3 months. In order for MacConkey agar to be a medium for inoculation and biochemical tests to identify isolates such as IMViC and TSIA test were performed. The method of antibiotic sensitivity pattern of Escherichia coli was tested by disk diffusion.

**Results:** The result revealed 40 samples, 34 samples were exposed to contamination by E. coli. The pattern of antibiotic sensitivity showed high resistance against ampicillin (62%), ciprofloxacin (56%), tetracycline and trimethoprim sulfamethoxazole (53%). Sensitive antibiotics were also observed for amoxicillin clavulanic acid, cefepime, ampicillin sulbactam, amikacin and meropenem. The presence of MDR and ESBL-producing *Escherichia coli* isolated from cloacal swabs of layer poultry farms in Blitar were 47.1% (16/34) and 5.9% (2/34), respectively.

**Conclusion:** This research to find out exposed the layer poultry farms to consider critical antibiotic resistance of E. coli and regarded potential public health hazards.

**Keywords:** Layer poultry farms, *Escherichia coli*, public health hazards, MDR, ESBL.

## Introduction

Antibiotic resistance is major global health in worldwide especially in poultry, such as treatment failure economic losses and source of resistant organism that may

represent a risk to human health. Antimicrobial usage in animal production raised with intensive conditions using large amount of antimicrobial to prevent and treat disease<sup>(1)</sup>. Enterobacteria especially *Escherichia coli* is the pathogenic bacteria who receive antibiotic treatment in the gastrointestinal tract of animals and humans into the environment which not only devolvement of the bacterial but antimicrobial affect more than one antibiotic and become multi drug resistance<sup>(2)</sup>. Antimicrobials are commonly used in animals which human consume the animal product and antimicrobial resistance can controlled by reduce antibiotics use for animals, overuse of antibiotic and residues can lead to more drug resistance among microbe<sup>(3)</sup>.

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*Escherichia coli* is a Gram-negative bacterium commonly found in animal and human intestinal tract. Exposure of antibiotic use in animals to inhibit microbial can cause resistance to antibiotics, antibiotics resistance appearance of *Escherichia coli* in poultry is main purpose to reduce transmission of resistance in the region. Observation of antibiotics resistance especially investigate the resistance appearance of microbe commonly found in poultry. The bacteria commonly detected in the environment so that it can enter the digestive tract of animals is *Escherichia coli*<sup>(4)</sup>.

Antibiotics resistance is caused by a factor already arise on the bacteria. *E. coli* bacteria which genes that preserve to immunity from the influence of antibiotics derived from the plasmid. *E. coli* was detected possess plasmids to some drug resistance genes<sup>(5)</sup>. Plasmids can carrying the resistance genes in bacteria sensitive to antibiotics<sup>(6)</sup>. This study used some antibiotics that were often associated with data about the problem of resistance in *E. coli* and then the antibiotic sensitivity test to determine the profile antibiotics resistance of *E. coli*. The purpose of this study were also to exhibit occurrence of multidrug resistant (MDR) of *E. coli* and extended spectrum beta-lactamase (ESBL) producing *E. coli* from layer poultry farms.

## Materials and Method

**Isolation and Identification of *E. coli*:** The study collected 40 samples and taken from 8 layer poultry farms in Blitar, East Java, shown on table 1. Purpose sampling of layer farm was based on some specification such as low sanitation, lack of cleanliness and proper hygiene management by the farm and low maintenance<sup>(7)</sup>. Samples obtained from cloacal swab brought to the laboratory in Amies medium transport wrapped sterile conditions and were taken using a cool-box<sup>(8)</sup>. Samples were inoculated streaked onto MacConkey media agar and incubated at 37 ° C for 18 ± 24 hours<sup>(9)</sup>. Colonies that showed lactose-fermenting was purified and continued positive presumptive test of *E. coli*. Identification of bacteria were performed using morphological and biochemistry. Biochemical tests include tests Indole, Methyl Red, Vagos-Pasteur, Simon Citrate (IMViC) and TSIA to determine the level of genus and continued until the sugar fermentation test to determine the species of *E. coli*<sup>(10)</sup>.

**Antibiotic Sensitivity Test:** Antibiotic sensitivity testing was done using Kirby-Bauer disc

diffusion assay on medium Mueller-Hilton agar<sup>(11,12)</sup>. Antibiotics and concentration used was ampicillin (10 µg), chloramphenicol (30 µg), gentamicin (10 µg), ciprofloxacin (10 µg), trimethoprim-sulfamethoxazole (25 µg), ceftazidime (30 µg), amoxicillin clavulanic acid (30 µg), cefepime (30 µg), ampicillin sulbactam (20 µg), cephazolin (30 µg), amikacin (30), tetracycline (30 µg), levofloxacin (5 µg) and meropenem (10 µg). Interpretation of the antibiotic resistance use the recommendation of the Clinical and Laboratory Standards Institute was through measurement of inhibitory zone diameter formed in study<sup>(13)</sup>.

**Confirmation ESBL using Double Disc Synergy Test (DDST):** Test for ESBL in *E. coli* by used disk antibiotic CAZ/Ceftazidime 30µg, AMC/Amoxicillin Clavulanic Acid 30µg, CTX/Cefotaxime 30µg, ATM/Aztreonam 30µg and inoculation on Muller-Hinton agar plate, shown on figure 2. The result showed measuring inhibition of the diameter inhibitory zone formed on Clinical and Laboratory Standards Institutions<sup>(13)</sup>.

## Results and Discussion

In this study, a total of 40 cloacal swab samples were collected from chickens in layer poultry farms in Blitar and screened for the presence of multidrug resistant (MDR) and Extended Spectrum Beta-lactamase (ESBL)-producing *E. coli*, shown on table 2. Total prevalence of 47.1% of *E. coli* was obtained with the MDR cases and ESBL cases was 5.9% in layer chicken, shown on table 3. This agrees with the findings of Kwoji et al. where a similar occurrence of *E. coli* from chickens was also reported<sup>(14)</sup>.

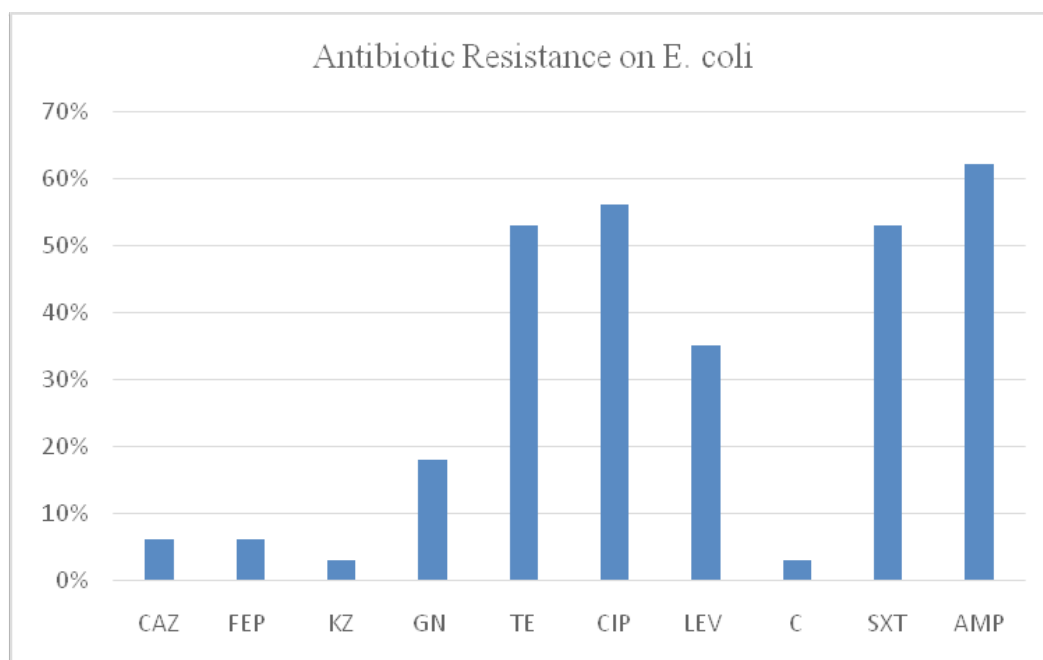
This study used fourteen antibiotics against *Escherichia coli*, the results of antibiotic sensitivity test of *Escherichia coli* showed that the antibiotic ampicillin occurrence of resistance higher at (62%), ciprofloxacin (56%), tetracycline and trimethoprim sulfamethoxazole (53%), levofloxacin (35%), gentamycin (18%), ceftazidime and cefepime (6%) cephazolin and chloramphenicol (3%) but in this study *Escherichia coli* sensitive to the antibiotic amoxicillin clavulanic acid, ampicillin sulbactam, amikacin and meropenem, shown on table 2 and figure 1. Sensitivity of microbes to antibiotic can resistant depend on commonly used of antibiotics<sup>(15)</sup>. These results are ampicillin which the highest of antibiotic resistance against *Escherichia coli*<sup>(16)</sup>.

**Table 1. Location of samples, sample size, results of isolation of E. coli and results of MDR and ESBL cases.**

Location	Number of samples	Positive E.coli	Positive MDR	Positive ESBL by DDST
Farm 1	5	4	0	0
Farm 2	5	4	2	0
Farm 3	5	5	3	0
Farm 4	5	5	5	0
Farm 5	5	4	1	0
Farm 6	5	4	1	1
Farm 7	5	4	2	1
Farm 8	5	4	2	0
Total	40	34	16	2

**Table 2. Antibiotic susceptibility profiles of 34 E. coli from cloacal swabs of layer poultry farms in Blitar.**

Antibiotic	Resistant (%)	Intermediate (%)	Sensitive (%)
Ceftazidime (CAZ)	2 (6%)	0	32 (94%)
Amoxicillin Clavulanic Acid (AMC)	0	0	34 (100%)
Cefepime (FEP)	2(6%)	0	32 (94%)
Ampicillin Sulbactam (SAM)	0	0	34 (100%)
Cephazolin (KZ)	1(3%)	0	33 (97%)
Gentamycin (GN)	6(18%)	0	28 (82%)
Amikacin (AK)	0	0	34 (100%)
Tetracycline (TE)	18(53%)	5(15%)	11 (32%)
Ciprofloxacin (CIP)	19 (56%)	3(9%)	12 (35%)
Levofloxacin (LEV)	12 (35%)	6(18%)	16 (47%)
Meropenem (MEM)	0	0	34 (100%)
Chloramphenicol (C)	1(3%)	0	33 (97%)
Trimethoprim-sulfamethoxazole (SXT)	18(53%)	0	16 (47%)
Ampicillin (AMP)	21 (62%)	0	13 (38%)

**Figure 1. Percentage of antibiotic resistance on E. coli**

Multidrug resistant (MDR) as an organism that is resistant to three or more antimicrobial classes<sup>(17)</sup>. One method that is often used by various researchers to characterize organisms as MDR is based on in vitro antimicrobial susceptibility test results, when researchers tested resistance to multiple antimicrobial agents, classes or subclasses of antimicrobial agent<sup>(18)</sup>. The most commonly used definitions for Gram-positive<sup>(19)</sup> and Gram-negative bacteria that are resistant to three or more antimicrobial class<sup>(20)</sup>. An overview of this variability of definitions is given in a comprehensive review of MDR<sup>(21)</sup>, which is used as a reference by some researchers that a large number of studies do not propose specific definitions for MDR.

There were 16 multidrug resistant (MDR) and 2 extended spectrum beta lactams (ESBL) in this study, shown on table 3. The consume of antibiotics raised antibiotics resistance contain important MDR organisms in poultry. These MDR organisms can transmission to the human through direct contact or consumption and *E. coli* is the most caused high economic losses and food contamination rates which obtained antibiotic-resistant genes with the potential to spread to other populations. The abundant use of antibiotics in poultry farms has been associated with treatment failure and the development of antibiotic resistance itself. A study showed that *E. coli* from poultry in China were resistant to at least 18 different antibiotics<sup>(22)</sup>.

**Table 3. Cases of MDR and ESBL of E. coli from cloacal swabs of Layer poultry**

Sample Code	Phenotype Resistance	Type of Resistance
L2A	TE, CIP, SXT	MDR
L2B	CIP, LEV, SXT	MDR
L3A	CIP, LEV, SXT	MDR
L3D	TE, SXT, AMP	MDR
L3E	TE, SXT, AMP	MDR
L4C	TE, CIP, SXT	MDR
L7E	TE, CIP, AMP	MDR
L8B	TE, SXT, AMP	MDR
L8C	TE, CIP, LEV	MDR
L5C	TE, CIP, SXT, AMP	MDR
L7B	TE, CIP, LEV, AMP	MDR
L4B	GN, CIP, LEV, SXT, AMP	MDR
L4D	GN, CIP, LEV, SXT, AMP	MDR
L4E	GN, CIP, LEV, SXT, AMP	MDR
L6B	TE, CIP, LEV, SXT, AMP	MDR
L4A	GN, CIP, LEV, C, SXT, AMP	MDR
L6A	CAZ, FEP, GN, TE, CIP, LEV, AMP	ESBL
L7D	CAZ, FEP, KZ, GN, TE, CIP, LEV, SXT, AMP	ESBL

In our research findings, 100% of ESBL-producing isolates showed multi-drug resistance to various families of antibiotics. This finding correlates with other studies in other countries such as Switzerland<sup>(23)</sup>, Zambia<sup>(24)</sup> and in Turkey<sup>(25)</sup> almost all ESBL-producing *E. coli* isolates found in animals are multi-resistant.

The nature of multidrug resistance of these isolates may be explained by the fact that ESBL is mediated by plasmids carrying multiresistant genes by plasmids, transposons and integrons and also they are ready to be transferred to other bacteria, not necessarily

same species. Bacteria with various resistance to antibiotics are widely distributed in animals and the environment[14]. The facts supported by recent surveys from China<sup>(22)</sup>, Thailand<sup>(26)</sup> and Indonesia<sup>(27)</sup>, have illustrated an alarming trend related to resistance among ESBL-producing organisms isolated from animals and the environment. Our results support the fact that ESBL producers provide a high level of resistance to not only third generation cephalosporins but also other non beta-lactam antibiotics groups, shown on table 3.

This study also revealed that all ESBL producers

and almost isolates that MDR showed resistance to ampicillin. In contrast, better susceptibility was observed to amikacin and no resistance was observed with meropenem. Better susceptibility to amikacin and

meropenem were also noted and can be explained by the absence of routine use of amikacin as empirical therapy on poultry farms and the absence of sufficient cross resistance with the beta-lactam antibiotic group.

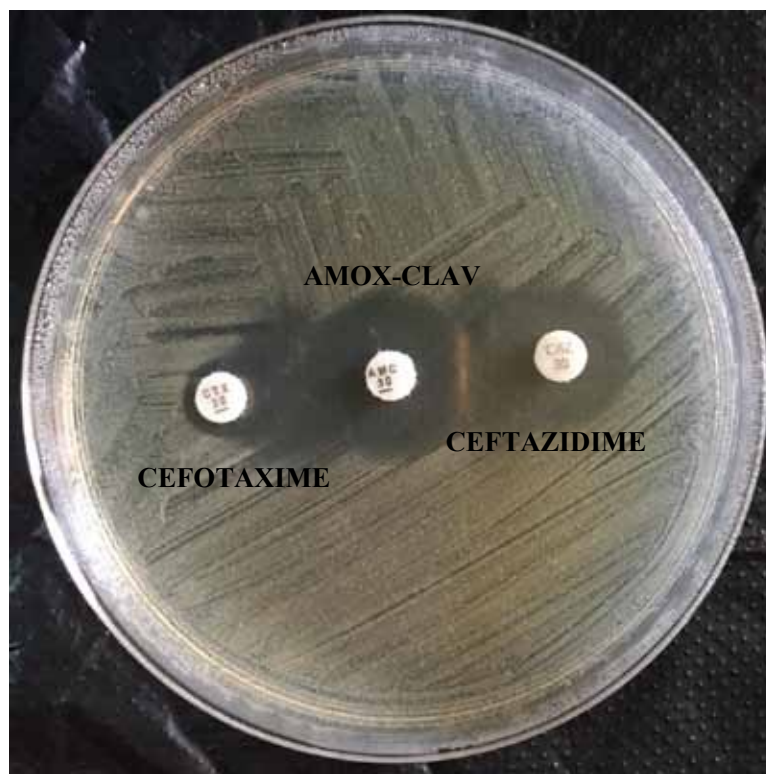


Figure 2. Confirmation of ESBL by Double Disc Synergy Test (DDST)

### Conclusion

The high percentage of drug resistance in *E. coli* isolates were detected ampicillin, ciprofloxacin, tetracycline and trimethoprim sulfamethoxazole more than 50%. The number of MDR of *E. coli* isolates was significantly higher in healthy poultry, namely 16 isolates and found also 2 ESBL producing *E. coli* isolates. This general description of the antimicrobial resistance of these poultry bacteria creates the basis for future investigations and analyzes of resistance development in Blitar, East Java, Indonesia. In view of this, we strongly recommend assessing treatment plans in the poultry industry in Blitar to ensure prudent antimicrobial use and to minimize the potential for the spread of resistant bacteria from poultry to the environment and humans.

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**Ethical Clearance:** Cloacal swabs were used in this study, hence ethical clearance was not necessary. Cloacal swab samples were collected from Blitar area in East Java province, Indonesia.

**Conflict of Interest:** Nil.

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# Analysis of Carbon Monoxide (CO) in Blood or Carboxyhemoglobin (COHb) on Psychological Stress in Public Transport Drivers (City Transportation) (Case Study in Depok in 2019)

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## Abstract

Carbon monoxide, in general, can cause hypoxia and lead to inflammation and stress. This study aims to look at the relationship of carbon monoxide with stress on city transportation drivers. The study design used a cross-sectional study. The sample in this study was 73 city transportation drivers who met the inclusion criteria, a man, smoking, having health insurance and willing to draw blood. Research data were obtained by interview for stress measurement and laboratory testing of blood samples to determine carboxyhemoglobin levels. Data analysis uses simple linear regression for bivariate analysis. The results showed there was a relationship between carboxyhemoglobin and stress (p-value = 0.003), the level of weak relationship was  $r = 0.344$ . The line equation is obtained 0.118, that is carboxyhemoglobin affects stress by 11.8%, while the rest is influenced by other variables. Exposure to carbon monoxide increases carboxyhemoglobin levels so that it can increase stress. It is hoped that public transport drivers can reduce smoking behavior and conduct periodic testing of vehicle engines.

**Keyword:** Carbon Monoxide, carboxyhemoglobin, COHb, stress.

## Introduction

Air pollution refers to the release of pollutants into the air that damage human health and the earth as a whole.<sup>1</sup> It is known that 2016 WHO data shows there are 4.2 million premature deaths as a result of exposure to ambient air pollution. As many as 91% of the world's population lives in places where air quality exceeds WHO guidelines. In urban areas, one of the air pollution comes from motor vehicle fumes. of the several types of pollutants produced, carbon monoxide is one of the

most pollutants issued by motorized vehicles.<sup>2</sup> Carbon monoxide (CO) is an odorless and colorless gas that kills without warning. He snatches hundreds of people every year and makes thousands more sick.<sup>3</sup>

Carbon monoxide enters the human body and then binds with hemoglobin to defeat oxygen, because the ability of carbon monoxide to bind red blood cells is higher than oxygen.<sup>4</sup> Hemoglobin which is supposed to bind oxygen will first bind to carbon monoxide, thus forming a carboxyhemoglobin (COHb) bond. Carboxyhemoglobin bonds cause blood to lack oxygen.<sup>5</sup> This results in the body's tissues or cells lacking oxygen, resulting in inflammation that results in oxidative stress on the tissue.<sup>6</sup>

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Lack of oxygen due to carbon monoxide gas causes a person to get tired easily so that it can affect psychological conditions.<sup>4</sup> People will become irritable,



upset and sometimes difficult to make decisions and have difficulty in controlling emotions to stay in control. Stress experienced will affect the physical environment (work, household and friendship) and health conditions. This is prone to be experienced by city transportation drivers who spend their time working on highways crowded with vehicles and most of them have smoking habits. This study measures the level of carbon monoxide in the blood of public transportation drivers (city transportation) and is then associated with psychological stress levels.

**Method**

This study uses a cross-sectional design with analytic method. The population of this study is the driver of city transportation in the city of Depok, West Java, Indonesia, which passes the Margonda highway, which is known to be the most populous road in the city of Depok. A minimum sample of research was obtained by 75 people. Determination of participants is done when in the field, with the fulfillment of inclusion criteria, a man, smoking, having health insurance and being willing to draw blood. Determination of male participants is due to almost all drivers of the male so that even if at the time of the study met women, this is very unlikely and the number of men and women will be out of balance, so it was decided to only take male participants. The smoking criteria are determined as a reference that COHb is obtained apart from ambient air from car exhaust fumes as well as from smoking, so it is assumed that participants are exposed to carbon monoxide. Measurements of carbon monoxide were not carried out in the environment but immediately looked at the levels of carbon monoxide in the blood/ carboxyhemoglobin (COHb) of the participants.

Measurement of carbon monoxide levels in the blood or carboxyhemoglobin (COHb) using the ELISA method, with venous blood sampling as much as 3cc for each respondent, testing was conducted in the integrated laboratory of the Faculty of Medicine, Universitas Indonesia in Salemba. Measurement of psychological stress was carried out using a Perceived Stress Scale (PSS) questionnaire consisting of 14 questions, with each question score 1-5 being based on the answer scale given. The higher the score obtained it is possible to have a higher stress level.

Data analysis using statistical tests (simple linear regression) looked at the relationship between carbon monoxide in the blood/carboxyhemoglobin (COHb) with psychological stress.

**Result**

All participants were men who consisted of various age groups and received different incomes. Participants were urban transport drivers with 75 people, but in the analysis, only 73 people, due to lysis blood samples so they could not be used in testing. All of the blood samples were taken for measurement of carboxyhemoglobin (COHb), this was done during the day, which is believed by the drivers to have been exposed to carbon monoxide from the environment both ambient air and cigarettes.

The results of the research are the assessment of carboxyhemoglobin with stress on urban transport drivers Case study in Depok using the univariate analysis to see the distribution of characteristics of urban transport drivers, the results are summarized in Table 1. Bivariate analysis to see the relationship of COHb with stress using correlation or regression analysis simple linear is summarized in table 2.

**Table 1. Distribution of age, income, work duration, workload and carboxyhemoglobin in city transportation drivers in Depok**

Variable	Mean	SD	Min-Max	95% CI	
				Under	Uper
Age	43	12,098	18-67	40,51	46,15
Income	2.000.000	1.067.219	400.000-6.000.000	2.029.081	2.527.082
Duration of work	10	2,127	4-20	9,48	10,94
Beban kerja	91,15	14,009	75-130	87,86	94,44
Carboxihemoglobin (COHb)	0,90	0,60	0,23-3,12	0,76	1,04

Based on table 1. It is known that the average age of a public transport driver is 42 years with a variation of 12,098 years (95% CI: 40.51-46.15). The average income of a city transportation driver is 2 million per month with a working duration of 10 hours per day (95% CI: 9.48-10.94). The workload of city transportation drivers receives an average of 91.15 beats/minute, the lightest workload is 79 beats/minute and the heaviest is 130 beats/minute. The average carboxyhemoglobin (COHb) level of the city transport driver was 0.90% with a variation of 0.60 and it was concluded that 95% believed that the average level of COHb of the city transport driver was between 0.76% to 1.04%.

**Table 2. Relationship between carboxyhemoglobin and stress in city transportation drivers in Depok**

Variable	r	R <sup>2</sup>	Persamaan Garis	P-value
Carboxihemoglobin (COHb)	0,344	0,118	Stress = 40,055+4,452 *COHb	0,003

Based on table 2 it is known that the measurement of the relationship between carboxyhemoglobin (COHb) with psychological stress obtained significant results, but the relationship is known to be classified as moderate (r = 0.344) and positive patterned means that the higher the levels of carboxyhemoglobin, the higher the stress level of city transportation driver. The determinant coefficient value of 0.118 means that the obtained line equation can explain 11.8% of stress variation.

### Discussion

The results of the study concluded that there is a relationship between carboxyhemoglobin levels with stress with a prediction of 11.8%. Not much research has directly linked carboxyhemoglobin with stress, especially humans. Previous studies have looked more at animals, but their quantity is still relatively small.<sup>7-12</sup> Generally, it will be difficult to connect COHb with stress, but if we explain the role of carboxyhemoglobin in the body, it can be seen how carboxyhemoglobin affects stress.

Carbon monoxide gas is very dangerous for human health, where a low concentration of <100 ppm can cause health problems in humans. Carbon monoxide is a metabolic poison, in which it also acts metabolically in the human body following blood circulation. If carbon monoxide is inhaled, it will enter the lungs and then enter the blood circulation, so that it blocks the path of oxygen

to be distributed throughout the body. Carbon monoxide is easy to react with blood hemoglobin which is 200 times faster than oxygen, so that blood hemoglobin is more easily bound to carbon monoxide than oxygen and has an impact on the vital function of blood as a carrier of oxygen disturbed.<sup>4,13</sup> The result is vital organs, such as the brain, nerve tissue and heart, do not receive enough oxygen to work properly. No more than 2.5% of hemoglobin can be bound to carbon monoxide before some health effects appear. At very high concentrations of carbon monoxide, up to 40% of hemoglobin can be bound to carbon monoxide and at this level, it will almost certainly kill humans.<sup>5</sup>

Inhaling high levels of carbon monoxide can kill humans. Inhaling low CO concentrations may not produce obvious symptoms of CO poisoning, but exposure to low CO levels can cause long-term health damage, even after the source of CO is removed. These health effects include long-term neurological damage such as learning and memory disorders, emotional and personality effects and sensory and motor disorders.<sup>3,4,6,14,15</sup>

For most people, the first signs of low concentration CO exposure include mild headaches and shortness of breath when exercising lightly. Continuous or acute exposure can cause flu-like symptoms including more severe headaches, dizziness, fatigue, nausea, confusion, irritability and impaired judgment, memory and coordination. CO is called a “silent killer” because if these initial signs are ignored, a person may lose consciousness and cannot escape danger.<sup>16</sup>

Someone who lacks oxygen due to increased carboxyhemoglobin is easily affected by drowsiness and fatigue which causes the emotional condition to be difficult to stabilize so easily irritated and angry. First, most of the city transportation drivers behave on average, consuming 1 to 2 packs a day, which means that within 24 hours they can smoke 12 to 24 cigarettes. Cigarettes are a source of carbon monoxide, so they are directly exposed to CO. In addition, the source of exposure is also obtained from vehicle exhaust. The environmental conditions on the streets are congested, so at certain times there is often congestion which supports the incomplete combustion of vehicles that are the source of CO gas from the exhaust.

Stressful events experienced by city transport drivers will have an impact on the professionalism of their work. Working in the service sector requires good

mental and emotional health. If they are stressed then the service is not optimal and it might have an impact on their work. For example, a stressed driver is easily emotional, so that if there are other riders who cut the road, he will get angry easily, creating an awkward atmosphere with his passengers. Stressed drivers are also likely to be reckless due to uncertain emotions that are felt that endanger themselves and the passengers. Finally, if stress is experienced continuously it will have an impact on the rise in the hormone cortisol so that if this continues, cortisol has a slow time to return to normal. As a result, diseases such as high blood pressure decreased immunity, increased risk of heart disease, stroke, cholesterol and metabolic syndrome arise.<sup>17-23</sup>

In this study the relationship between COHb and stress is still classified as moderate, the prediction number is below 20% so it cannot be said the main factor influences stress. In this research there may be confusion that affects the results, namely the number of samples is small and the stress index is measured from the questionnaire, so it is possible to bias information. Although researchers have been very thorough in contracting bias such as skilled interviewers and blinding purposes. However, cortisol hormone levels are measured to get stress results from different perspectives and directly bind to stress hormones, so that more accurate results are obtained (these results will be displayed in a later journal).

This study was also not accompanied by measurements of carbon monoxide in the environment, making it difficult to determine the main source for environmental control.

### Conclusion

The result provides carboxyhemoglobin (COHb) affects stress by 11.8% while the rest is influenced by other variables. The relationship between the two is known to have a positive pattern, meaning the higher levels of carboxyhemoglobin, the higher the level of stress on the driver. Exposure to carbon monoxide increases the levels of carboxyhemoglobin so that it can increase the incidence of stress. It is hoped that public transportation drivers can reduce smoking behavior and conduct periodic testing of vehicle engines. Future studies are suggested to measure carbon monoxide exposure in the environment and include confounding variables that can affect stress with a larger sample size.

**Ethics Approval:** The study protocol was approved

by the Ethics Committee of Public Health Faculty, Universitas Indonesia, Depok, Indonesia.

**Conflict of Interest:** No conflict interests.

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# Relationship between Serum Uric Acid and Lipid Profiles in Thai Adults

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## Abstract

Although the link between serum uric acid, including hyperuricemia and metabolic syndrome had been reported, the relationship of lipid profiles with serum uric acid remains not comprehensively assessed in Thai adults. This current study was performed to examine the relation between serum uric acid and lipid profiles in Thai adults. A total of 192 blood samples were collected from Thai adults aged 20 years and over (men, n = 67 and women, n = 125). We analyzed serum uric acid levels and serum lipid profiles, including serum total cholesterol, triglycerides, low-density lipoprotein and high-density lipoprotein. Multiple linear regression analysis was used to evaluate the relationship between serum uric acid and lipid profiles. Our results found that triglycerides and total cholesterol was linearly related with serum uric acid levels (0.404, 95% CI, 0.578, 95% CI 0.164-0.993, respectively). Meanwhile an inverse relation was observed between serum uric acid levels and high-density lipoprotein (-0.042, 95% CI -0.015 - -0.067).

This study suggested that triglycerides, total cholesterol and obesity had a significant linear association with serum uric acid levels, whereas serum HDL cholesterol levels are significantly inversely associated. The early prevention of obesity and dyslipidemia can reduce the incidence of associated hyperuricemia and gout among Thai adults.

**Keywords:** Serum uric acid, Lipid Profiles, Total cholesterol, Triglycerides, Low density lipoprotein, High density lipoprotein.

## Introduction

Uric acid (UA) is an end product of purine base metabolism. Excessive UA production and its decreased excretion are an independent causative or potential risk factor of mortality in patients with severe disease such as kidney disease, hypertension, cardiovascular events and diabetes mellitus.<sup>1-3</sup> Serum uric acid (SUA) level is a

multi-factorial and influenced by environmental factors such as body mass index, purine-rich foods such as alcohol, meat, legumes and seafood, can influence SUA concentrations.<sup>4,5</sup> Several previous studies have also reported that single nucleotide polymorphisms (SNPs) in the SLC2A9 and ABCG2 genes are significant associated with SUA concentrations.<sup>5-12</sup> Moreover, the relation of SUA and dyslipidemia is complex and not fully elucidated yet. A few studies have been conducted to investigate the association between SUA and lipid profiles in the adult population of India,<sup>13</sup> Italy,<sup>14</sup> Korean<sup>15</sup> Saudi Arabia<sup>16</sup> Kuwait,<sup>17</sup> and the United States.<sup>18</sup> In a present study in Bangladeshi adults showed a significant positive relationship for SUA with TG, TC and LDL levels and an inverse relationship for SUA with HDL.<sup>19</sup> However, there is a lack of evidence on the relation of SUA with lipid profiles for the Thai

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adult population. In this study, we aimed to assess the independent relationship between SUA and lipid profiles in Thai adults.

## Materials and Method

**Study Population:** This study was a cross-sectional design and conducted between June 2017 and June 2018. Urban people and individuals had participants in routine health check-up in the SWU-clinic, Faculty of medicine, Srinakharinwirot University (SWU). of the 192 subjects were individuals over 18 years of age and were apparently without any arthritis and any severe cardiovascular disease. However, subjects with acute heart disease, kidney disease, cancer, stress or anti-depression medication and those on lower the SUA concentrations therapy were excluded from the study.

**Anthropometric measurements and blood sample collection:** Anthropometric measurements taken were weight and height using the standard procedure. Body mass index (BMI) was calculated as the weight (kg) divided by the square of the height (m<sup>2</sup>). General obesity was defined by a BMI  $\geq 25.00$  kg/m<sup>2</sup>, regardless of gender. Five milliliters (ml) venous blood sample was collected from each participant after overnight fasting. Serum was separate for analysis of biochemical parameters. Serum uric acid and serum lipid profiles: total cholesterol (TC), triglyceride (TG) and high-and-low density lipoprotein cholesterol (HDL-C and LDL-C, respectively) were analyzed by automatic biochemical analyzer (Abbott CI 8200, United State) at the laboratory of the HRH Princess Maha Chakri Sirindhorn Medical Center (MSMC).

**Statistical Method:** Statistical analyses were performed using the STATA version 14 (Stata Corp, College Station, TX). Values are presented as mean  $\pm$  standard deviation (SD) for continuous variables and as frequency and percentages (%) for categorical variables. The correlation between lipid profiles, BMI and SUA were assessed by Pearson's correlation coefficient test. One way ANOVA was performed to determine difference among BMI group. To indicate the relation of lipid profiles and SUA were assessed using multiple linear regression models adjusted by all covariates. Model 1 was adjusted age and sex. Model 2 was further adjusted age, sex, serum TG and TC. Model 3 was adjusted age, sex, serum TG, TC, HDL-C and LDL-C. The statistical tests were two-sided and a p-value less than 5% was estimated to indicate statistically significant.

## Results

A total of 192 participants were 67 (34.90%) men and 125 (65.10%) women. The mean age of all participants was  $47.40 \pm 15.38$  years ( $50.37 \pm 14.68$  years in men and  $45.80 \pm 15.58$  years in women). The mean BMI for all participants was  $24.90 \pm 4.79$  kg/m<sup>2</sup>. The average SUA, TG, TC, HDL-C and LDL-C levels for all participants were  $5.91 \pm 1.31$ ,  $127.84 \pm 64.68$ ,  $208.78 \pm 35.60$ ,  $59.14 \pm 14.10$  and  $128.51 \pm 33.75$  respectively. In the gender group, Men subjects had a higher of BMI, SUA, serum TG and serum TC than women subjects. However, serum HDL-C and LDL-C levels were lower in men than women (**Table 1**).

In the current study, we analyzed the correlation between SUA levels with lipid profiles and BMI (**Figure 1**). SUA levels were positively correlated with serum TC, TG and BMI, but not serum LDL-C level, whereas a negatively correlated with serum HDL-C. Levels of serum uric acid in different body mass index are showed in Table 2. A level of serum uric acid was a statistically significant difference between BMI groups as demonstrated by one-way ANOVA (p-value  $< 0.001$ ). A post hoc test showed that the obesity group was increases statistically further than the underweight group. Moreover, there was a statistically significant difference between the obesity and normal groups, including between the obesity and overweight groups. After adjusting for age and gender (Model 1), serum TG and TC levels were progressively increased (mean difference = 0.508, 95% CI = 0.262 - 0.755, 0.509, 95% CI = 0.071-0.948, respectively) and HDL-C level (mean difference = -0.062, 95% CI = -0.018 - -0.052) was progressively decreased serum uric acid level (**Table 3**). However, the relation remained unchanged after additionally adjusting for other covariates in model 2. Furthermore, after adjusting for age and gender (Model 1), BMI was also increased serum uric acid level. The relation remained unchanged after additionally adjusting for other covariates in model 2 and 3.

## Discussion and Conclusion

To the best of our current knowledge, there are few studies which focused on the relationship of lipid profiles with serum uric acid in the urban representative sample of Thai adults. Our study demonstrated the serum uric acid was positively correlated with serum TC, TG and BMI even after additionally adjusting for confounders, while a level of uric acid is not associated with serum LDL-C level. A similar finding has been illustrated in

many ethnicities. There is positively linear association of serum uric acid with both triglyceride and total cholesterol.<sup>13-18</sup> A recent study in Bangladeshi adults, also, demonstrated that a positive relationship for serum uric acid with triglyceride and total cholesterol. Therefore, the synthesis of triglyceride and total cholesterol requires NADPH, which resulted in an increased serum uric acid production.<sup>19</sup> However, some previous studies indicated that serum LDL cholesterol is strongly associated with serum uric acid levels,<sup>13, 18-20</sup> while a level of uric acid is not associated with high level of total cholesterol.<sup>21</sup> Previous in vitro studies demonstrate that high serum uric acid levels can increase monocyte chemoattractant protein and reduce the production of adiponectin, which contributes to insulin resistance and inflammation. However, these results indicated a complex interaction between SUA and lipids has remained unclear.<sup>22,23</sup> When we taking into account present study results, we are agreed with a previous study remarks that lipids may intensify several pathophysiological mechanisms that are associated with high serum uric acid, including may have synergistic interaction with other lipid profile causing gout. In addition, our present study showed that serum HDL-C, as known as a protective factor for cardiovascular disease (CVD), is inversely correlated with serum uric acid in line with some previous study. It has been lately noted that elevated serum HDL-C was a significant negatively related to serum uric acid,<sup>13, 18-20</sup> although the direct evidence of the role of HDL in reducing serum uric acid has not clearly understood yet. Furthermore, our present study also revealed that body mass index was increased serum uric acid level even after additionally adjusting for all covariates. The present results have the same direction as previous reports; SUA

was found to be significantly associated with body mass index.<sup>20, 24</sup> Serum uric acid is intimately associated with obesity in many populations of young and adults<sup>25</sup>, in addition, the reduction of weight leads to reduced serum uric acid.<sup>26</sup>

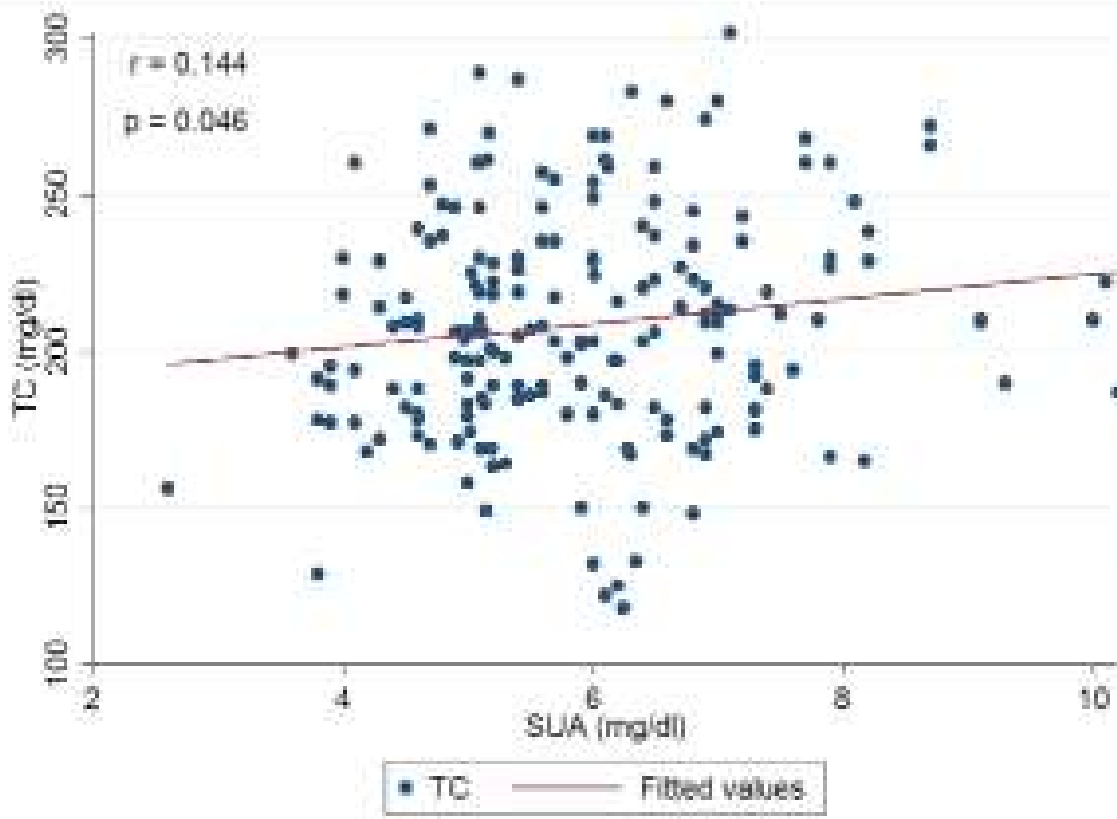
The current study had few limitations; this study was performed in an urban representative a small sample of Thai adults, which may not represent the observed findings for the entire population of Thai adults. However, the findings are likely to be generalizable to the Thai general population. Although previous reports suggest that lipid levels (serum triglycerides, total cholesterol and serum HDL cholesterol level) would be related to serum uric acid levels as observed, a cross-sectional study design may preclude the cause-effect relationships between SUA levels and lipid profile is assumed. Thus, confirming the relationship with a prospective longitudinal cohort study would be performed to confirm the observed association of SUA levels and lipid profiles. Finally, we did not collect individual food habits information, including apolipoprotein-B, lipoprotein, apolipoprotein AI, ratio of triglycerides to HDL cholesterol and ratio of apolipoprotein-B to AI which may affect lipid levels. Therefore, we should be investigated in future studies.

In conclusion, both general obesity and lipid profiles such as triglycerides, total cholesterol and serum HDL cholesterol level were a significant linear association with serum uric acid levels in Thai adults. Therefore, early prevention of obesity and dyslipidemia can reduce the incidence of associated hyperuricemia, gout and also cardiovascular disease.

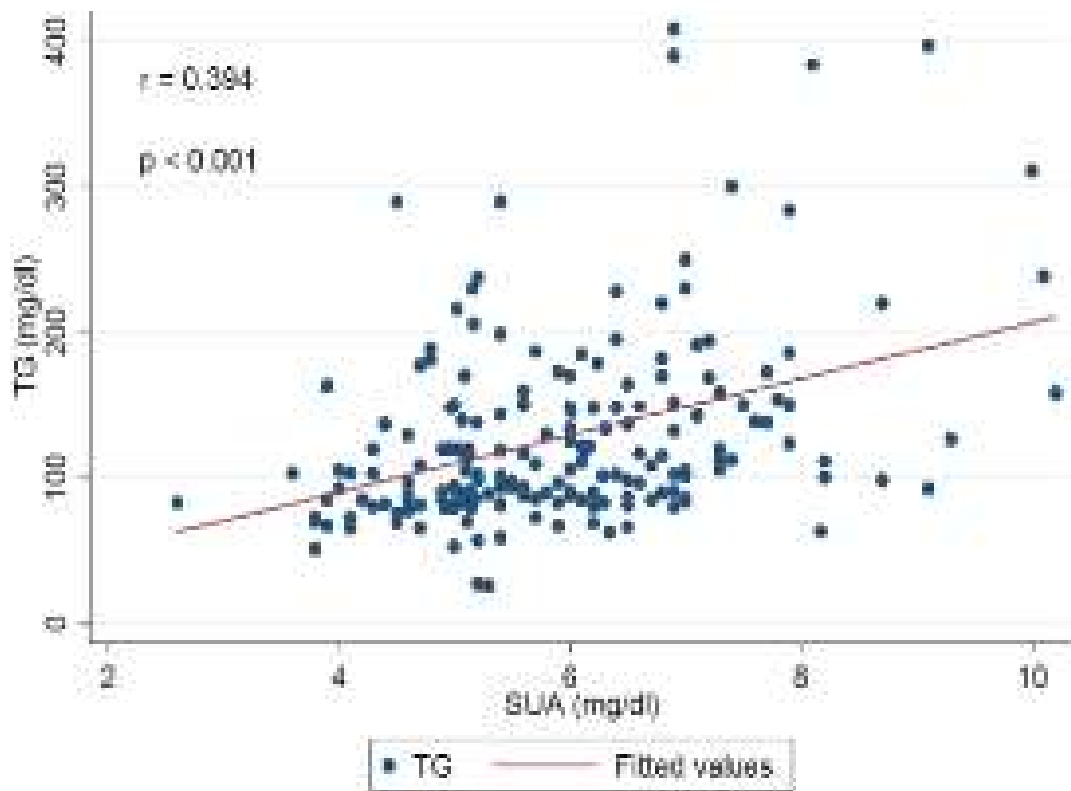
**Table 1. Baseline characteristics and serum uric acid levels separated by gender**

Variables	Total	Male	Female
Number (%)	192	67 (34.90)	125 (65.10)
Age (years)	47.40±15.38	50.37±14.68	45.80±15.58
Height (cm)	162.21±7.53	168.86±5.47	158.65±5.88
Weight (Kg)	65.71±14.48	74.99±14.22	60.73±11.99
BMI (Kg/m <sup>2</sup> )	24.90±4.79	26.23±4.30	24.19±4.90
SUA (mg/dl)	5.91±1.31	6.88±1.27	5.38±1.00
TG (mg/dl)	127.84±64.68	155.00±84.78	113.27±44.78
TC (mg/dl)	208.78±35.60	209.25±41.63	208.53±32.09
HDL-C (mg/dl)	59.14±14.10	54.81±16.08	61.47±12.38
LDL-C (mg/dl)	128.51±33.75	126.89±3.97	129.38±30.72

Continuous variables are presented as mean ± SD, BMI: Body mass index; HDL-C: high-density lipoprotein cholesterol; LDL-C: low-density lipoprotein cholesterol; TG: Triglycerides; TC: Total cholesterol; SUA: Serum uric acid levels

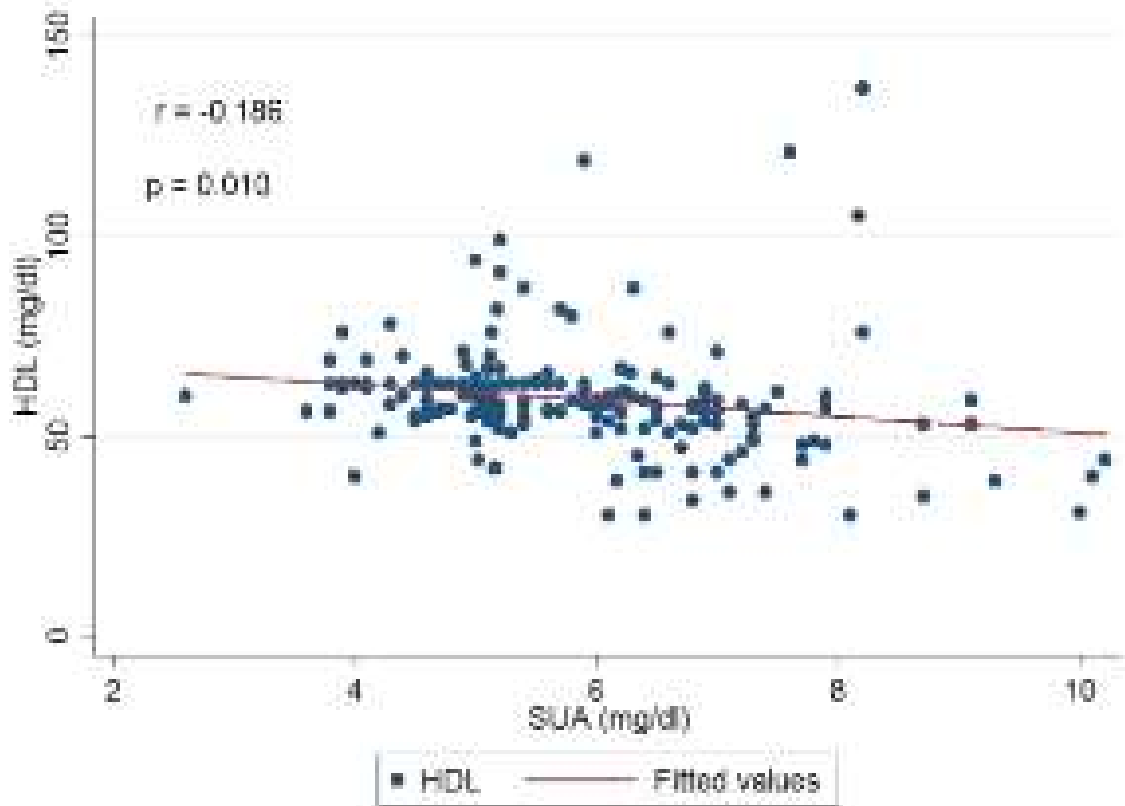


a

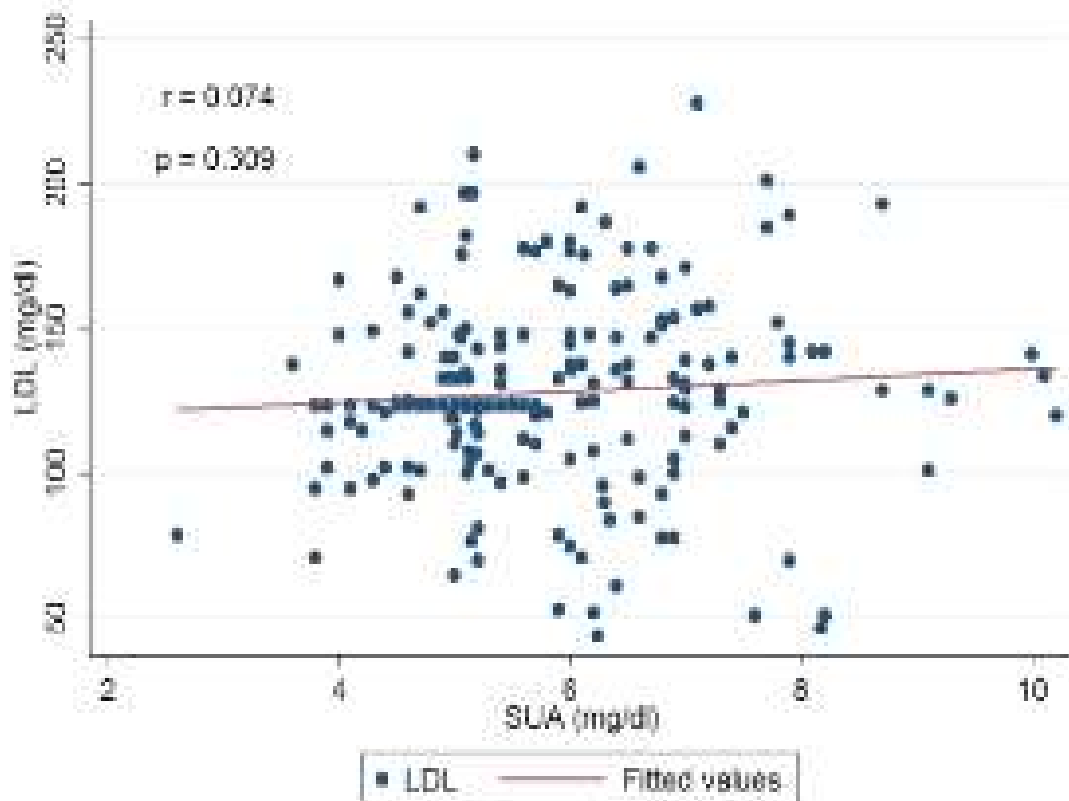


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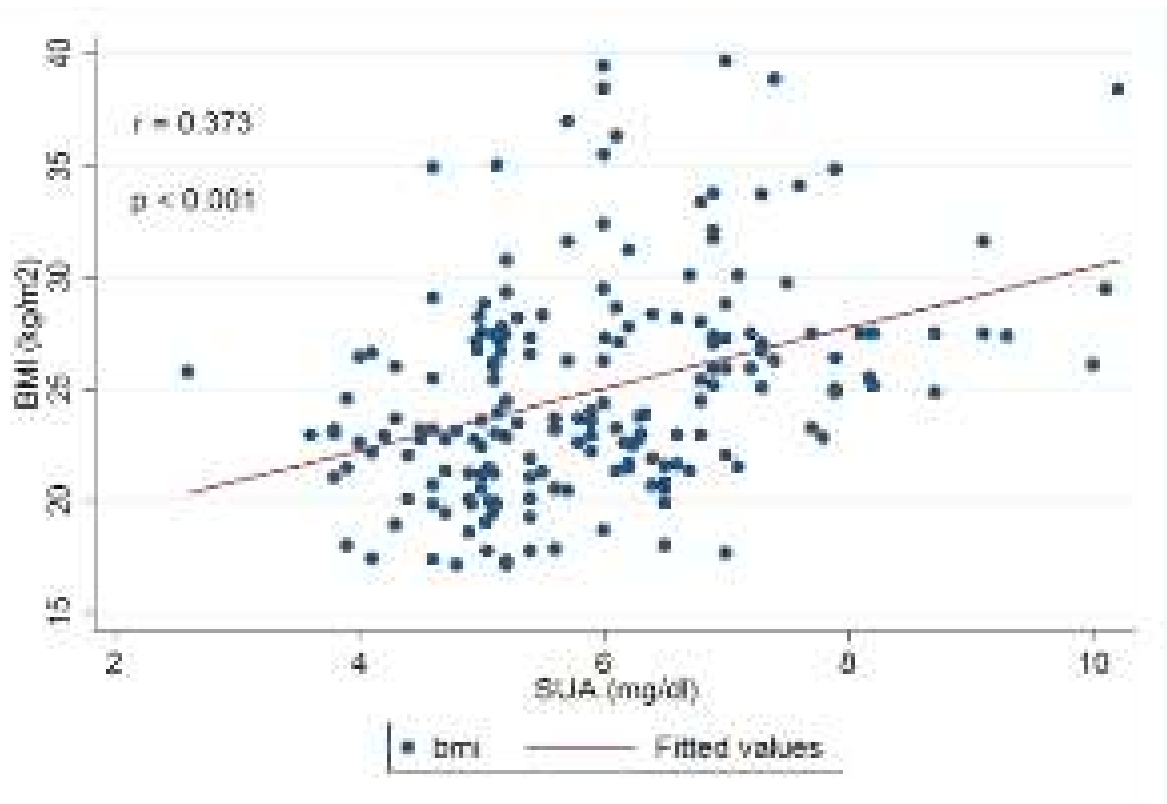




c



d



e

**Figure 1.** The correlation between serum uric acid and total cholesterol (a), Triglycerides (b), High-density lipoprotein cholesterol; HDL (c), Low-density lipoprotein cholesterol; LDL (d) and body mass index; BMI (e)

**Table 2.** Level of serum uric acid in different body mass index

Group	N	Mean± SD	p-value	Multiple comparison
				Mean diff.(95% CI)
Underweight	11	5.21±0.92	<0.001	1.25(0.21-2.29) <sup>a</sup>
Normal	67	5.46±0.89		1.00(0.47-1.53) <sup>b</sup>
Overweight	29	5.56±1.22		0.90(0.20-1.60) <sup>c</sup>
Obesity	85	6.46±1.45		

Mean diff: mean difference; (a) Obesity vs. Underweight (b) Obesity vs. Normal (c) Obesity vs. Overweight

**Table 3.** the association of serum uric acid with lipid profiles and obesity based on multiple linear regressions

Variables	Mean diff.	95% CI	p-value
<b>Body mass index (kg/m<sup>2</sup>)<sup>a</sup></b>			
Model 1	0.075	0.043-0.107	<0.001
Model 2	0.068	0.036-0.100	<0.001
Model 3	0.068	0.036-0.100	<0.001
<b>Triglycerides (mg/dl)<sup>b</sup></b>			
Model 1	0.508	0.262-0.755	<0.001
Model 2	0.404	0.161-0.647	0.001

Variables	Mean diff.	95% CI	p-value
<b>Total cholesterol (mg/dl)<sup>b</sup></b>			
Model 1	0.509	0.071-0.948	0.023
Model 2	0.578	0.164-0.993	0.007
<b>High-density lipoprotein cholesterol (mg/dl)<sup>b</sup></b>			
Model 1	-0.062	-0.018 - -0.052	0.028
Model 2	-0.042	-0.015 - -0.067	0.045
<b>Low-density lipoprotein cholesterol (mg/dl)<sup>b</sup></b>			
Model 1	0.036	-0.010-0.083	0.126
Model 2	0.045	-0.013-0.089	0.054

**Mean diff: mean difference;** <sup>a</sup>Adjusted covariates: Model 1 = age and sex; Model 2 = age, sex, triglycerides and total cholesterol; Model 3 = age, sex, triglycerides, total cholesterol, HDL and LDL, <sup>b</sup>Adjusted covariates: Model 1 = age and sex; Model 2 = age, sex, body mass index

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**Ethical Clearance:** The ethics committee of Srinakharinwirot University, Thailand has approved the study protocol (MEDSWUEC-148/60E). All participants provided written informed consent for the study.

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# The Relationship of Intelligence and Health Perceptions

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## Abstract

Perception is cognitive process. Perception influenced by intelligence. Until now there has been no research on intelligence and perception. The purpose of this study was to investigate on relationship between intelligence and health perception. The study was correlational descriptive . The sample consisted of 80 persons of Spiritual lectures at the Council of Dhikr, Sidoarjo, Indonesia. The Intelligence: Spiritual, Emotional and Adversity) Inventory were used as a research instrument. The Pearson correlation method were used for statistical analysis. The results show that there was a positive and significant relationship between spiritual intelligence and health perception. However, there were insignificant relationship between emotional and adversity with health perception. Spiritual Intelligence most related with health perception.

**Keywords:** Cognitive, Intelligence, Spiritual, Emotional, Adversity, Perception.

## Introduction

Perception is the knowledge we have of objects or of their movements by direct and immediate contact, while intelligence is a form of knowledge obtaining when detours are involved and when spatio-temporal distances between subject and objects increase. It is therefore essential that we should start with perceptual structures, to enquire whether we may not derive from them an explanation of the whole of thought, including groupings themselves<sup>[1]</sup>.

Processing cognition and emotional experiences interact with each other to systematically raise your behavior<sup>[2]</sup>. Thoughts and feelings for oneself and surrounding environment are interconnected, so it can affect the kind of behavior it appears<sup>[3]</sup>. Perception is cognitive process<sup>[4]</sup>. Cognitive embraces intelligence (emotional, spiritual and adversities).

Emotional intelligence (EI) is crucial in shaping perception. The better perception, understanding and management of emotion of those with higher emotional intelligence may prevent the development of maladaptive emotional states associated with mood and anxiety disorders<sup>[5]</sup>.

Spiritual intelligence (SI) is considered as developmental in nature, built through the accumulation of separate experiences, as manifestations of spiritual intelligence appear in an individual's life in an increasing manner<sup>[6]</sup>. Spiritual intelligence is capable of forming and organizing our perceptions about some notions, including health and disease. Spiritual intelligence improves not only personal health and welfare, but also helps people to tolerate difficult experiences such as grief and loss.<sup>[7]</sup>

The concept of Adversity intelligence (AI) helps us in understanding how people react to challenges and different adversities in all the aspects of life. AI is the most widely used way of measuring and strengthening human resilience<sup>[8]</sup>.

Perception of health will affect someone in taking a health-related decision. Incorrect or negative perception can lead to errors in action. Therefore the purpose of this

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paper is to explain the relationship of intelligence with the perception of health.

**Method**

**Study Design, Setting and Sampling:** The study method was correlational descriptive. Statistical population was comprised of Spiritual lectures at the Council of Dhikr, Sidoarjo, Indonesia.

The sample was selected randomly. The sample size consist of 80 person that 12 questionnaires were omitted because of the deficiency and 68 one were used.

**Study Variables:** The variables of this study were the intelligence that consist of spiritual intelligence, emotional intelligence, adversity intelligence; and perception.

The Spiritual Intelligence Inventory is a 26-item scale that measures spiritual intelligent. Spiritual intelligence components are Iman, Islam and Ihsan. The alpha coefisien 0.894

The Emotional intelligence inventory is a 34-items scale that measures emotional intelligence. This inventory consist of self awareness, self regulation, social skill, empathy and motivation. The alpha coefisien 0.862

The Adversity Intelligence inventory is a 28-items scale that measures adversity intelligence. Adversity intelligence components are Control, Ownership, Reach and Endurance. The alpha coefisien 0.869

The Health Perception Inventory is a 20-items scale that measures perception of health. The alpha coefisien 0.742.

**Data Analysis:** The Pearson correlation method were used for statistical analysis.

**Result**

**Table 1. Correlation between Spiritual Intelligence with Health Perception**

Pearson correlation	Spiritual Intelligence	Health Perception
Spiritual Intelligence	1	0.243*
Health Perception		1

\*p<0.05

Table 1 shows a significant correlation between

spiritual intelligence and health perception. Although the relationship between the two is weak (0.243). The correlation was positif.

**Table 2 Correlation between Emotional Intelligence with Health Perception**

Pearson correlation	Emotional Intelligence	Health Perception
Emotional Intelligence	1	0.193
Health Perception		1

p>0.05

Table 2 presents no significant correlation between emotional intelligence and health perception.

**Table 3 Correlation between Emotional Intelligence with Health Perception**

Pearson correlation	Adversity Intelligence	Health Perception
Adversity Intelligence	1	0.182
Health Perception		1

p>0.05

Table 3 presents no significant correlation between adversity intelligence and health perception

**Discussion**

Perception is the stimulus that the individual senses, organized and interpreted, so that individuals realize and understand what it senses. Perception as a fundamental person in taking decisions or actions. Similarly in terms of health, perception of health is essential as a basis for taking health-related decisions. Perception is cognitive process<sup>[4]</sup>. Cognitive embraces intelligence (emotional, spiritual and adversities).

Multiple intelligence needed to solve problems encountered, including to address health problems. Intelligence is composed of spiritual, emotional and adversity Intellegence. Emotional Intelligence (EQ) is defined as the ability to identify, assess and control one’s own emotions, the emotions of others and that of groups<sup>[9]</sup>. Emotional Intelligence is the ability to recognize and understand emotions in yourself and others and your ability to use this awareness to manage your behavior and relationships<sup>[10]</sup>.

There is a relationship between EI and health functioning<sup>[11]</sup>. Higher emotional intelligence was associated with better health<sup>[12]</sup>. The findings reflect

that emotional intelligence can play an important role in general health<sup>[13]</sup>. Emotional intelligence partially mediated the relationship between anxious insecurity and health outcomes<sup>[14]</sup>. Emotional intelligence is the ability to motivate yourself and survive face a frustrating, control impulses and heart does not surpass – exaggerated pleasure, set the mood and keep the burden of stress does not cripple the ability of thinking and Empath<sup>[9]</sup>.

Spiritual intelligence is the ability to put all the behavior and live in the context of broader meaningfulness<sup>[15]</sup>. Spirituality is a personal quest to understand the answer as the ultimate goal in life, about the meaning and relationship of the sacred or transcendent that arise from religious rituals and community<sup>[16]</sup>. The inter connectedness of spirituality with the healing process can be explained by the concept of holistic nursing<sup>[17]</sup>. Holistic model is a comprehensive model of looking at a variety of healthy pain response. This model explains that all disease psychosomatic component contain, biological, psychological, social, spiritual<sup>[18]</sup> and cultural<sup>[19]</sup>.

Spiritual intelligence allows us to reconsider our experiences and create meaning; Personal meaning production is an applicable component of spiritual intelligence<sup>[20]</sup>. Spiritual health is extremely important for many researchers, to the extent that it is seen as one of the key aspects of health <sup>[21]</sup>. Spiritual intelligence was positively associated with general health. Those who had higher levels of spiritual intelligence tended to have higher levels of health<sup>[22]</sup>. On the other hand, spiritual intelligence includes neurological processes, particular cognitive capabilities and spiritual personal and interests <sup>[23]</sup>.

Adversity Intelligence is considered to be the determinant of superior performance and success <sup>[24]</sup>. Adversity intelligence is a concept about personal qualities possessed someone to face many difficulties and in order to achieve success in many areas of his life <sup>[8]</sup>. Adversity intelligence as human capacity in the form of response patterns that are owned by a person in control and directing, admits, a difficult situation, acknowledge and rectify a difficult situation.

According to Stolz (1997)<sup>[8]</sup> Adversity intelligence (AI) is the most widely used way of measuring and strengthening human resilience. AI is rooted in three sciences: cognitive psychology (relationship between

thoughts and feelings), psychoneuroimmunology (mind-body relationship) and neurophysiology (study of brain)<sup>[8]</sup>. These three are the building blocks for the adversity quotient. Psychoneuroimmunology deals with the feelings and emotions. Neurophysiology deals with how the brain learns and functions. Cognitive Psychology deals with the thoughts and feelings<sup>[24]</sup>. Stolz, further suggested AI is about how one responds to life especially the tough times many people encounter every day. AI is a gauge to measure how you respond and deal with challenges and adversities that many times catch us totally off guard and unprepared<sup>[8]</sup>.

Good AI of a person indicates that the person can fight against all the odds and achieve success. AI helps us to understand many other factors like self-esteem, motivation, fighting spirit, creativity, sincerity, positive attitude, optimism, emotional stability <sup>[24]</sup>. AI can be improved if the person has empathy, sympathy and if the person is able to understand other's emotions.

## Conclusion

Spiritual intelligence relates significantly to health perception, as opposed to emotional intelligence and adversity. So that spiritual approaches can be used as an effort to improve perception of individual health.

**Ethical Clearance:** The ethical approval for this study was granted by the IRB committee of the Faculty of Medicine at the Universitas Airlangga in 2019.

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**Conflict of Interest:** None

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# Maturity Model and Safety Culture in Healthcare: A Systematic Review

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## Abstract

**Background:** Research on safety culture maturity in hospitals is rare and still focuses on patient safety, not yet involved safety and occupational accidents. Previous research uses the *Manchester Patient Safety Framework* (Ma PSaF) instrument to measure 5 levels of patient safety culture maturity: Pathological, Reactive, Bureaucratic, Proactive and Generative. This study aims to investigate the level of patient safety culture maturity in hospitals.

**Method:** This study used a systematic literature review of 5 databases: PubMed, EBSCO, Proquest, Science Direct and Scopus. Inclusion criteria in this study are articles related to patient safety criteria; research outcome in this study is patient safety maturity level; 3) articles in the form of results obtained from the keywords used; articles have been published since 2009-2019; the article is an academic journal; english articles. 498 articles were obtained and after screening 2 articles selected.

**Results:** The two articles involved 2 countries: United Kingdom and Indonesia. There are 10 indicators examined in both studies which one developed 10 indicators with 24 dimensions. Study in UK, using univariate quantitative method. Research in Indonesia uses a qualitative method by interviewing experts and literature studies, there is a change in the definition of maturity in 3 dimensions to maintain research reliability, such as safety, communication and teamwork. Maturity of patient safety culture in the UK is proactive level.

**Conclusions:** There are 10 keys indicators for maturity of a patient safety culture: commitment to overall continuous improvement, priority given to safety, system errors and individual responsibility, recording incidents and best practices, evaluating incidents and practices best, study and make changes, communication about safety issues, personnel management and safety issues, staff education and training, teamwork. At present the safety culture maturity measuring instrument only patient safety. Further research should measure the maturity of safety culture more comprehensive including patient safety, occupational safety and health (OSH).

**Keywords:** *Maturity of patient safety, patient safety, occupational safety and health, hospital, clinic.*

## Introduction

Maturity of safety culture describes attitudes and behaviors related to incident and accident prevention, reporting, investigation and accident solutions. Maturity of safety culture is used to develop safety culture in organizations <sup>(1)</sup>. According to Westrum,

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1988 divides safety culture maturity groups based on how organizations handle safety information, namely pathology, bureaucratic and generative which are then developed by adding reactive and proactive levels<sup>(2)(3)</sup>.

Safety culture maturity models help organizations to know the level of safety culture conditions so that efforts can be made to improve culture<sup>(4)(5)</sup>. Safety culture is defined as a set of organizational characteristics and attitudes as well as the behavioral characteristics of its workers related to organizational performance in the aspect of safety<sup>(6)(7)</sup>. The WHO publication in 2004 collected research figures on KTD in hospitals in various countries, namely the United States, United Kingdom, Denmark, Australia, New Zealand, Canada, found to range from 3.2 to 16.6%<sup>(8)</sup>. It is estimated that almost 50% are preventable events<sup>(9)</sup>.

*National Health and Safety* states that safety culture organizations influence the behavior of workers in terms of taking risks, following rules and talking about security<sup>(10)</sup>. Good safety culture practices can have an impact on reducing individual accidents and can stimulate the risk assessment process that causes these accidents<sup>(11)</sup>. There are 9 instruments that have been formulated to measure safety culture and climate in the health service sector, where 8 instruments use quantitative method with a Likert scale and only 1 instrument measures maturity using qualitative method, namely *Manchester Patient Safety Framework* (Ma PSaF). In Indonesia, patient safety incidents were reported by hospital patient safety committees in 2006 as many as 145 incidents. In 2007 to 2011 457 incidents occurred, 11.23% in the nursing unit, 6.17% in the pharmaceutical unit and 4.12% by doctors. Hospital patient safety committee report for 2008 found the case of near-death 47.6%, side effects (46.2%)<sup>(12)</sup>.

The hospital is one of the organizations providing health services that also should guarantee the safety of human resources, namely hospital workers. Hospital is a place of work that has the risk of workplace accidents and the potential to cause workplace accidents or occupational diseases<sup>(13)</sup>. *National Safety Council* (NSC) reports that the number of accidents that occur in hospitals is around 41%<sup>(14)</sup>. Data from the Bureau of Labor Statistics in the United States reveals that injuries and illnesses that occur in health workers are 2 times greater than in the private industry as a whole<sup>(12)(15)(13)</sup>. So this study aims to determine the maturity model of safety culture in health care.

## Method

**Eligibility Criteria:** This research is a systematic literature review with electronic literature searching of academic journals with a certain criteria. Literature on patient safety maturity is considered relevant if it meets the inclusion criteria, which are 1) articles related to patient safety criteria; 2) research outcome in the form of patient safety maturity level; 3) articles in the form of results obtained from the keywords used; 4) articles have been published since 2009-2019; 5) the article is an academic journal; 6) English language articles. The number of articles found was 533.

**Search Strategy:** All references that have been found are managed using endnote software. Study selection process includes 4 stages: identification, screening, eligibility and include. Keywords in this study were maturity of safety culture AND healthcare used to search articles on the database. The number of articles obtained as many as 498 articles that was then screened so as to obtain articles eligible to be synthesized as many as 2 articles. The outcome definition is the level of patient safety maturity in health services consisting of Pathological, Reactive, Bureaucratic, Proactive and Generative. The result of articles presented using instruments of Preferred Reporting Items for Systematic Reviews & Meta-analyses (PRISMA) and flowchart arranged according to checklist guidelines from PRISMA 2009.

**Quality Assessment:** Assessment of research quality used standard criteria that test for misclassification, selection and reporting by evaluating factors of sampling strategy, adequacy of samples, anticipation of bias, focus of intervention and comparison groups, analysis, suitability of statistical tests, description of intervention procedures, determination of inclusion criteria and exclusion, limitations of research and reporting of outcome data. Study quality was classified according: high (score 8 to 12), moderate (score 5 to 7) or low (score 4 to 0). The article used is the value of Quality Assignment  $\geq 8$ .

## Results

From the literature search results with systematic literature review techniques obtained 498 articles with the keywords maturity of safety culture and healthcare. Duplicate selection and open access are obtained 480 articles and the we screened (457 articles are not according to population, 18 are not in accordance with

outcome, 1 article is systematic review/literature review and 4 articles are researching not in health services). Two articles are eligible to be synthesized.

The research were obtained from hospitals in United Kingdom and Indonesia. The method of study was pilot study and qualitative research through surveys and interviews with experts about the maturity of patient safety culture. Measuring instruments used in the study are Ma PSCAT (Manchester Patient Safety Culture Assessment Tool) and Ma PSaF (Manchester Patient Safety Framework). Statistical analysis in both journals used univariate analysis and qualitative.

Study by Madelyn P. Law, et al<sup>(16)</sup> showed that the highest Hamilton Health Science (HHS) teamwork is proactive. Design method in the study was pilot study and employed survey using Ma PSaF. Response rates ranged from 33 to 85%, pathological rates 6.14%, reactive rates 10.53%, bureaucratic rates 12.28%, proactive rates 58.11%, generative rates 12.94%.

The second study was by Arum Astika, et al<sup>(17)</sup> showed that modifications Ma PSaF from 10 variables to 24 dimensions in research. There were different definition in 3 variables before and after for reliability in the maturity level. Design method in this study was qualitative research that used experts interview and literature study approach. There is a change in the definition of 5 levels of maturity for 3 dimensions to maintain reliability, such as the priority dimensions of safety, communication and teamwork.

## Discussions

From the results of this study it appears that research on patient safety maturity is still very rare. Safety maturity research was carried out in hospitals and clinics. In the study of Madelyn P. Law, 2010 in the United Kingdom, 10 variables were measured using The Manchester Patient Safety Culture Assessment Tool (Ma PSCAT)<sup>(16)</sup>. Ma PSCAT is a collaboration between researchers in United Kingdom and Canada based on MapSaF. The study was conducted in the form of a survey of hospital workers using patient safety culture maturity instruments (Ma PSaF). There are 10 variables studied related to patient safety. The results of the highest maturity research at the level of Proactive (58.1%), Bureaucratic (12.28%), Generative (12.94%), Reactive (10.53%), Pathological (6.14%). The results describe the level of proactive or generative maturity there are safety priority variables (73.01%), incident

evaluation (68.42%) and collaboration (71.05%). The bureaucratic level includes commitment to continuous development (82.4%), system errors and individual responsibility (96.26%), recording of incidents and best practices (85.84%), learning and effective change (88.29%), safety communication (72.56%) and training and education of workers (82.34%). At the reactive level are management personnel for safety (84.41%).

Arum Astika Research, 2017 in Indonesia, it was conducted qualitatively. Researchers conducted interviews with experts and study literature. The study used a modification of 10 Ma PSaF maturity variables into 24 measured dimensions. And there is a change in definition at 5 levels of maturity for 3 dimensions to maintain reliability, namely the priority dimensions of safety, communication and teamwork. According to NPSA(18), the lowest level of safety culture maturity is Pathological, where patient safety has not been considered. Reactive level if the conditions in a patient safety event. Bureaucratic level if there is a patient safety issue system Proactive level if workers in the organization are alert and think about patient issues that might occur. And at the Generative level where the patient safety system is integrated in the organization.

Maturity models describe the development of an entity over time. This entity can be anything that is interesting such as humans, organizational functions, etc. (19) or a collection of structured elements that describe the characteristics of effective processes at various stages of development. It also suggests demarcation points between stages and the method of transition from one stage to another (20). Maturity models can be used as a tool to assess and make improvements to the organization's culture towards a more mature level of safety [5][20][21]. The measurement of cultural maturity is based on a comprehensive set of criteria, measuring an organization's ability to make continuous improvements (23). Measurements can be made using group discussion method, interviews, questionnaires, audits and checklists (21).

In the field of health services, there are 8 instruments measuring patient safety culture using quantitative method with a Likert scale such as HSOPSC, MSI, SCSu, PSCHO, SCORE, SAQ, Victorian SCS. There is only 1 measurement of patient safety culture maturity using a qualitative method, the Manchester Patient Safety Framework (Ma PSaF). The use of qualitative method can provide an in-depth explanation of worker

perceptions so as to combine quantitative and qualitative method to get a complete picture of safety culture(24). According to Weigman, 2002 explains that to assess safety culture it is necessary to use a combination of quantitative method with structured interviews, surveys and questionnaires as well as qualitative method that can be used by means of observation, FGDs, prior information reviews and case studies. This combination of method is usually known as triangulation (25).

### Conclusions

This study found evidence that hospital-related research on patient safety culture maturity is still very rarely studied. There are no studies in hospitals that combine patient safety with occupational safety and accidents. In the United Kingdom, the maturity of patient safety in hospitals is at a proactive level. In Indonesia there needs to be improvements in terms of commitment, audits, policies, patient safety priorities, risk management systems, patient safety practices, causes of incidents, patient safety culture, feelings and reporting systems, data analysis, focus and results of investigations, incident learning, people in determining changes, communication about patient safety between staff, patients or both.

Based on the two articles found the similarity of basic instruments used in measuring the maturity of a patient safety culture consisting of 10 indicators namely commitment to overall continuous improvement, priority given to safety, system errors and individual responsibility, recording incidents and best practices, evaluating incidents and practices best, studying and influencing change, communication about safety issues, personnel management and safety issues, staff education and training, teamwork. At present the safety culture maturity measuring instrument only prioritizes patient safety. So that further research is needed that can measure the maturity of safety culture in a more comprehensive hospital including patient safety and occupational safety and health (OSH). In the article, the data analysis is still descriptive so further research needs to use statistical analysis to determine the predictors associated with the maturity of patient safety culture.

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# Photographic Description of Mother's Dental Anxiety based on Oral Health Literacy Level in Surabaya, Indonesia

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## Abstract

**Background:** Mothers, the main influencers of their children's development, are thought to be one cause of high anxiety in children. Basic Health Research or RISKESDAS 2018 stated that 93 percent of early childhood, in the age range of 5-6 years, have cavities. Mother's dental anxiety may effects their childrens oral health and hygiene and worsened by lower oral health literacy.

**Aims:** To analyze the relationship of dental health literacy level to maternal dental anxiety in the photographic description.

**Method and Material:** This is a observational analytic research method using a cross-sectional approach, consist by 100 participant mothers of children who visited dental clinic with research criteria, living in the city of Surabaya. Instruments used are MDAS & HELD-IM questionnaire and confirmed by photographic description on mother anxietal face.

**Results:** There is a significant relationship between the variable level of oral health literacy with the variable maternal dental anxiety with a significance value of 0,000 and a correlation coefficient of 0.704. Mother with lesser oral health literacy, have higher level of dental anxiety and confirmed as that by photographic description.

**Conclusions:** In this study, it is found that lesser oral health literacy state plays a role as a risk factor in arising dental anxiety in mother perspective. Dental anxiety of mother recorded (photographed) as if emoticon used in MDAS indicators as it is.

**Keywords:** *Photographic; Dental; Anxiety; Oral; Health; Literacy; Mother.*

## Introduction

Dental anxiety is defined as the patient's response to stress that is specific to the dental situation. There are various psychometric self-assessment scales to assess anxiety in general which usually used for research and clinical purposes to assess dental anxiety<sup>1</sup>.

Research in the United States and in other countries has shown that dental anxiety in adults is widespread and likely to result in worse oral health<sup>2</sup>. In addition, A mother's behavior when caring for her children is considered a natural instinct that leads to a strong emotional connection between them<sup>3</sup>. This can produce negative feelings such as anxiety.

The high prevalence of dental caries in children is caused, among others, one of which is the behavior of the people who are not basic information about the importance of maintaining oral health. Oral Health Literacy (OHL) is a degree of capacity a person has

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to obtain, process and understand basic oral health information and health services needed to obtain appropriate health decisions<sup>4</sup>.

Moreover, Indonesia is the second-least literate nation in the world in a list of 61 measurable countries. It suggested that literate behaviors are critical to the success of individuals and nations in the knowledge-based economics that define the global future. The ability of Indonesians to obtain dental and oral health services can be influenced by the level of oral health literacy.


Oral health literacy can be used to promote oral health so as to prevent oral and dental health problems. In this study, the relationship between maternal dental and oral health literacy levels and dental anxiety experienced by the mother will be analyzed and in this study dental anxiety was confirmed (described) by photographic studies of the mother’s face when filling in the Modified Dental Anxiety Scale (MDAS)

questionnaire. This validation technique is carried out by reviewing the facial expression of the mother when it comes to dental clinic and asked to fill in the MDAS and Health Literacy in Dentistry (HeLD) questionnaire. The mother’s expression can be obtained in the form of factual portraits that can be recorded with human interest photography techniques. Hypothesis of this research is there are correlation between the level of literacy with MDAS.

**Material and Method**

This is a cross-sectional research, in which a total of 100 mother of children 5-6 years age were randomly selected. An assessment is carried out using the Health Literacy in Dentistry (HeLD) & Modified Dental Anxiety Scale (MDAS) to analyze the relationship of dental health literacy with the level of their dental anxiety. Covered by 6 aspects of MDAS, described by table below<sup>5</sup>:

**Table 1. MDAS questionnaire to assess participant’s dental anxiety level**

No.	Questionnaires	Anxiety Level (give on numbers based on your state)					Resp. Answers (Score)
							
		1	2	3	4	5	
1.	Feeling when going to visit the dentist						
2.	Feeling when waiting in line to go to the dentist						
3.	Feeling when going to receive treatment of tooth been drilled						
4.	Feeling when receiving treatment for dental calculus removal						
5.	Feelings when will receive an injection of local anesthetic						

MDAS is a short five-item questionnaire, which is well validated with a 5-point Likert scale response to each question, from one “no worries” to 5”very anxious”. Responses are scored from 1 to 5 have scales range from a minimum of 5 to a maximum of 25. The higher the score, the higher the fear of teeth and the limit point for

fear of high teeth has been suggested on a score of 19<sup>1</sup>.

Maternal dental anxiety levels in this study will be confirmed using facial expression from the mother by photography description, described by visualization of these faces:



**Figure 1. Facial expression visualization sequences according to dental anxiety situation based on MDAS**

**questionnaire**

These 5 faces visualization are photographed when they are being asked about their dental anxiety according to the MDAS scale. Photograph were taken under subject’s consent, using Canon L Series 70-300mm F4 IS USM tele-lens, mounted on Sony A7 mark III Full Frame Mirrorless Digital Camera by Sony E-Mount to Canon EF mount adaptor.

HeLD questionnaire is a development of the Health Literacy Management Scale (HeLMS) which has 29 items to be scaled are designed to assess components of oral health literacy. It can measure the ability of individuals to search for, understand and use health information to determine care. Since the instrument was originally written in English, it was back-translated into Indonesian version and ran by validation and

reliability trial in Surabayan Population Characteristics and resulting in having 26 items of HeLD-IndonesiaN MODIFIED (HELD-IM) which is focused on the ‘Difficulty experienced’.

**Results**

The research was carried out from June to September 2019 at the Mulyorejo Public Health Center in Surabaya. The sample of this study amounted to 100, data collected randomly. The study population was a group of mothers of children aged 5-6 years, who visited with criteria: 1. Living in the city of Surabaya while the research was ongoing; 2. Being in a healthy condition; and 3. Willing to be a research sample participant. The distribution & correlation of the participant’s risk factors according to Oral Health Literacy level & Dental Anxiety Level are given in Table 2.

**Table 2. Percentage distribution & correlation of the participant’s dental anxiety level according to risk factors, towards oral health literacy level**

Risk Factor Variables	Sample Size	Percentage Distribution of HeLD		Percentage Distribution of MDAS		P value HeLD	P value MDAS
		High (Mean 67.6)	Low (Mean 32.2)	High (Mean 54.8)	Low (Mean 46.7)		
<b>Academic Level</b>							
Primary Ed.	79	42.7	48.3	46.8	53.2	0.078	0.098
Higher Ed.	21	47.1	52.9	51.1	48.9		
<b>Job Status</b>							
Unemployed	62	45.6	54.6	73.7	26.3	0.091	0.086
Employee	38	49.3	50.7	68.9	32.1		
<b>Oral Health Condition Self-assessment</b>							
Good	34	66.7	33.3	87.4	12.6	-0.007*	0.032*
Poor	66	24.4	75.6	13.4	86.4		
<b>Historical Dental Visit</b>							
Scheduled/Routine	71	58.3	41.7	17.9	82.1	-0.003*	0.043*
Rarely/Never	39	31.2	68.8	76.3	23.7		
<b>Latest Dental Visit</b>							
6-12 months	60	54.9	45.1	57.4	43.6	-0.005*	0.025*
>1 year	40	23.6	76.4	66.8	33.2		
<b>Experience on Latest Dental Visit</b>							
More Pleasant	44	78.3	21.7	11.2	88.8	-0.012*	0.007*
Less Pleasant	56	34.7	65.3	74.3	26.7		
<b>Delayed visit behavior to the dentist</b>							
Yes	26	56.5	43.5	65.4	34.6	-0.032*	0.021*
No	74	83.2	16.8	80.2	19.8		



These scientific findings of distribution and correlation of oral health literacy variable based primarily on a couple group of risk factors mentioned in table 2. Although the higher the level of one’s education, the higher the level of one’s knowledge would get, the results of this study remarks that the relationship between HELD-IM level and education level is not significant.

Based on table 2 above also, there is a significant relationship between risk factor variables that are inversely proportional between: Oral Health Condition Self-assessment, Historical Dental Visit, Latest Dental

Visit, Experience on Latest Dental Visit and Delayed visit behavior to the dentist, with score levels in dental anxiety and OHL levels in subjects. However, in this study, it was found that there was no significant relationship between economic conditions in this study represented by employment status figures, literacy levels and subjects’ dental anxiety levels.

Based on table 2 it is found that there is a inverse relationship between the self-assessment of oral health with the subject’s level of dental anxiety and the level of literacy on the subject, this is in line with the theory of Bandura (1977) which states that a person is able to regulate the activities required for a particular performance and did it<sup>6</sup>. In addition, the experience of visiting a dentist or being exposed to information from dental medical personnel also contributes to the fluctuation in the value of dental anxiety and oral health literacy as in the table found that subjects who have a routine history of visiting a dentist have a higher level of dental anxiety lower (P = -0.043) compared to those who rarely visited the dentist. Likewise, with the oral health literacy results that those who regularly visit the dentist also have a high level of literacy (P = 0.003). This was also evidenced by the subject’s most recent visit to the dentist if they visited more than 1 year ago, subjects had lower dental and oral health compared with those who had the experience of the last visit in the last 6-12 months.

**Table 3. Percentage distribution & correlation of the participant’s photographic description towards dental anxiety level & oral health literacy level**

Confirmatory Variable	Sample Size	Percentage Distribution of HeLD		Percentage Distribution of MDAS		P value HeLD	P value MDAS
		High (Mean 67.6)	Low (Mean 32.2)	High (Mean 54.8)	Low (Mean 46.7)		
<b>Photographic Description</b>							
Less anxious	12	27.8	72.2	23.5	76.5	-0.244	0.036
More anxious	19	23.2	76.8	79.7	20.3		

Based on the experience of the subject visit to the dentist is illustrated in table 2, that 56% of the subjects had a less pleasant experience during the visit. This risk factor, has the impact of an inverse relationship (P = 0.012) with the level of dental health literacy held by the subjects. This finding is in line with Corah’s (1988) study which states that anxiety related to dental care is a well-known phenomenon that has been reported to cause 6% of the general population to avoid dental care<sup>7</sup>. On the other hand, the experience was linearly proportional to the level of dental anxiety experienced by the subjects (P = 0.007).

It was further translated by table 3 which illustrates that a photographic percentage of people who were slightly anxious had a low level of dental anxiety (P

= 0.036). Based on table 4 also, in people who have a high level of dental anxiety visiting a dentist in this study revealed a visualization of a face that did look more anxious, accompanied by a decrease in the level of dental health literacy (p = -0,244). Added in table 3, for those who also had the behaviour to postpone a visit to the dentist further decreased (p = -0.032) the level of dental and mouth literacy that he had while having a linear relationship to the increase in dental anxiety (p = 0.021).

**Discussion**

Dental anxiety is a phenomenon that often arises in children which is influenced by their mother and it also associated with fewer dental visits, poor oral hygiene

habits and poorer oral health status<sup>8</sup>. The current high rate of dental and mouth disease can be influenced by a number of factors, especially behaviour for understanding basic information about the importance of maintaining oral health.

*Oral Health Literacy* (OHL) is a degree of capacity a person has to obtain, process and understand basic oral health information and health services needed to obtain appropriate health decisions<sup>4</sup>. It is believed that an increase in OHL is associated with better patient-dentist communication, which can contribute to reducing dental anxiety and thereby increasing the likelihood of seeking dental care<sup>9</sup>.

In this study it was found that psychometric assessments using HELD-IM questionnaires were able to show their specificity. This is evidenced by the discovery of the relationship between risk factor variables in the form of self-assessment of oral health, dental history of visits to the dentist, recent experiences when visiting the dentist and delaying visits to the dentist with fluctuations in oral and dental health literacy values and dental anxiety owned.

Based on the results of the validity test of the HeLD questionnaire modified into Indonesian (HELD-IM), there were 26 items that were tested as valid ( $p > 0.3$ ). Based on the results of reliability testing, it is known that the Cronbach alpha number of 26 questionnaire items is 0.817. So this number (0.817) is greater than the minimum value of Cronbach Alpha 0.6. Therefore, it can be concluded that the research instrument used to measure service variables can be said to be reliable.

The educational level variables examined in this study found no significant relationship between differences in education levels and the level of dental health literacy. This is consistent with Sabbahi's (2009) findings that the relationship between OHLI and education level is not significant<sup>10</sup>. OHLI scores were significantly correlated with scores on the TOFHLA ( $q = 0.613$ ) and oral health knowledge tests ( $q = 0.573$ ).

In the study results of the relationship between the level of literacy and dental anxiety possessed by the subjects in this study found a significant relationship between the two ( $p = 0,000$ ). Not only that, this relationship pattern was also reinforced by the visualization of some subjects who did look more photographically anxious and had a significant relationship with their dental anxiety (MDAS) ( $p = 0.036$ ). Dental anxiety is identical

to facial changes. So in this study, maternal dental anxiety levels are confirmed using facial expressions. Likewise in many other researches<sup>11</sup>.

This study uses human interest photography to present activities that can affect emotions and feelings of sadness or joy to see them<sup>12</sup>. Thus, in this study the photographic visualization of the subjects when filling out a questionnaire about dental anxiety experienced was tested in relation to the MDAS number and yielded a significant number linearly related.

## Conclusion

This research, produces a conclusion that dental anxiety possessed by someone in this case the mother has many literative factors that underlie it. If, a mother is more often visit frequency and is exposed to routine and valid dental and oral health information, then it is possible to have lower dental anxiety. The photographic description of the visualization of anxiety faces using photography techniques *human interest* in this study shows that there is a significant correlation between the MDAS questionnaire scores and the linear proportions. However, these two questionnaires (HELD-IM and MDAS), may not be a representation of all regions in Indonesia (because they only involve the people of Surabaya). The limitations of this study, will be even more reduced if other studies are conducted to explore the reliability of the instrument namely HELD-IM, MDAS and confirmed by a sustainable photographic picture in other location settings in Indonesia.

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# Vertical Dimension of Rest (VDR) Analysis Using Photography Application

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## Abstract

Vertical dimension is a vertical height of the face that can be determined by muscle relation and physiologic rest position. Vertical dimension of rest position is usually used as a reference point in vertical dimension of occlusion measurement. The aim of the study was to compare the vertical dimension of rest measurement by phonetic, photograph measurement and photo analysis method. 30 subjects within age 19-25 years, Angle class I malocclusion, has complete teeth, not wear dentures and orthodontics appliances, normal overjet and overbite and no face deformities or asymmetry were measured. Phonetic method was done by measured the distance between tip of nose and chin with digital vernier caliper while subject pronounce the letter m. Subjects were photographed with distance 56 cm from the tip of the nose to the lens while the subjects pronounce letter m. Photograph measurement method, photo was print and the vertical dimension of rest was measured. Photo analysis method, vertical dimension of rest was measured using Corel Draw X5 application. The results of one way ANOVA showed no significant differences between vertical dimension of rest measurement from phonetic, photograph measurement and photo analysis method. In conclusion, there is no vertical dimension of rest measurement differences between phonetic, photograph measurement and photo analysis method.

**Keywords:** Rest vertical dimension, photograph measurement, photo analysis method, phonetic.

## Introduction

World Health Organization in 2000 reported that tooth loss is found in 5-15% of most population.<sup>1</sup> Tooth loss could be caused by trauma, caries and periodontal disease.<sup>2</sup> Full denture is used to restore the function of mastication, phonetic and esthetic.<sup>3</sup> According to Geerts et. al.,<sup>19</sup> the most important procedure in the full denture treatment, is vertical dimension measurement.

Vertical dimension is a vertical height of the face that can be determined by muscle relation and physiologic rest position use of the lower jaw as an indicator.<sup>4</sup> Based on *The Academic of Prosthodontic*,<sup>6</sup> vertical dimension is a distance between two selected anatomic or marked points, one on a fixed and one on a movable member. Vertical jaw relation can be measured in two positions, vertical dimension of rest position (VDR) and vertical dimension of occlusion (VDO).<sup>3</sup> Vertical dimension of occlusion is the height of lower part of the face between two reference points when the tooth in maximal intercuspal position, while vertical dimension of rest is measured when the postural position of the mandible of an individual is resting comfortably in an upright position and the associated muscles are in a state of minimal contractual activity.<sup>6</sup> VDO is constant and can be maintained in an unlimited time.<sup>3</sup>

In long time complete edentulous patients, mandibular will be changed into habitual rest position.

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Physiologic rest position is a jaw position when elevator and depressor muscle in a rest or physiologic condition, balanced tonus and the condyle on relax position in the mandibular fossa.<sup>7</sup> Vertical dimension of rest position is usually used as a reference point in vertical dimension of occlusion measurement.<sup>8</sup> The difference between VDR and VDO is named as freeway space or interocclusal space, which the normal range is 2-4 mm.<sup>3</sup>

Over high of vertical dimension may cause cheek biting, trauma, the increase of facial height, swallowing and speaking problems and clicking of temporomandibular joint. Over low of vertical dimension can cause angular cheilitis, swallowing problem, the decrease of facial height, pain and TMJ clicking accompanied by headache and neuralgia.<sup>3</sup> Support of lip and cheek will be decreased, so that the efficiency of mastication and esthetic will be decreased too.<sup>9</sup> Measurement of vertical dimension can be done directly or indirectly. Direct measurement consists of facial measurement, swallowing method<sup>10</sup>, fonetic method<sup>11</sup>, tactile and biting forces. Indirect measurement of vertical dimension can be conducted by cephalography, digital photo and pre-extraction record.<sup>19</sup> Determine the height of a third lower part of face is an important step in the making of removable denture. There are several method to evaluate and measure the vertical dimension, but none of the method has high accuracy, thus the vertical dimension measurement should be combined with other method to reduce the error that can be happened.<sup>19</sup>

In the digital era, photograph has been used in many dentistry sectors, as in orthodontics, reconstructive surgery and prosthetics.<sup>12</sup> Gomes reported that digital photo is a good representative and significantly more accurate than cephalometric analysis when the measurement in soft tissue is needed.<sup>8</sup> Vertical dimension of rest position measurement by digital photo was done by Gomes with the measurement of distance between outer canthus eye to rima oris and subnasion to menton using *HL image ++97* software.<sup>8</sup> The result of this study showed that the range of the two points was equal. It is known that vertical dimension can be measured with digital camera at the range of shoot is 56 cm from the lens to the tip of the nose. The use of tripod is to stabilize the camera so that there is not a distortion when taking the photo. Vertical dimension can also be obtained from digital photo with the equation:  $N-Sn$  (subject)  $\times$   $Sn-Gn$  (photo) /  $N-Sn$  (photo).<sup>12</sup> (N= nasion; Sn=Subnasal; Gn=Gnasion)

Conventional measurement tool, as a sliding caliper, can injury the patient if it contact with the patient's skin. They are simple and easy to handle. However its is difficult to reset them accurately on the previously marked two reference points and to hold them in place by hand during measurement. Vertical dimension measurement by digital photo can solve the problem, but the accuracy is still questionable.<sup>7</sup>

Although it is accurate, a very difficult procedure will reduce the frequency of usage, whereas an easy procedure will be used more often in vertical dimension measurement. Digital photo is an easy method to measure the vertical dimension, but it is used infrequently.<sup>15</sup> Digital photo can make up the direct vertical dimension measurement, so that the inaccuracy of measurement can be avoided.<sup>16</sup>

## Materials and Method

This research was done on 30 dentistry students of Universitas Gadjah Mada Yogyakarta who meet the following inclusion criteria: 19-25 years, not in orthodontic treatment, Angle class I malocclusion, has complete teeth and does not have face abnormality (birth defects of the face) and asymmetry.

The research was started by preparing the tools and materials which are needed. Those following tools and materials were: digital vernier caliper, diagnostic set, DSLR Nikon 50mm 1.8D camera (Nikon, Japan), tripod, black marker, research form, cotton, alcohol 70%, Dettol antiseptic and informed consent. After that, the researcher gave verbal and written instructions to the subject and did the selection of subject based on inclusion criteria. The subjects that had fulfill the criteria and were willing to be as a subject, were requested to fill and sign the informed consent.

VDR measurement by phonetic method was done by measuring the length between the tip of the nose (pronasal) and the chin (gnathion) of the subject with digital vernier caliper while instructing the subject to pronounce the letter of "m". After that, VDR measurement with photograph measurement was done by taking a photo of the face of subject with range 56 cm from the lens of camera to the tip of the nose while instructing the subject to pronounce the letter of 'm'. The camera was putted on the tripod and subjects were instructed to relax, the head upright, the face perpendicular to Frankfurt Horizontal Plane. Photo was printed by using printer in 5R size (127

x 178 mm) and the photo was calculated to predict the vertical dimension by the formula:

$$\frac{N - Sn(subject) \times tipofnose - Gn(photo)}{N - Sn(photo)} = tipofnose - Gn(subject)$$

Photo analysis method measure the distance between tip of nose and chin with Corel Draw X5 application. The photo was changed to life-size first, then by Horizontal or vertical dimension tool the VDR was measured. All of the measurement was done three times then averaged for all the subjects. The result of the measurement was analyzed by software SPSS 16.0.

**Results**

The result from DVR measurement of phonetic method, photographic measurement and photo analysis method was tested by normality test (Shapiro-Wilk) and homogeneity test (Levene’s test) as a requirement to do the one way ANOVA.

**Table 1. Descriptive statistics of DVR by phonetic method, photograph measurement and digital photo analysis in millimeter.**

Group	N	x	Sb
Phonetic method	30	69,0423	4,54707
Photograph Measurement	30	67,1017	4,38271
Digital photo analysis	30	68,2647	4,66987

The average of DVR from phonetic method was 68.0423 mm, photograph measurement was 67.01017 mm and photo analysis method was 68.2647mm. The average difference from phonetic method and photograph method was 1.03213mm. The average

of phonetic method and photo analysis method was 0.22mm. The average of photograph measurement and photo analysis method was 1.03213mm. The average difference was still in the range of 2 – 4 mm. Thus the value was considered to be neglected.<sup>18</sup>

**Table 2. The comparison between the distance tip of nose-Gn (photo) and tip of nose-Gn (subject).**

N-Sn (subject)	Tip of nose -Gn (photo)	N-Sn (photo)	Tip of nose -Gn (subject)
56,1829	50,36133	42,109	67,10
$\frac{Tipofnose - Gn(subject)}{Tipofnose - Gn(photo)} = \frac{67,10}{50,36133} = 1,33$			

Based on the table 2, the rate of magnification between the distance tip of nose-Gn (photo) and tip of nose-Gn (subject) was 1,33.

**Discussion**

This research was conducted on 30 Dentistry students of Universitas Gadjah Madawith inclusion criteria that had been set before. The election of the subjects’ age

was between 19 – 25 years old, assuming that the growth of the jaw would stop at the age of 12 on the men while the women would stop at the age of 18.<sup>17</sup> Based on Basic Health Research in 2007, loosing entire tooth started at the age of above 25. Thus it is expected that in the range of age 19 – 25 years old, the subjects’ teeth will be complete with the maximum growth. Another inclusion criteria were the subject does not use dentures, not

currently using orthodontics device, malocclusion Angle I and symmetrical face. These criteria put in a place to avoid the difficulty of measuring the vertical dimension which can cause inaccuracies. The use of orthodontia and dentures could transform jaw relation.

The average of DVR from phonetic method was 68.0423 mm, photograph measurement was 67.01017 mm and photo analysis method was 68.2647mm. The average difference from phonetic method and photograph method was 1.03213mm. The average of phonetic method and photo analysis method was 0.22mm. The average of photograph measurement and photo analysis method was 1.03213mm. The average difference was still in the range of 2 – 4 mm. Thus the value was considered to be neglected.<sup>18</sup>

The results of this study indicate no significant differences between the tip of nose-gnathion distances measured on respondents, calculate them on photos and measure them using Corel Draw X5 application. Therefore, the measurement results of the three method were statistically the same. In stages of Maxillo Mandibular Relation on the making of the dentures, the determination and measurement of the vertical dimension of occlusion or rest position can be predicted using the photograph measurement and digital photo analysis. This result was in accordance with Gomes's statement<sup>8</sup> that the picture is a good representation and significantly more accurate than the analysis of the cephalometric when the measurements on soft tissues required.<sup>7</sup> This result also indicated that the distance of the tip of the nose to the chin of the patient can be calculated by using the predictions of the photo. Therefore vertical dimension of rest predicted by the use of photograph application can be used as alternative method of measurement.

The vertical dimension as the distance between the two selected anatomic or marked points, one on a fixed and one on a movable member.<sup>6</sup> Vertical dimension at rest was an important factor in this research, because it is a major guideline in determining vertical dimension in the process of making a complete denture.<sup>3</sup> Phonetic and photo analysis method were chosen as method in this research. Phonetic method is simple, fast and does not require many tools and commonly used.<sup>19,20</sup> Whereas, the photo analysis method is a modification of conventional measurement which able to complete the direct measurement of vertical dimension. Thus, inaccuracy in the results could be avoided.<sup>15</sup>

VDR measurement can be done in various ways. An accurate result needs a difficult measurement. Unfortunately, the difficult measurement will reduce the frequency of use. Otherwise, a simple way will be frequently used in determining the vertical dimension. One convenient way of measuring the vertical dimensions at rest is the phonetic method which is a direct measurement. An easy but rarely used measurement method is digital photo analysis.<sup>16</sup> Digital photo can complement direct vertical dimensional measurement. Thus, the inaccuracy in measurements can be avoided.<sup>15</sup>

The face measurement and the photo taking were performed on subjects with upright head and rest jaw position. The slightly bent head position reduced the vertical dimension at rest while the backward head position rose up the vertical dimension at rest.<sup>10</sup> Meanwhile, another research used Corel Draw to measure the vertical dimension of occlusion from the digital photo. This software is commonly used to edit pictures, but this software is also able to measure certain points on the face.<sup>18</sup>

This research used an one way ANOVA to determine whether there was a difference in the average value of the vertical dimension at rest between the phonetic method, photograph measurement and digital photo analysis. The results showed there was no significant difference between them ( $P > 0.05$ ). Through this test, it was concluded that the measurement of vertical dimensions using photograph measurement and digital photo analysis can be used as an alternative method. This result was suitable with Tjahjanti's report. The research said that photo profiles could be used as one method to get the vertical dimension.<sup>16</sup> Moreover, the correlation is not tested in this research. Thus, this research does not provide the information on how good the method is. Phonetic method was done by measuring the distance between the tip of the nose and the chin. The measurement can be done by using digital Vernier caliper. The lack of this method is the large of the results range and varied. This method depends on the operator capability. Moreover, there is a difficulty on applying the same measurement point at the same time and the unstable of supporting tools (the tools need to be held by the hand). Different emphasis on soft tissue also caused variations in measurement results. The measurement of vertical dimension by using digital photo analysis will give the result within a range which are closer to each other in repeated measurements. Ruler in Adobe

Photoshop will eliminate the emphasis on soft tissue,<sup>7</sup> nevertheless this method requires more sophisticated tools.

The use of Corel Draw is commonly used, cheap and easy to apply. Identify the tip of the nose and chin is done by looking at the marks that have been given using black markers before the photo taking is done. Measurement through phonetics and photo analysis method was done with three times. The means of each subject measurement were analysed by SPSS. This was done to minimize errors.<sup>18</sup> Measurement of vertical dimensions with a combination of several method is recommended to minimize errors.<sup>5</sup>

### Conclusion

The conclusion suggests no significant differences among VDR measurement and phonetic method, photograph measurement and digital photo analysis. The vertical dimension of rest can be predicted from photograph measurement and digital photo analysis using the formula  $N-Sn(\text{subject}) \times \text{tip of the nose} - Gn(\text{photo}) / N-Sn(\text{photo})$ .

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**Ethical Clearance:** This study has received ethical clearance from Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia, by number: 001358/KKEP/FKG-UGM/EC/2018.

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# The Correlation between Joint Sound Versus Temporomandibular Opening Index (TOI) on Cases of Maxillary and Mandibular Teeth Loss

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## Abstract

Temporomandibular disorder (TMD) is a condition that affects adjacent masticatory or temporomandibular joints (TMJ) including the entire tissue. Evaluation for TMD includes lateral jaw movement, protrusion and maximum mouth opening. Dysharmony in one or more of that evaluation can be a TMD indicator. The aim of study was to understand the correlation between joint sound against Temporomandibular Opening Index (TOI) on cases of maxillary and mandibular teeth loss. Subjects were taken from Yogyakarta province. There were 40 subjects was divided to be four groups include 10 lost two quadrants of posterior teeth for 18 months, 10 lost one quadrant of posterior teeth for 18 months, 10 lost two quadrants of posterior teeth for 12 months and 10 lost one quadrant of posterior teeth for 12 months. Mouth opening were measured by active and passive means followed by inserting into a formula to acquire TOI. The temporomandibular joint sound was observed by special prototype of electrosonography and processed with Matlab software to acquire the data. The joint sound was carried out on both sides. The data were analysed by SPSS 16.0 program using regression test to obtain the correlation between TOI and joint sound. The level of significant was set at  $\alpha=0.05$ . Results revealed means of TOI on all groups showed significant differences of positive correlation between frequency and amplitude of joint sound ( $p<0.05$ ). In conclusion, joint sound has a positive correlation with TOI in cases of maxillary and mandibular tooth loss.

**Keywords:** Temporomandibular joint, TOI, TMD, joint sound.

## Introduction

The joint of the human body that is having the most complicated work mechanism is the temporomandibular joint. There are two actions that can be performed by this joint, rotation and translation movement (sliding). This joint can provide a very large chewing force causing

rotation at the bottom of the joint cavity. Some of the components of the temporomandibular joints including skeletal components (temporal and mandibular muscles), articular discs, various ligaments and muscles.<sup>1</sup> TMD could be caused by several factors. Occlusal factors are one of them. The occlusal factor may affect the incidence of TMD<sup>2</sup>, the number and quadrant of loss of two teeth associated with decreasing vertical height, number of teeth contacted and malocclusion disorder.<sup>3</sup> When molars are missing, they will move to the correct position when touching the teeth and change the movement and position of condyles.<sup>4</sup>

The imbalance of vertical dimension reduction and occlusion causes tooth movement which may be resulted by the loss of molars of the second molar and third molar. According to Effat<sup>5</sup>, movement occurs due to changes in the, frequency, direction, and surface of the

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pressure absorbed by the teeth. The pressure absorbed by the tooth can result into a biomechanical change of the mandible.<sup>3</sup> Assessments that could be performed to confirm the condition of TMJ are the lateral movement of the jaws, the formation of protrusions and opening the mouth to the maximum. The presence of disharmony in one or all of these movements indicates TMD.<sup>6,7</sup>

There are various ways that temporomandibular joint mobility could be analyzed. Dijkstra<sup>7</sup> compared four measurement methods include the measurement of mouth opening angle, linear opening width measurement, condylar mobility measurement and radiographic examinations of the temporomandibular joint mobility. In addition to these four measurement methods, other measurement methods such as measuring the mandibular deviation or calculating the submandibular jaw opening index (TOI), by measuring the widths of the active and passive openings.<sup>9</sup> Many advantages of TOI assessment are found. This method can be used to evaluate the success of treatment of TMD patients and is independent of the length factor of the mandibular anterior teeth or gonial angle where these factors account to the extent of the effect of the linear opening. In addition, special instruments such as cephalogram, mandibular bone goniometer, mandible excursiometer are not necessary, resulted in measurement that is easier and less expensive.<sup>9,10</sup>

Atrophy of the condylar intervertebral disc complex arises from the collapse of the normal rotational movement of the intervertebral disc on the condyles. Thinning of the posterior boundary of the intervertebral disc can cause the disc to displace to a more posterior position. If the condyle rests on the posterior side of the intervertebral disc or posterior disc tissue, abnormal translational movement of the condyle to the trailing edge of the intervertebral disc can occur during the opening. Clicks are associated with abnormal condylar movements, which may be felt as a single click while opening for the first time, but later felt during opening and closing of the mouth.<sup>7,11</sup> TMJ sound is very common among patients with TMD, but it is also common in non-patient populations. Various causes of TMJ sound are suggested. TMJ's joint deformation, anatomical changes, muscle discordance and intervertebral disc replacement.<sup>12</sup> Clicks and creping are regarded as signs of morphological changes and displacement of the anterior disc with arthropathy.<sup>13</sup>

The purpose of the study was to examine the relationship

between TOI and joint sound that can lead to a reliable evaluation method to assess TMD patients in the future.

## Materials and Method

A cross-sectional study was conducted in this study. Subjects were obtained from the population of Yogyakarta city. All subjects received sufficient information on the research procedure and signed an informed consent. The ethical clearance was delivered from Prof. Soedomo Dental Hospital Ethics Committee. Forty subjects were divided into 4 groups including 10 who lost the two quadrants of posterior teeth in 18 months. Ten people had lost one quadrant of posterior teeth for 18 months. Ten people had lost the two quadrants of posterior teeth for 12 months. Ten people had lost one quadrant of posterior teeth for 12 months. The inclusion criteria were the minimum age is 18 years old, patients who have undergone loss of the maxillary and mandible (bicuspid and molar) unilateral free end or bilateral free end, she/he has one or more TMD signs and symptoms as joint pain, joint sound and opening restriction, subjects lost posterior teeth for 12 months or 18 months and the upper and lower jaw still have complete teeth. However, the exclusion criteria included patients who are wearing a denture and they had previous orthodontic treatment and patients have a habit of bruxism.

Passive and active openings were measured by a digital caliper (electronic Digital Caliper, Hong Kong). After repeating the measurement three times, the average value was calculated with the formula:  $TOI = \frac{\text{passive mouth opening}}{\text{passive entrance} + \text{active mouth}} \times 100\%$ .

**Opening width measurement:** Measurement of oral opening width was carried out with a method like patients were asked to sit upright with a comfortable posture. To obtain the active mouth opening width, the patient was instructed to maximally open the mouth without operator assistance. Using the digital caliper, the active mouth opening width (mm) was measured from the mesioincisal edge of the mandibular central incision in the margin of the cusp center. Measurement was performed three times and an average value was taken. Active mouth opening width (mm) was measured from mesioincisal edge of maxillary central incisor to mesioincisal edge of mandibular central incisor using digital caliper. To get the passive opening width, the patient was instructed to open the mouth to its maximum. Thereafter, the thumb of the operator was placed in the upper incisor, the index finger was placed

in the lower incisive and the operator applied pressure to the jaw so that the lower jaw moved further to the upper jaw. Passive mouth opening width was measured from mesioincisal edge of maxillar central incisive to mesioincisal edge of mandibular central incisive using digital caliper.

**Recording of temporomandibular joint sound:**

Joint sound was measured when opening and closing the mouth from the right left Temporomandibular joint, the sound will be recorded in frequency and amplitude. Joint sounds can be obtained with a special instrument ordered in electronic instrumentation study program in mathematics and science faculty at Universitas Gadjah Mada.

**a. Objective examination**

1. Re-examination to ensure loss of posterior teeth using a diagnostic set.
2. Re-examination of the sound of the temporomandibular joint. Examination was done in two stages. First, a stethoscope was used to determine the presence or absence of joint sounds and then an electrosonographic prototype was delivered to listen and ensure the presence of joint sounds. Examination of joint sounds was performed on both sides of the temporomandibular joint.

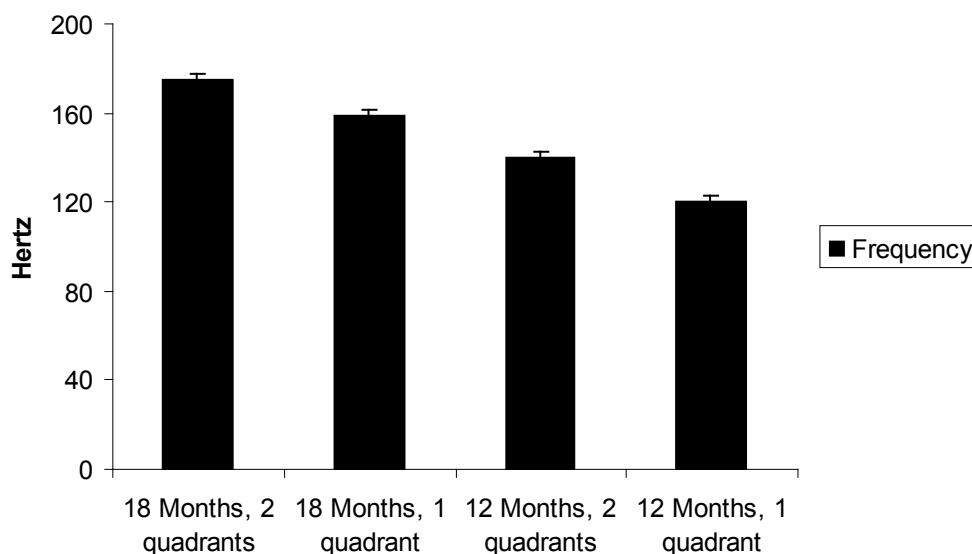
**b. Sound recording**

1. Subjects were asked to attach an electrosonographic prototype earpiece to the external acoustic meatus to feel like using an ear plug.
2. Subjects were instructed to open and close the mouth following the movement of the metronome of 5 times. The maximum mouth opening was as wide as possible that the subject can do.
3. Recording the sound of the temporomandibular joint as well as examining the sound produced by the hands free on both sides of the temporomandibular joint.

The recorded temporomandibular joint sound was analyzed by the Matlab program (The Math Works Inc, Masachussets, USA). The analysis data were done by comparing the TOI of the 4 groups. Firstly, the data were tested for normality and homogeneity using Levene’s test and Kolmogorov-Smirnov test. Regression and corellation test were done to understand the correlation between TOI and joint sound test with  $\alpha = 5\%$ . The software used for data analysis is SPSS 17.0 (IBM, New York, USA).

**Result**

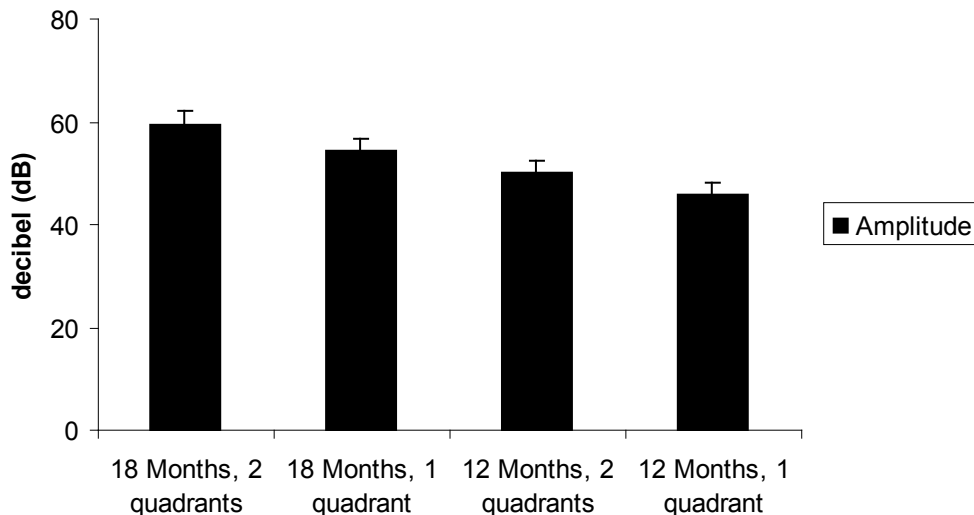
Measurement of joint sound, quadrant number and time length of teeth loss was explained in Figure 1.



**Figure 1. Mean and standard deviation (X ± SD) of requery of joint sound, quadrant number and time length of teeth loss.**

Based on Figure 1, the frequency of patient losing teeth for 18 months on two quadrants was  $174.81 \pm 0.77$ . The frequency of patient losing teeth for 18 months on one quadrant at  $158.89 \pm 0.41$ . The frequency of patient losing teeth for 12 months on two quadrants was  $140.26 \pm 0.40$ , The frequency of patient losing teeth for 12 months on one quadrant was  $120.16 \pm 0.37$ . These values shown a specific pattern, that was the joint sound (frequency and amplitude) of patient losing teeth for

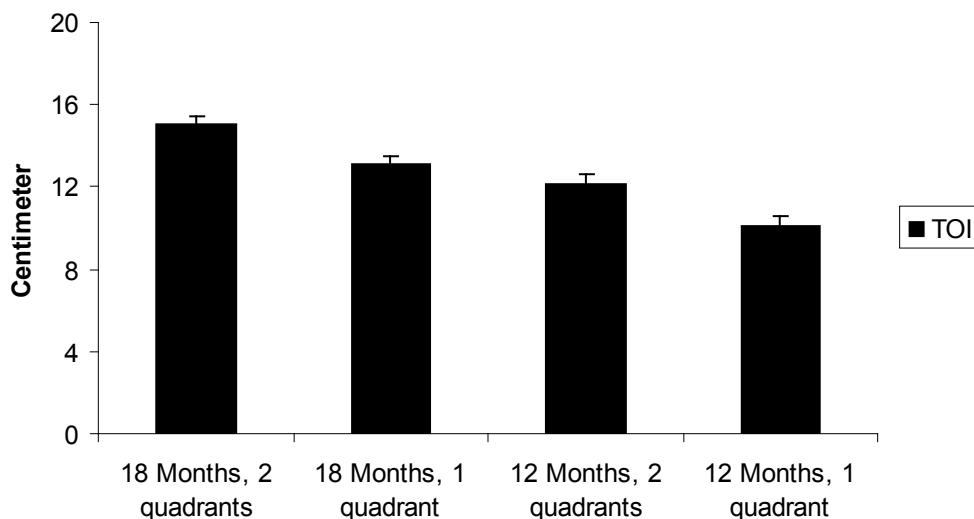
18 month on two quadrants was more than patients losing teeth for 18 months on one quadrant, 12 months on two quadrants and 12 months on one quadrant. The joint sound of patients losing teeth for 18 months on one quadrant was more than patients losing teeth for 12 month on two quadrants and 12 months on one quadrant. The joint sound of patients losing teeth for 12 months on two quadrants was more than patients losing teeth for 12 month on one quadrant.



**Figure 2. Mean and standard deviation (X ± SD) of amplitude of joint sound, quadrant number and time length of teeth loss.**

As seen in Figure 2, the amplitude of patient losing teeth for 18 months on two quadrants was  $59.26 \pm 0.86$ , for 18 months on one quadrant at  $54.38 \pm 0.29$  and for

12 months one two quadrants at  $50.08 \pm 0.46$  and for 12 months on one quadrant was detected at  $45.70 \pm 0.44$ .



**Figure 3. Mean and standard deviation (X ± SD) of Temporomandibular Opening Index (TOI), quadrant number and time length of teeth loss.**

As shown in Figure 3, TOI value for patient that losing posterior teeth for 18 months on two quadrants was  $15.06 \pm 0.34$ . TOI value for patient with losing the posterior teeth for 18 months on one quadrant was  $13.07 \pm 0.44$ . TOI value for patient with losing posterior teeth for 12 months on two quadrants was  $12.14 \pm 0.50$ . TOI value for patient with losing posterior teeth for 12 months on one quadrant was  $10.08 \pm 0.52$ . Moreover, TOI value for patient with losing posterior teeth for 18 months on two quadrant was more than patient that losing posterior teeth for 18 months on one quadrant, 12 months on two quadrants and 12 months on one quadrant.

Regression and correlation value of patients with losing posterior teeth on various time length and quadrant. The regression value that states significance ( $p < 0.05$ ) between TOI and joint sound (frequency and amplitude) was shown on patients that losing posterior teeth for 18 months on two quadrants, 18 months on one quadrant and 12 months for two quadrants. The negative sign of correlation shown negative relationship between TOI of various time length and quadrant with joint sound (frequency and amplitude). Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was  $-0.23$  (-23%), it means there were 23% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was  $-0.27$  (-27%), it means there were 27% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on two quadrants was  $-0.33$  (-33%), it means there were 33% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was  $-0.34$  (-34%), it means there were 34% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was  $-0.58$  (-58%), it means there were 58% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was  $-0.55$  (-55%), it means there were 55% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was  $-0.78$  (-78%), it means there were 78% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior

teeth for 12 months on one quadrant was  $-0.66$  (-66%), it means there were 66% contributing factor of smaller TOI on higher amplitude.

## Discussion

The results of the study showed that there was an influence between the number of quadrants and the length of posterior on patient's Temporomandibular Opening Index (TOI) with joint sound (frequency and amplitude). The lower of TOI value showed the lower mouth opening resulted in higher frequency and amplitude. The regression test showed a higher negative correlation between a longer period of losing teeth on more quadrant.

Temporomandibular joint disorders are classified into 2 include intrinsic disorders (originating from intra-articular) and extrinsic disorders (extra-articular origin). Intrinsic factors are related to conditions that occur in the joint capsule, while extrinsic factors are not directly related to the temporomandibular joint. The existence of these extrinsic factors can cause disruption in the temporomandibular joint.<sup>8,9,10</sup>

Assessment of mouth opening limitations plays an important role in the clinical examination of the masticatory system. This is based on the width of the maximum mouth opening describing the capacity of the condyle to translate in the joint. Muscle contractions with myospasm or fatigue can induce pain, so that the movement of mandibular patient will be limited for reducing the pain. Clinically, inability to open the mouth in the normal range will be assessed. Hyperactivity of the masticatory muscles can induce the spasm, pain and fatigue, so that the width of the active mouth opening will decrease.<sup>9,10</sup>

The low score of TOI in TMD occurs as a protective mechanism of pain. Antagonistic muscle contraction and changes in muscle structure will cause decreased of the active opening width. The difference in the width of the passive and active mouth openings in the TOI calculation was a reference to assess the tissue elasticity. Increased of mouth opening differentiation showed the difference of muscle activities in each patients. The mechanism of protective contraction caused an increase in the activity of the antagonistic jaw muscles. The TMD structural changed such as shortening of the jaw muscle was correlated with contributing to jaw excursion sripped.<sup>9</sup>

TOI has simple method, fast, inexpensive and it is a

reliable indicator to determine the range of mandibular condyle movement and limited mandibular motion in patients with temporomandibular joint disorders.<sup>8</sup> The method has many advantages because it does not depend on the anatomy and morphology of facial bones. This method can help classify of the patients into the difference of temporomandibular joint disorders diagnosis suggesting it can provide the clinical benefits.<sup>10</sup>

### Conclusion

Negative correlation was detected between TOI and joint sound caused by TMD followed by the reduction of active mouth opening. Interestingly, the lower of TOI showed the higher of the frequency and amplitude of patient joint sound.

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**Conflict of Interest:** The authors declare no conflict of interest.

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# Correlation between Duration of Work and Hand Position Using Computer with Carpal Tunnel Syndrome (CTS) at the Registration Administration Officer in Dr. Soetomo General Hospital Surabaya

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## Abstract

**Background:** Carpal tunnel syndrome (CTS) is commonly reported among professional computer users. Repetitive work is a widely known risk factor for occupational CTS. Administrative staff for patient registration is one of the jobs in Dr. Soetomo General Hospital that deals with repetitive data entry work in terms of long-term use of computers.

**Objective:** This study aims to determine the relationship between length of work and hand position of computer use with the incidence of carpal tunnel syndrome in administrative registration staff at Dr. Soetomo Hospital Surabaya.

**Method:** Clinical examination and nerve conduction study (NCS) observes 60 hands of 30 registration officers with computer users at Dr. RSUD Dr. Soetomo Surabaya that fulfills the inclusion and exclusion criteria from period of the October-December 2012.

**Results:** The average age of the study subjects was  $37.80 + 10.841$ . The subjects of the study consisted of 54 women and 6 men. The average length of work in the year is  $9.75 + 8.36$ . The average working hour / day is  $6.02 + 1.367$ . The frequency of the most extension hand position with 68.3%, the incidence of 92.9% for the occurrence of CTS work duration > 3 years was significant with  $P = 0.005$ , RO 8,273 (95% CI 1,829-37,410). The incident rate is 89.6%, for the occurrence of CTS at staff with working years > 4000 hours, gets result of  $P = 0.021$ , RO 6.143 (95% CI 1.406-26,842). The incident of 87.8% for the occurrence of CTS with extended hand position, gets insignificant result with  $P = 0.263$ , RO 2.571 (95% CI 0.644-10.270).

**Conclusion:** There was a significant relationship between length of work and the incidence of CTS and there was no relationship between extension hand position and incidence of CTS.

**Keywords:** *Duration of Work, Hand Position, CTS Occurrence.*

## Introduction

Computers are used in offices around the world, for the last few decades there has been a rapid increase in computer-related work demands. Several studies have reported a positive relationship between computer use and musculoskeletal symptoms<sup>(1)</sup>. CTS is commonly reported among professional computer users among musculoskeletal disorders. Repetitive work on the hands causes a variety of changes to the carpal tunnel that could

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cause the CTS. Repetitive was a widely recognized risk factor for occupational CTS due to the increased pressure on the carpal tunnel. The cause of trauma was a hand movement that has been identified as a disturbing factor for CTS occurrence especially in people who work repetitively requiring strength of the fingers and flexion-extension of the wrist.

The compression of the median nerve in the wrist was the most common compression neuropathy and, consequently, was one of the most common reasons for electro diagnostic examination. Almost all patients have compression sites that usually occur in the carpal tunnel resulting in a set of symptoms and signs called carpal tunnel syndrome.

Soetomo General Hospital Surabaya is a type A referral hospital for Eastern Indonesia that uses computerization in its service administration. The patient registration administration officer is one of the jobs in Soetomo General Hospital which is related to repetitive data entry job in long term computer usage<sup>(2)</sup>.

Therefore, the researcher wanted to know the correlation between the duration of work and hand position of computer usage with the incident carpal tunnel syndrome (CTS) which evaluated by electro diagnostic nerve conduction study (NCS) on median wrist nerve in the form of distal latency and  $\Delta$  SNAP at the registration administration officer in Soetomo General Hospital who uses the computer in its activity.

### Method

This study was an observational analytic study that aims to find the correlation between the duration of work and the hand position using a computer with the incidence of carpal tunnel syndrome (CTS) at the registration administration officers in Soetomo General Hospital Surabaya. The cross sectional study was used in this study because it was considered in accordance with the purpose of research which was to know the correlation between two variables at one time. In addition, this design was relatively easy, fast, and rarely threatened to drop out. Consecutive sampling was used as a method of selecting samples because this method was the best of non-probability sampling and easy to do<sup>(3)</sup>.

This study used cross sectional study because it was considered in accordance with the problems studied and the objectives to be achieved. The sampling of the

research was conducted in the Section of Registration of Patients and Neurology Polyclinic at Soetomo General Hospital, while the NCS recording was done in EMG Room of Soetomo General Hospital Surabaya<sup>(4)</sup>.

**Population and Sample:** Population in this research was administration officer of patient registration using computer in Soetomo General Hospital. While the samples were the administrative officers of patient registration using both mouse and keyboard computers that fulfilled inclusion-exclusion criteria. The inclusion criteria were the registration administration officers in Soetomo General Hospital using computer in their duties, aged 18 - 56 years, has worked for a minimum of 6 months, and was willing to follow the research. While the exclusion criteria as follows officers who have experienced trauma (carpal or radius fracture), neoplasms, and arthritis; and officers with CTS but did not want to do the NCV screening.

Moreover, the sampling from consecutive admissions was used until the number of samples has been determined. Preliminary research was conducted to determine the sample size. Based on the calculation obtained the required sample size was 12 of each proportion. Then, the total samples obtained were 60 officers in this study. Later on, the results of the preliminary research obtained the required sample size of each proportion was 12 along with the total sample that obtained during this study was 60 consisting of 6 men (10%) and 54 women (90%). That happened because this research was a cross sectional studies which recording and measuring variables at one time simultaneously<sup>(5)</sup>.

The sampling of the research was conducted in the Section of Registration of Patients and Neurology Polyclinic at Soetomo General Hospital, while the NCS recording was done in EMG Room of Soetomo General Hospital Surabaya from October to December 2012.

**Research Variables:** The independent variables in this research were the duration of work and hand position of computer usage at the administrative officers of patient registration in Dr. Soetomo General Surabaya. While the dependent variables was the incidence of CTS based on the NCS value of the median nerve wrist by the antidromic examination of the IV finger<sup>(6)</sup>.

The operational definition for the variable of the patient registration administration officer was the officer whose daily activities related to the administration of the

patient using computer in both the mouse and keyboard at least in the last 6 months. The duration of work was a routine activity related to the use of computers. The position of the hand was a habit of hand position when the working using a computer<sup>(7)</sup>. Flexions and neutrals were the position between the forearm and hand in straight position with no flexion/extension on the wrist.

CTS was an entrapment neuropathy by the median nerve compression that were diagnosed with anamnesis (pain or thickness on the anterior surface of the thumb, index finger, middle finger and half radial of ring finger a few weeks earlier), physical examination (positive sign of Tinel or Phalen) and was proved by using nerve conduction study<sup>(8)</sup>.

**Table 1. The Nerve Conduction Study (NCS) assessment of the median wrist nerves**

	Normal (msec)	Mild (msec)	Moderate (msec)	Severe (msec)
DL CMAP	< 4	4	4-6	>6
Δ SNAP the median-ulnar nerves	< 0,4	0,4	0,4-2	>2

Table 1 shows that the Nerve Conduction Study (NCS) assessment of the median wrist nerves using IV finger antidromic examination and normal assessment of CTS (mild, moderate, severe)

**Data Collection:** Prior to the data collection, all subjects which included in the inclusion criteria were briefed on the purpose, usefulness, and risk of the research, then asked to follow the study without coercion. At the end of the explanation, the subjects were asked to read the research descriptions. If the subjects have been understood, they were asked to sign the statement of consent to participate in research. However, if there were things that have not been understood or less clear then it could be asked back to the doctor who gave an explanation<sup>(2)</sup>.

The subjects who have signed a letter of approval will be recorded in the form of identity and characteristics. The data were collected by the author and other resident doctors with the following steps; conducting anamnesis, physical and neurology examination, selecting the samples for the experimental group according to the inclusion and the exclusion criteria, data collection, nerve conduction study (NCS) examination, and lastly, all results were collected for the data tabulation and the statistical analysis. The correlation between working duration and hand position with CTS incidents assessed with NCS median nerve wrist was analyzed by fisher test because it did not meet the requirements of chi square test<sup>(9)</sup>.

**Result**

**Table 2. Fisher Test Analysis between the Work Duration with the Incidence of CTS**

		CTS Incident				P
		Normal		CTS		
		N	%	N	%	
Work Duration	< 3 years	7	38,9	11	61,1	0,005
	>3 years	3	7,1	39	92,9	

Additionally, 11 subjects with a working duration <3 years experienced CTS (61.1%) whereas CTS incidence in long-term officers >3 years was found in 39 subjects (92.9%). The correlation between the working duration and the CTS incidence was analyzed by Fisher test that resulted in a significant difference with P =

0,005 (significance Fisher) and odd ratio of 8,273 (95% CI 1,829-37,410).The duration of work was calculated based on the working duration in year multiplied by the mean of working duration each subject in hours for each day was (276 effective working days in a year).

**Table 3. Fisher Test Analysis between the Work Duration in the Year/Hours with the Incidence of CTS**

		CTS Incidents				P
		Normal		CTS		
		N	%	n	%	
Work Duration	< 3000 hours	4	40,0	6	60,0	0,052
	>3000 hours	6	12,0	44	88,0	
Work Duration	< 4000 hours	5	41,7	7	58,3	0,021
	>4000 hours	5	10,4	43	89,6	

Tabel 4 shows that CTS incidence was experienced by 6 subjects with duration of <3000 hours (60%) and 44 subjects with duration >3000 hours (88%). The correlation between the working duration in year/hours and the CTS incidence was analyzed by Fisher test that resulted in no significant difference with P=0,052 (significance valueFisher) and odd ratio of 4,889 (CI

95% 1,063-22,484). CTS incidence was experienced by 7 subjects with duration of <4000 hours (60%) and 43 subjects with duration >4000 hours (88%). The data analysis of the correlation between the working duration in year/hours and the CTS incidence was a significant difference with P=0,021 (significance valueFisher) and odd ratio 6,143 (CI 95% 1,406-26,842).

**Table 4. Fisher Test Analysis between Hand Position with CTS Incidents**

		CTS Incidents				P
		Normal		CTS		
		N	%	N	%	
Hand Position	Normal	5	26,3	14	73,7	0,263
	Extension	5	12,2	36	87,8	
<b>Total</b>		<b>10</b>	<b>16,7</b>	<b>50</b>	<b>83,3</b>	

Table 5 shows that 14 subjects experienced CTS incidence in normal hand position (73.7%) and 36 subjects with extension hand position experienced CTS incidence (87.8%). Fisher test was performed to see the correlation between the hand position and the CTS incidence which resulted in no significant difference with P = 0,263 (Fisher significance value) and odds ratio 2,571 (95% CI 0,644-10,270).

computers usage have the risk factors for CTS events after examination with a nerve conduction study (NCS). This was consistent with a study by Ali KM who found that working with computers was 2.4 times more likely to have CTS (95% CI 1.4-3.8). The administrative activity was a repetitive activity with stress and mechanical stress, constantly typing and using the mouse, compared to other computer users<sup>(12)</sup>.

**Discussion**

The data above shows that women have higher risk to get the symptom because it was likely due to the use of intensive and repetitive hand in doing housework, typing and other work traditionally that done mostly by women<sup>(10)</sup>. This might be part of the explanation of why the prevalence of CTS in women was way greater than in men<sup>(11)</sup>. Moreover in this study, both working duration in years and in year/hours associated with the

The extension hand position risk for CTS incidence in this study was not statistically significant, but the proportion in this group (87.8%) was higher than the normal position (73.7%). These results were consistent with the results of Ali KM’s study which have a higher risk for CTS but did not statistically significant. The position of the extension hands while working using the computer causes the carpal tunnel to narrow compared to the neutral position (13) This requires ergonomic attention. Keeping hands neutral while working with a

computer could be facilitated by using adjustable seats and the proper positioning of the keyboard and mouse. Creating awareness among computer professionals to keep the hands in a neutral position was also important<sup>(11)</sup>.

The results of this study implied that CTS was an important musculoskeletal problem in administration officers who use computers. CTS have been reported to be a painful condition with numbness and tingling in the hands and an important cause of an occupational disability<sup>(14)</sup>. Therefore, it was important to make an early diagnosis of CTS in administration officers who use the computers based on clinical symptoms and examinations to prevented the development of working disability. It was also important to study the relationship of further risk factors, as well as the implement ergonomic rules to relieve suffering and pain<sup>(15)</sup>.

However, this study still has limitations, firstly, the predominant population was female. Based on a comparison study of CTS between men and women, it was not clear whether the results of this study could be generalized to the male population. Secondly, electro diagnostic standard was used in this study to diagnose CTS. Then, Thirdly, the positioning of the hands did not use a detailed angle.

### Conclusion

There was a correlation between the working duration both in years and in year/hours with CTS incidences based on NCS median nerve results. Also, there was no correlation between extension hand position when using computer with CTS occurrences based on NCS median nerve wrist results at registration administration officers in Soetomo General Hospital Surabaya.

**Ethical Clearance:** The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

**Conflict of Interest:** There is no report of conflict of interest so far and this paper is 100% original and never been published before elsewhere.

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# A Preliminary Study: Troponin T and Reg3 $\beta$ in Children with Left-to-Right Shunt Congenital Heart Disease with Heart Failure

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## Abstract

**Background:** Congenital heart disease (CHD) cause heart failure and myocardial injury. Troponin in the heart is a biomarker of myocardial injury in adults and children. Studies that examine troponin T and Reg3 $\beta$  in children with left-to-right shunt CHD with heart failure are still limited.

**Objective:** This study aims to analyse the troponin T and Reg3 $\beta$  in children with left-to-right shunt CHD with heart failure compared to children without heart failure.

**Method:** This study was a case control study of children with left-to-right shunt CHD with heart failure and children with left-to-right shunt CHD without heart failure performed with non-random sampling consecutive techniques at the Dr. Soetomo General Hospital, Surabaya in April–June 2019. The diagnosis of left-to-right shunt CHD was determined based on echocardiographic examination. All subjects with left-to-right shunt CHD were evaluated using the Paediatric Heart Failure Score. Troponin T examination was carried out using a one-dimensional electrophoresis technique, which is 12% sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE). Reg3 $\beta$  examination was carried out by the ELISA method. Data analysis was performed with an independent sample t test using the SPSS.

**Results:** This study involved 11 children, consisting of 7 children with left-to-right shunt CHD with heart failure and 4 children with left-to-right shunt CHD without heart failure. Most children (72.7%) were female, 3 children (27.3%) were  $\leq$  5 years old, 5 children (45.4%) were 5–10 years old and 3 children (27.3%) were  $>$  10 years old. There was a significant increase in the Troponin T and Reg3 $\beta$  in children with left-to-right shunt CHD with heart failure as compared to children without heart failure.

**Conclusion:** Troponin T and Reg3 $\beta$  can be used as biomarkers in children with left-to-right shunt CHD with heart failure.

**Keywords:** Congenital Heart Disease, Troponin T, Reg3 $\beta$ , Heart Failure.

## Introduction

Congenital heart disease (CHD) is a congenital disorder that often occurs in children<sup>1</sup>. Excessive pressure and volume in children with CHD creates the risk of injury to the myocardium<sup>2</sup>. Troponin in the heart is a biomarker of myocardial injury in adults<sup>3</sup>. Injury to the myocardium is the cause of elevated troponin levels in 60% of cases<sup>4</sup>. Studies in children mention the role of troponin as a diagnostic marker of myocarditis in children<sup>5</sup>.

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Injury to the myocardium raises the body's response by triggering proliferation, phagocytosis and M2 macrophage polarization<sup>6</sup>. This role is mediated by Reg3 $\beta$ , which is increased due to cardiac inflammation<sup>7</sup> and provides a protective mechanism when cardiac injury and stress occur<sup>6</sup>. Previous studies have mentioned an increase in the level of injured Reg3 $\beta$ <sup>8</sup>.

Several studies of biomarkers of myocardial injury have been carried out to predict the prognosis and improve outcomes in patients. Troponin T is associated with the degree of myocardial damage and can predict morbidity and mortality due to heart disease<sup>9</sup>. Troponin T is associated with prognosis and mortality in heart failure<sup>10</sup>. Another study stated that Reg3 $\beta$  can be used as a prognostic factor in mortality in patients with acute coronary syndrome<sup>7</sup>. Studies that examine troponin T and Reg3 $\beta$  in children with left-to-right shunt CHD with heart failure are still limited.

### Material and Method

This research was a case control study conducted at the Paediatric Cardiology Outpatient Clinic, Emergency Room and Paediatric Ward, Dr. Soetomo General Hospital, Surabaya in April–June 2019. Subjects were children with left-to-right shunt CHD with heart failure with a comparison group, children without heart failure. The diagnosis of left-to-right shunt CHD was determined by echocardiographic examination. The types of cardiac abnormalities categorized as left-to-right shunt CHD included ventricular septal defect (VSD), atrial septal defect (ASD) and patent ductus arteriosus (PDA). Inclusion criteria in this study were age between 5 and 10 years and meeting the clinical criteria for heart failure according to the Paediatric Heart Failure Score. Exclusion criteria in this study were children who scheduled for surgery within the next month, impaired renal function, hyperkalaemia with serum potassium levels > 5.5 mEq/L and unstable clinical conditions, such as receiving intravenous inotropes, ventilator pneumonia and sepsis. Sampling was done by consecutive non-random sampling techniques. All subjects with left-to-right shunt CHD were evaluated using the Paediatric Heart Failure Score.

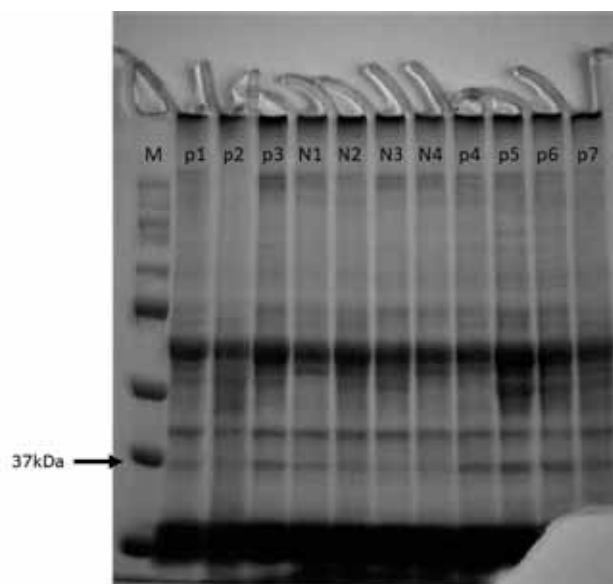
Troponin T measurement was carried out using a one-dimensional electrophoresis technique, which is 12% SDS-PAGE. Reg3 $\beta$  measurement was performed using the ELISA method.

The mean difference between the two groups was evaluated by the independent sample t test if the data were normally distributed and the Mann-Whitney U test if the data were not normally distributed. The normality of data distribution was tested with the Shapiro-Wilk test. Differences in troponin T and Reg3 $\beta$  in children with left-to-right shunt CHD with heart failure and children without heart failure were analysed using an independent sample t test. Data were analysed using the Statistical Package for Social Sciences (SPSS).

**Findings:** A total of 11 children were involved in this study, consisting of 8 (72.7 %) females, 3 children (27.3 %)  $\leq$  5 years old, 5 children (45.4 %) 5–10 years old and 3 children (27.3 %) > 10 years old (Table 1).

**Table 1. Subject Characteristics**

Variable	Case n (%)	Control n (%)
<b>Sex</b>		
Female	5 (71.4 %)	3 (75 %)
Male	2 (28.6 %)	1 (25 %)
<b>Age</b>		
$\leq$ 5 years old	2 (28.6 %)	1 (25 %)
5–10 years old	3 (42.8 %)	2 (50 %)
> 10 years old	2 (28.6 %)	1 (25 %)



**Figure 1. Troponin T**

Figure 1 showed the measurement of Troponin T using 12% SDS-PAGE. This study showed that there was a significant increase in 37 kDa protein distribution (Troponin T). The protein band profile obtained from the SDS-PAGE electrophoresis showed differences in

the synthesized protein bands. The group with left-to-right shunt CHD with heart failure had higher Troponin T levels as compared to the group without heart failure (Table 2).

**Table 2. Level of Reg3 $\beta$  and Troponin T**

	<b>Case (Mean <math>\pm</math> Standard Deviation)</b>	<b>Control (Mean <math>\pm</math> Standard Deviation)</b>
Reg3 $\beta$ (ng/mL)	19.063 $\pm$ 0.619	9.978 $\pm$ 0.678
Troponin T	42.600 $\pm$ 15.545	6.831 $\pm$ 5.61

Reg3 $\beta$  ELISA results showed that there was a significant increase in Reg3 $\beta$  levels in the left-to-right shunt CHD group with heart failure as compared to controls (Table 2).

## Discussion

CHD is a congenital disorder that often occurs in children and accounts for up to 1/3 of cases of congenital abnormalities in children<sup>1</sup>. CHD occurs in 6 to 10 per 1000 live births, with an average of 8 out of 1000 live births<sup>11</sup>. The highest prevalence of CHD occurs in Asian countries, which is 9.3 out of 1000 live births<sup>1</sup>. CHD is divided into several types, including right-to-left shunt CHD, obstructive heart disease, cyanotic heart disease and miscellaneous heart disease. The pathogenesis of CHD is multifactorial, including genetic factors or chromosomal abnormalities, environmental factors, maternal infections, smoking and alcohol during pregnancy, pregnancy with diabetes mellitus and obesity during pregnancy or interactions of all these factors<sup>12</sup>.

Heart failure can be a complication of CHD. Left-to-right shunts of CHD that can generally cause heart failure include VSD, ASD, atrioventricular septal defect (AVSD) and patent ductus arteriosus (PDA) with moderate to large diameter defects. Children with CHD have a risk of myocardial injury due to excess pressure and volume<sup>2</sup>.

Troponin is a single homogeneous protein consisting of four main protein fractions using SDS-PAGE, namely fraction 2, fraction 3 and fraction 4<sup>13</sup>. There are three forms of troponin, namely troponin T (TnT), troponin I (TnI) and troponin C (TnC)<sup>14</sup>. Troponins in the heart are distinguished by regions with different amino acid sequences. Fraction 2 (~24 kDa) is called TnI ('I' for inhibitory), which inhibits the activity of Mg<sup>2+</sup>-dependent actomyosin ATPase in the absence of Ca<sup>2+</sup>. Fraction 3 (~37 kDa) is bound to tropomyosin, so it is called TnT

('T' for tropomyosin), which connects tropomyosin and troponin complexes. Fraction 4 (~20 kDa) is bound to Ca<sup>2+</sup> and is referred to as TnC ('C' for calcium), which regulates the activity of thin-filaments<sup>13</sup>.

Troponin and tropomyosin work to regulate muscle contraction<sup>14</sup>. Troponin levels increase significantly in children with VSD and ASD as compared to healthy children. This condition indicates a significant increase in volume and pressure because left-to-right shunts in CHD can cause damage to the myocardium<sup>15</sup>. Troponin correlates with oxygen saturation and ejection fraction in children with CHD<sup>2</sup>.

This study found that children with left-to-right shunt CHD with heart failure had higher levels of troponin T as compared to children without heart failure. Troponin T is associated with myocardial injury in children. However, studies in new-borns have shown that troponin T levels were neither related to the type of heart failure nor the type of heart abnormality<sup>16</sup>.

Reg (Regenerating gene) is a protein that was first isolated from rat cDNA and consists of three subtypes, namely types I, II and III. Reg3 consists of Reg3 $\alpha$ , Reg3 $\beta$  and Reg3 $\gamma$ <sup>17</sup>. Reg3 $\beta$  was first found in mice models with pancreatitis<sup>18</sup>. Previous studies have suggested that Reg3 $\beta$  was associated with the intensity of inflammation in the heart and increased in cases of acute coronary syndrome<sup>7</sup>.

In this study, there was an increase in Reg3 $\beta$  levels in children with left-to-right shunt CHD with heart failure. Previous studies have suggested that Reg3 $\beta$  was involved in the mechanism of protection against cardiac injury and stress<sup>6</sup>. Reg3 $\beta$  levels increase in cardiac ischemia. Healing myocardium after injury requires macrophages<sup>8</sup>. Reg3 $\beta$  plays a role in the repair of myocardial injury by triggering proliferation, phagocytosis and polarization of M2 macrophages<sup>6</sup>.

## Conclusion

Troponin T and Reg3 $\beta$  can be used as biomarkers in children with left-to-right shunt CHD with heart failure.

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# The Combination of SLC2A9 Gene (rs2280205 and rs6820230) and Major Metabolic Factors with Association to Gout in Thai Men; A Matched Case-Control Study

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## Abstract

A combination of non-synonymous variants, rs2280205 and rs6820230 of the SLC2A9 gene and major metabolic parameters contribute to developing gout remains not well studied or assessed in Thai men. This study was conducted to assess the association between combined of two non-synonymous variants and gout. Using data from male subjects of age  $\geq 20$  years in the Genetic variation of Urate transporter genes in Hyperuricemia and Gout among Thai population Study (GUHGTHS). We randomly performed a 1:1 age-matched case-control study that included 48 gout patients and 48 non-gout subjects. Using multivariate logistic regression analysis was used to analyze data. The single and joint locus effect of rs2280205 and rs6820230 variants were independently associated with gout. However, the combination of rs2280205 and high fasting glucose, including rs6820230 variant and high fasting glucose were associated with gout, the adjusted odds ratio was 13.70-fold and 5.81-fold, respectively. Meanwhile, we did not observe an association between these variants and high blood pressure, including general obesity with gout.

In conclusion, rs2280205 and rs6820230 variants did independently associated with increased risk of gout, but predominantly occurred in high fasting glucose subjects. However, further studies with larger sample sizes and homogeneous populations should be confirmed these results.

**Keywords:** rs2280205 variant, rs6820230 variant, gout, metabolic parameters.

## Introduction

Gout has an increasing prevalence and incidence in the Asia-Pacific region.<sup>1-2</sup> Genetic factors play an essential role in the risk of gout. The genome-wide

association studies (GWAS) have identified that more than 20 multiple loci associated with gout in American-European populations.<sup>3-6</sup> A subsequent functional study revealed that glucose transporter 9 encoded by SLC2A9 gene possibly interfered with excretion of urate.<sup>7-10</sup> However, several studies have reported the association of some non-synonymous variants of SLC2A9 gene to gout.<sup>11-13</sup> The two common rs2280205 and rs6820230 variants have been described as possible sites of interaction with urate and glucose, thereby interfering with their excretion.<sup>14</sup> Previous studies in 2014 showed that rs2280205 variant was reduced associated with the risk of gout (32%), while rs6820230 variant was increased with susceptibility to gout in Caucasian.<sup>15</sup> A frequent rs2280205 variant was associated with

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slightly lower serum uric acid reduction of 5 to 10%.<sup>3,16</sup> However, studies on these variants did not show an association with gout<sup>(3,16)</sup>. Moreover, previous studies revealed that the risk factors of gout are complicated due to environmental factors, particularly in men, postmenopausal,<sup>17-19</sup> diuretics,<sup>17,19</sup> seafood,<sup>19</sup> and sugar-sweetened soft drinks.<sup>20</sup> Previously, several studies also revealed that the major associated factors of metabolic syndrome including obesity,<sup>21-23</sup> hypertension,<sup>23,24</sup> and high fasting glucose<sup>25,26</sup> are independently associated with gout. The previous studies also provided successful findings which indicated the associations of genetic variants and major metabolic factors that play a part in determining the risk of developing gout. However, the association between rs2280205 and rs6820230 variants and gout risk in Thai men has never been examined. Thus, the aim of this study was to investigate the effects of these variants, SNP-SNP interaction and a combination of genetic and major metabolic factors contributing to the development of gout.

## Materials and Method

**Study Population:** This matched case-control study was performed using the GUHGTHS data. The target population was men with age  $\geq 20$  years and had participated in health examinations and blood sampling. of the 145 subjects (77 gout patients and 68 non-gout subjects) whose data were used in 2018, subjects over 65 years of age and those with incomplete data were excluded from this study. Furthermore, subjects showing evidence of diseases related to gout such as acute heart disease, kidney disease, cancer, induce and/or reduce serum uric acid medication/substances were also excluded from the study. Gout cases and non-gout subjects were randomly selected and matched (1:1) based on age ( $5 \pm 10$  years). As a result, a total of 96 subjects (48 gout patients and 48 non-gout subjects) were enrolled for this present study. Forty-nine subjects were excluded from the study because we could not match between cases and non-gout subjects.

**Definitions:** All gout patients were clinically diagnosed based on the Rome criteria<sup>27</sup> and confirmed by the rheumatologist. The inclusion criteria of non-gout subjects were normal level of serum uric acid and no evidence and no symptoms of gout. General obesity was classified based on body mass index (BMI)  $\geq 25$  kg/m<sup>2</sup>. High fasting plasma glucose (FPG) was defined by FPG  $\geq 100$  mg/dl or diabetic treatment. High blood pressure (BP) was defined by systolic BP  $\geq 130$  mmHg

or diastolic BP  $\geq 85$  mmHg and antihypertensive medication. Hypertriglyceridemia was defined by elevated triglyceride  $\geq 150$  mg/dl or medication. Finally, Low high-density lipoprotein cholesterol (HDL-C) was defined by HDL-C  $< 40$  mg/dl or reduced HDL-C medication.

**Data Collection:** We recorded the results of genotype and allele distribution from the GUHGTHS. Moreover, we collected the original values of clinical and biochemical data via standardized data extraction form.

**Statistical Method:** All statistical analyses were performed using STATA version 14 (Stata, College Station, TX). The Hardy-Weinberg equilibrium was used to describe genotype and allele distribution.<sup>28</sup> Multivariate conditional logistic regression analysis was used to analyze the data. A p-value less than 5% was considered statistically significant.

## Results

In Thai men, the gout patients were found to be older than the non-gout subjects (Table 1). The mean BMI and uric acid level of gout patients were higher than non-gout subjects. The percentage of gout patients with general obesity, high BP, high FPG and hypertriglyceridemia was higher than non-gout subjects, but the percentage of low HDL-C with non-gout subjects was higher than gout patients.

Our representative results of the genotype and allele distribution for rs2280205 and rs6820230 variants are shown in Table 2. A single locus effect of rs2280205 and rs6820230 variants were not associated with gout (Table 3). In addition, we found that there were no interactions between two variants with the development of gout risk. However, the interactions between rs2280205 variant with high FPG significantly increased the risk of gout. The interactions of rs6820230 variant with high FPG also increased the risk of gout. In contrast, the rs2280205 and rs6820230 variants combined with high BP and general obesity were not significantly associated with gout risk (Table 3).

## Discussion and Conclusion

The present study indicated that two non-synonymous rs2280205 and rs6820230 variants were not associated with gout in Thai men. The previous studies also demonstrated that these variants did not

show an association with gout in Czech population<sup>3</sup> and Cameroonians.<sup>12</sup> However, Chisnall (2014) indicated that rs6820230 variant was associated with susceptibility to gout, whereas the rs2280205 variant could reduce (32%) the risk of gout in Caucasian.<sup>15</sup> Moreover, several recent studies by GWAS have identified that the SLC2A9 gene may be associated with gout.<sup>29-31</sup> The product of SLC2A9 gene encodes for the molecule to reabsorb uric acid in the kidney and loss of function from a mutation in this gene causes renal hypouricemia and prevents reabsorption of filtered urate proximal tubules.<sup>7-10</sup> When we examined the SNP-SNP interaction that could be involved in a wide range of gout-related processes. We found that the combination of rs2280205 and rs6820230 variants has no association with gout. In general, several genes can contribute to gout without their gene products ever directly interacting. We assumed that the expression of the rs2280205 and rs6820230 variants may also oppose each other, with one variant modifying the expression of another variant.

There is some evidence suggesting that major metabolic factors such as general obesity,<sup>21-23</sup> hypertension,<sup>23</sup> and high FPG<sup>32</sup> are associated with gout. Therefore, we hypothesized that gene-environmental interaction might also play a significant role in gout risk; our study indicated that the combination of rs2280205 and rs6820230 variants with high FPG, but not general obesity and high BP, is significantly increased the risk of gout. We agreed with the remarks of a previous study that high FPG might influence the function of glucose transporter 9 (GLUT-9)<sup>33</sup> and may contribute to the reabsorption of uric acid through elevated expression of the urate transporter-1.<sup>34</sup> we assumed that an increase of glucose in tubular fluid with an associated elevation of reabsorptive transport on GLUT-9 may inhibit uric acid

reabsorption. However, the mechanisms of association between gene-environment need to be explored in near future.

The current study had few limitations. First, this study involved the use of a small number of gout patients from a single hospital-based population: Large independent studies are required to further validate our results. Secondary, we only studied two variants of SLC2A9, therefore gene-gene interactions with some other gene should be investigated in the future studies. Finally, we were not able to collect other details of major environmental factors such as alcohol, smoking, dietary consumption, waist circumference, waist to hip ratio, that could affect gout.

In conclusion, the combination of rs2280205 and rs6820230 variants and high FPG contributed to the development of gout. Our study revealed that these genetic data and an interaction analysis have provided considerably to our understanding of the pathogenesis of gout. Further studies with larger sample sizes and homogeneous populations should be confirmed.

**Table 1. Baseline characteristics**

Variables	Gout, n (%)	Non-gout, n (%)
Number	48	48
Age (years)	57.94±12.23	54.58±14.64
Body mass index (kg/m <sup>2</sup> )	26.20±5.00	24.95±3.58
Body mass index ≥ 25	30(62.50)	22(45.83)
High blood pressure	41(85.42)	29(60.42)
High fasting glucose	33(68.75)	17(35.42)
Hypertriglyceridemia	33(68.75)	25(52.08)
Low HDL-C	40(83.33)	43(89.58)
Serum uric acid (mg/dL)	6.28±2.27	6.47±1.19

HDL-C: high density lipoprotein cholesterol

**Table 2. Genotypes and alleles distribution**

SNPs	Genotypes or Alleles	Frequencies, n (%)		p-value*
		Gout	Non-gout	
Number		48	48	
<b>rs2280205</b>				
	G/G	29 (60.00)	32 (67.00)	0.140
	G/A	16 (33.00)	12 (25.00)	
	A/A	3 (6.00)	4 (8.00)	
	G/A-A/A	19 (40.00)	16 (33.00)	
	Allele, G	74 (77.00)	76 (79.00)	
	Allele, A	22 (23.00)	20 (21.00)	

SNPs	Genotypes or Alleles	Frequencies, n (%)		p-value*
		Gout	Non-gout	
<b>rs6820230</b>				
	C/C	39 (81.00)	42 (88.00)	1.000
	C/T	9 (19.00)	6 (12.00)	
	T/T	0	0	
	C/T-T/T	9 (19.00)	6 (12.00)	
	Allele, C	87 (91.00)	90 (94.00)	
	Allele, T	9 (9.00)	6 (6.00)	

\* Hardy-Weinberg equilibrium test; SNPs: single nucleotide polymorphisms

**Table 3. The major risk factor associated with gout**

Factors		OR (95% CI)	aOR (95% CI)
<b>rs2280205<sup>1</sup></b>			
G/G		1.00	
G/A-A/A		1.33 (0.57-3.02)	2.70 (0.45-16.04)
<b>rs6820230<sup>1</sup></b>			
C/C		1.00	
C/T-T/T		1.60 (0.53-4.96)	2.80 (0.51-15.47)
<b>Best combination</b>			
rs2280205	rs6820230		
G/G		1.00	
G/G		2.20 (0.58-8.26)	2.47 (0.39-5.57)
G/A-A/A		1.63 (0.63-4.22)	3.51 (0.90-3.64)
G/A-A/A		1.28 (0.75-2.73)	1.57 (0.70-5.40)
rs2280205	Obesity <sup>2</sup>		
G/G		1.00	
G/G		1.81 (0.68-4.80)	1.48 (0.31-6.87)
G/A-A/A		1.39 (0.40-4.80)	2.09 (0.28-5.42)
G/A-A/A		3.31 (0.81-13.52)	3.93 (0.44-5.09)
rs2280205	Fasting plasma glucose (FPG) <sup>3</sup>		
G/G		1.00	
G/G		3.65 (1.06-12.68)	4.45 (0.93-11.19)
G/A-A/A		0.96(0.24-3.82)	1.25 (0.15-14.28)
G/A-A/A		12.05(1.99-17.95)	13.70(1.59-15.25)
rs2280205	Blood pressure (BP) <sup>4</sup>		
G/G		1.00	
G/G		7.31 (0.48-8.24)	7.38 (0.85-9.42)
G/A-A/A		2.20 (0.26-6.77)	3.68 (0.46-8.73)
G/A-A/A		7.31 (0.46-8.64)	7.84 (0.18-9.87)
rs6820230	Obesity <sup>2</sup>		
C/C		1.00	
C/C		1.15 (0.46-2.86)	0.89 (0.24-3.21)
C/T-T/T		0.52 (0.88-3.05)	0.56 (0.46-6.87)
C/T-T/T		6.68 (0.81-9.16)	3.14 (0.24-4.65)

Factors		OR (95% CI)	aOR (95% CI)
rs6820230	Fasting plasma glucose (FPG) <sup>3</sup>		
C/C	Normal	1.00	
C/C	High FPG	4.88 (1.47-6.16)	7.47 (0.53-6.47)
C/T-T/T	Normal	1.40 (0.20-9.81)	3.98 (0.22-7.04)
C/T-T/T	High FPG	7.12 (1.18-13.04)	5.81(1.88-8.21)
rs6820230	Blood pressure (BP) <sup>4</sup>		
C/C	Normal	1.00	
C/C	High BP	3.43 (0.15-7.78)	5.06 (0.78-9.58)
C/T-T/T	Normal	1.54 (0.26-8.66)	4.27 (0.28-8.29)
C/T-T/T	High BP	1.03 (0.11-6.58)	1.53 (0.19-4.68)

OR: crude odds ratio; Adjusted odds ratio (aOR) 1) obesity, high BP, hypertriglyceridemia and high FPG, 2) high FPG and hypertriglyceridemia; 3) obesity, high BP and hypertriglyceridemia; 4) obesity, high FPG and hypertriglyceridemia

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# Acute Infection Following Flood Disaster: An Example from Bojonegoro District, East Java, Indonesia

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## Abstract

On December 27, 2007, huge flood inundated Bojonegoro district, Indonesia. Our study aims were to investigate occurrence and risk factors of acute infections following the Bojonegoro flood. This survey with multistage-cluster sampling studied 1016 flooded-household members, 1021 non-flooded members. Chi-square test and Cox multiple-regression model were used in the analysis. Half of flooded-household members experienced acute infections within 1 month after flood, predominantly dermatitis (prevalence rate: 20.4%), acute respiratory tract infection (19.1%), gastroenteritis (10.7%) and dengue hemorrhagic fever (0.7%). The prevalence rates of these infections were higher than official rates before flood. Age, household status, contact duration with flood water were significant risk factors of gastro-enteritis, while for acute respiratory infection, number of household member, age, contact duration with floodwater, socio-economic status, displacement duration were the significant predictors. Environmental disruption, poor hygiene and sanitation, displacement and evacuation may increase the likelihood of spreading acute infections following the flood.

**Keywords:** Flood, dermatitis, respiratory infection, gastroenteritis, Bojonegoro.

## Introduction

Since 2006, Indonesia was in 4<sup>th</sup> rank of countries in the world most frequently hit by natural disasters. Most of the events were hydrological, predominantly flood.<sup>1</sup>

On December 27, 2007, one of the most disastrous floods in Indonesia attacked Bojonegorodistrict in East Java province, after days of heavy rain and overflowing of the great river Bengawan Solo, inundating 60% of its sub-districts and displacing 229,000 people.<sup>2</sup>

Since 1966 until now, Bojonegoro, located in the downstream of Bengawan Soloriver, was frequently

hit by floods due to ecologic and infrastructure factors such as overflowing of the river, poor drainage system, ecological destruction, lack of river capacity, etc.<sup>3,4</sup> Yet, there was little information about health impact, including occurrences of infections following flood. Our study was then aimed to investigate occurrence and risk factors of acute infections following the Bojonegoro flood.

## Method

This cross-sectional study, done in 2008 in Bojonegoro district through multistage-cluster sampling, had selected randomly 25 villages from 167 flooded villages and also 25 villages from 268 non-flooded villages.

Among 25 flooded villages, we collected data from 245 randomly selected flooded households, with 1,016 household members. Simultaneously, among 25 non-flooded villages, we also collected data from 244 randomly selected non-flooded households, with 1,021 members.

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Respondents were heads of the households (or spouses) aged 18+ years old and/or had ever got married and signed informed consent. Standard pre-tested questionnaire was used in guided interview to elaborate socio-demographic profile, evacuation, displacement, environmental disruption, hygiene and sanitation, and acute infection (based on history, symptoms and signs, as diagnosed by physician). The prevalence rates after flood was compared with officially reported prevalence rates before flood in 2007 (from National Basic Health Survey) in Bojonegoro population.<sup>5</sup> Prevalence Ratio (PR) with its 95% confidence interval (CI) were used to measure associations. Chi-square test and Cox regression model were applied.

Ethical clearance (letter No.62/KE/12/08) was obtained from Health Research Ethical Committee, Faculty of Public, Universitas Indonesia.

**Results**

Majority of respondents were males, adults aged 20+, married, low educated and displaced. Flooded household members were commonly exposed with flood water for 90 minutes/day (table not shown).

Most flooded household members were displaced for 8 days and majority moved to relatives/friends/neighbors' houses and many moved to other villages. The flood, generally, reached 1-meter height inside house and lasted for 10 days. (Table 1).

**Table 1. Flooding, Evacuation and Displacement**

Variables	Flooded households (N=245)	
	n	%
<b>Displacement</b>		
No	59	24.1
Yes, displaced	186	75.9
<b>Place of evacuation/displacement</b>		
Relative's house	76	40.9
Friend's/neighbor's house	23	12.4
Public building (school, offices, mosque/church)	53	28.5
Tent/barrack	11	5.9
Other	23	12.4
<b>Area of evacuation/displacement</b>		
Same village	110	59.1
Different village, same sub-district	37	19.9
Different sub-district, same district	28	15.1
Different district	11	5.9
<b>Separation with household member during displacement (N = 186)</b>		
No	124	66.7
Yes	62	33.3
<b>Flooded Household</b>		
	<b>Mean (SD)</b>	<b>Range</b>
Water level inside house (meter) (N=245)	1.0 (0.5)	0.10 – 2.5
Duration of flooding in house/yard(day) (N=245)	10.2 (6.6)	1 - 60
Duration of displacement (days) (N=186)	7.7 (3.6)	2 - 30

Comparison between proportions of flooded households having certain hygiene and sanitation conditions at moments before and after flood showed very significant differences (p-value<<0,05), such as

decrease of using bored/spring water, increase of using bottled water/water supply (from government/agencies), increase of poor drinking water quality, increase of drinking raw (not-boiled) water, increase of defecating

in open places (e.g. garden, field, bushes, river and flood water), increase of throwing garbage to river/drain/ditch (table not shown).

About half of flooded-household members reported experiencing acute infections one month after flood occurrence. The predominant acute infections were skin infection/dermatitis (prevalence rate: 20.4%), acute

respiratory-tract infection (ARI) (19.1%) and gastroenteritis (GE) (10.7%) (table not shown). The past prevalence rates of dermatitis, ARI, GE and Dengue hemorrhagic fever (DHF) within 1 month after flood were substantially higher ( $p\text{-value} \ll 0,05$ ) than corresponding officially reported prevalence rates before flood (i.e. dermatitis: 0.7%; ARI: 16.2%; GE: 6.5%; DHF: 0.2%).<sup>5</sup> (Figure 1).

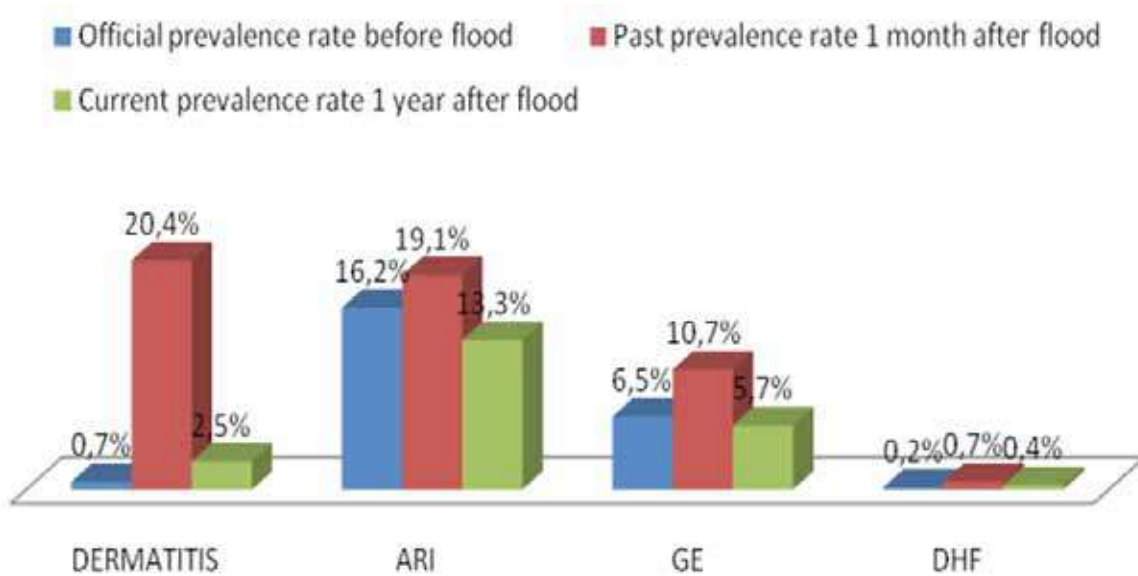


Figure 1. Prevalence Rates of Acute Infections among Bojonegoro Population

We found that age, household status and contact duration with flood water were significant predictors of GE. (Table 2)

Table 2. Important Predictors of Gastroenteritis, 1 Month after Flood, Using Cox Regression Model

Predictors	$\beta$	SE	p-value	PR (95% CI)
<b>Age Group (Years)</b>			<b>.000</b>	
0-5	1.733	.399	.000	5.7 (2.6 -- 12.4)
6-14	.887	.382	.020	2.4 (1.2 -- 5.1)
50+	.499	.235	.034	1.7 (1.1 -- 2.6)
15-49				1.0
<b>Household status</b>			<b>.002</b>	
Child	1.126	.322	.000	3.1 (1.6 -- 5.8)
Spouse	.965	.334	.004	2.6 (1.4 -- 5.1)
Head				1.0
<b>Contact duration with floodwater (minutes/day)</b>			<b>.000</b>	
> 120	3.236	.495	.000	25.4 (9.6 -- 67.1)
31-120	3.247	.474	.000	25.7 (10.2 -- 65.1)
$\leq 30$	2.903	.480	.000	18.2 (7.1 -- 46.6)
0				1.0

$\beta$  is regression model coefficient and SE is standard error.

Concerning ARI, we found that the number of household members, age, contact duration with floodwater, social-economic status, duration of displacement were significant predictors (Table 3).

**Table 3. Important Predictors of Acute Respiratory Infection, 1 Month After Flood, Using Cox Regression Model**

Predictors	$\beta$	SE	p-value	PR (95% CI)
Number of HH members	-.173	.051	.001	0.84 (0.76 -- 0.93)
<b>Age Group (Years)</b>			.000	
0-5	1.093	.242	.000	3.0 (1.9 -- 4.8)
6-14	.487	.205	.017	1.6 (1.1 -- 2.4)
50+	.368	.183	.045	1.4 (1.0 -- 2.1)
15-49				1.0
<b>Contact duration with floodwater (minutes/day)</b>			.008	
> 120	1.314	.478	.006	3.7 (1.5 -- 9.5)
31-120	1.052	.471	.026	2.9 (1.1 -- 7.2)
$\leq$ 30	.783	.466	.093	2.2 (0.9 -- 5.5)
0				1.0
<b>Social-economic status</b>			.001	
Low	-.538	.184	.004	0.6 (0.4 -- 0.8)
Medium	-.553	.174	.002	0.6 (0.4 -- 0.8)
High				1.0
<b>Duration of displacement (days)</b>			.118	
10-30	.415	.222	.062	1.5 (0.9 -- 2.3)
1-9	.371	.195	.057	1.5 (1.0 -- 2.1)
0				1.0

$\beta$  is regression model coefficient and SE is standard error.

### Discussion

Official reported that Bojonegoro flood submerged and damaged 16 sub-districts, 131 villages, 2,544 hectares of rice fields, 15 health centers and displaced 2,715 families/229.00 people and caused 8 deaths.<sup>2</sup>

Overflow of Bengawan Solo, the longest great river in Java Island, due to torrential rains and damage of dams, were essential factors resulting in huge flood. We found large proportion of house damages and disturbances of water and sanitation (especially concerning drinking water) and sewage system. Environmental disruption, poor hygiene and sanitation, displacement and evacuation may increase likelihood of spreading common acute infectious diseases leading to outbreak after flood.<sup>6-8</sup>

Official report (within 3 weeks of flooding period) of main infections was consistent with our finding, i.e. skin problems (12,089 cases), acute respiratory infection/

influenza (9,341 cases), myalgia (3,844), and diarrhea (2,492).<sup>2</sup>

The significant increase of prevalence rates of dermatitis, acute respiratory-tract infection (ARI), gastro-enteritis (GE) and Dengue hemorrhagic fever (DHF) occurred within 1 month after flood, as compared to official rates before flood suggests high likelihood of transmission/spreading of the four acute infections in Bojonegoro population, especially among displaced and evacuated.

Our finding demonstrated that children, especially the under-five, had the largest risk to experience GE and ARI after flood. Similarly, in Aceh province, after tsunami, children had higher odds to get acute diseases.<sup>9</sup>

Dermatitis/eczema and skin infections after flood were also reported by Vietnam and Taiwan studies.<sup>10,11</sup> Studies from Taiwan and Pakistan<sup>11,12</sup> showed that skin infection, eye and GE, frequently occurred during/

after flood, because of exposure to contaminated water. During flood, pathogenic organism might be carried away by flood waters and introduced to the surface waters.<sup>11</sup> Failure to wash and treat wounds (even minor wounds) with clean water may cause infection. Skin problems founded after 2004 tsunami were infections, infestations, fungal infections, including *tinea corporis*, eczemas and lacerations.<sup>13</sup>

The increased prevalence of ARI could be attributed to housing/shelter and environmental factors, e.g. displacement, overcrowding, and poor ventilation, poor sanitation, cold temperatures, and individual susceptibility.<sup>14–17</sup> These factors existed during the Bojonegoro flood, especially during displacement in shelter. Our finding showed; experiencing some days of displacement gave 50% increasing risk to get ARI.

Pathogens, such as, virus (e.g. *Rotavirus*), bacteria (e.g. *Vibrio Cholera*, *Salmonella enterica*, *Enterotoxigenic Escherichia Coli*), and protozoa (e.g. *Entamoeba Histolytica*) may cause GE/diarrhea transmitting through drinking water contamination. Nevertheless, we did not examine the etiologic pathogens causing GE. When water purification and sewage disposal systems are disturbed or underground pipelines and storage tanks were damaged, sources of clean water might be contaminated by wastes leading to water-borne transmission of diarrhea/GE. The fecal-oral transmission, especially in crowded shelter, may further boost the spread of diarrhea/GE.<sup>12,18</sup> Humid and hot environment may be in favor of the growth and reproduction of pathogenic bacteria of gastrointestis.<sup>19</sup> This may explain the possible increase of GE prevalence during/after the Bojonegoro flood. Our finding underlined; the longer being exposed with flood water, the stronger the risk to experience GE. Flood study in 2007 in Anhui Province, China, demonstrated that longer duration of moderate flooding may cause greater risk and burdens of diarrhea than shorter duration of severe flooding.<sup>20</sup> In Netherland exposed to floodwater was significantly associated GE and ARI.<sup>21</sup> Many studies from many countries showing consistent associations between flood and diarrhea/GE strongly supported our finding.<sup>6,11,23–26,12,14–18,20,22,27</sup> Significant increase of proportion of not boiling water for drinking after flood, indicating poor access to clean drinking water, might have also contributed to this contamination. Host immunity, overcrowding and poor hygiene and sanitation might have played important role in this transmission dynamics.<sup>12,14,18</sup>

Increase of incidence or prevalence of mosquito-borne diseases after rainfall or floods, were due to increasing breeding sites created by the puddle or filled container, especially when the drain is blocked or the water flow is stagnant.<sup>18,28,29</sup> Positive effect of flood on the increase of DHF incidence, might particularly occurred in endemic areas of dengue fever.<sup>15</sup>

Our study limitation were difficulties to recall subject memories and having missing values in several variables.

We conclude that; 1) prevalence rates of dermatitis, ARI, GE and DHF increased substantially after flood; 2) age, household status and duration of contact with flood water were the most important predictors for GE; 3) number of household members, age, contact duration with flood water, social-economic status, duration of displacement were the most important determinants of ARI; 4) Environmental disruption, poor hygiene and sanitation, displacement and evacuation might increase the likelihood of spreading the infections after flood.

We recommend to, firstly, implement high standard management of displaced population, including quick restoration of environmental disruption, hygiene and water sanitation and sewage system, in order to prevent/minimize occurrence of predominant acute infections, after flood, like dermatitis, GE and ARI and DHF. Secondly, is to monitor and control effectively the spread of predominant acute infections in flood-prone areas through strong routine and emergency surveillance system, including EWARS (early warning and alert response system). Specific intervention might be strengthened to prevent the spread of acute infections among under-five children in flood-prone areas, including achieving and maintaining very high immunization coverage (in accordance to national guideline) and improving their nutritional status.

**Conflict of Interest:** None declared

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# Family Income and Prepregnancy Weight Associated Inversely with Gestational Age and Birth Weight

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## Abstract

**Background:** Preterm birth and low birth weight (LBW) are major determinants of child mortality. Like other developing countries, Bangladesh has been suffering for significant burden of preterm birth and LBW. Conclusive data on risk factors of these consequences should analyze to take preventive measures.

**Aim:** This study was to observe the effects of maternal socio-demographic and nutritional parameters on gestational age and birth weight. Materials and Method: A cross sectional data collected from 348 mothers seek antenatal care in a low-cost hospital from September 2017 to February 2018. A pre structured questionnaire used to gather maternal information. Correlation analysis, analysis of variance (ANOVA) and logistic regression used to find potential determinants.

**Results:** The prevalence of the preterm birth and LBW was 8.1% and 25.2% respectively. Chances of LBW found higher in lower income mothers (OR=1.62; 95% CI: 1.004 to 2.62) and the probability of preterm birth was higher in lower preconception weighted women (OR = 2.08; 95% CI: 1.07 to 2.81).

**Conclusion:** Pregnancy nutrition and economic solvency can reduce the bad outcomes of mothers.

**Keywords:** Birth outcome, income, nutrition, gestational age, factor, Bangladesh.

## Introduction

Preterm birth (before 37 weeks of gestation) remains a public health issue that causes high perinatal mortality and adult morbidity.<sup>1</sup> Globally, early birth affects 10% of all pregnancies and costs yearly 1 million neonatal deaths.<sup>2</sup> In addition, future cardiovascular diseases and

stroke are thought to be associated with preterm birth.<sup>3,4</sup> Identification of its causes should be in priority to frame preventive strategies. Unfortunately, risk factors of preterm birth is not still identified in this setting, although thought to be multifactorial and diverge with settings in general.<sup>5,6</sup> Reports showed 45–50% of causes of premature birth were unexplained.<sup>6,7,8</sup>

Like preterm birth, LBW (<2500 gm birth weight) is another indicator of child's susceptibility to diseases and survivalability.<sup>9,10,11</sup> In 2015, 20.5 million global newborns, approximately 14.6 % of total births, were LBW.<sup>10</sup> About half of world under weighted kids have born in South Asia.<sup>9,10</sup> National survey 2015 showed 22.5% LBW in Bangladesh.<sup>12</sup> Maternal demographic factors and nutrition are well reported risk factors of LBW including young maternal age<sup>13,14</sup>. The predictors of LBW is still too well-studied in this study area.

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National study 2011 expressed most noteworthy recurrence (23%) of low birth weight found at Chattogram division.<sup>15</sup> Many people from rural surroundings move to the city and lead lower class life in slums. They usually took antenatal care from low-cost maternity clinics. According to existing literature, only one hospital-based study conducted in this setting which used only MUAC as hypothesized predictors of birth size.<sup>16</sup> In Bangladesh, LBW prevalence was about 27% of which about 84% were small for gestational age and the rests of 16% were preterm.<sup>17</sup> The other possible determinants could be contributed to the detrimental outcome. Understanding on the prevalence of preterm birth and LBW and its potential risk factors would be the key for developing and designing interventions to reduce the events of LBW and premature birth.

## Materials and Method

**Study setting and design:** Three antenatal care (ANC) centers providing low cost services were selected to collect information from Chattogram city, the southeastern part of Bangladesh, beside the Karnaphuli River, and 265 km away from the capital Dhaka, Bangladesh by car. A total of 400 women, 29 to 40 weeks of pregnancy, selected randomly from ANC registrar book and invited to participate the study after informing the purpose of the study, confidentiality maintain and no harmful of them. After willingness 384 participants enrolled in this study.

**Sample size determination:** Single population proportion test of significance used to calculate sample size. A previous study of LBW prevalence used as a prior information.<sup>18</sup> Taking probability of LBW ( $p$ ) 20%, margin of error ( $m$ ) 4%,  $Z$  value 1.96 at 5% level of significance, we calculated 384 sample size to achieve 80% power of the test from the following formula.

$$n = (z_{0.05}/m)^2 p(1 - p)$$

**Ethical Consideration:** The study follows the Helsinki declaration ethical rules of 1964 and permission was taken from respective authority before commencing the study with approval no. 01/09/2015\_01. Written inform consent was taken from every participant before providing necessary information with assuring the concealment of their personal materials.

**Study Variables:** We collected data on socio-demographic of pregnant women, gestational age, mother's age, mother's age at married, mother's

education, maternal height, pre-pregnancy weight, family income, maternal parity, and nutritional parameters including mid-upper arm circumference (MUAC), body mass index (BMI), and hemoglobin (Hb).

**Maternal anthropometric measures:** Maternal height and preconception weight were recorded. Height was categorized as  $\leq 150$  cm and  $>150$  cm and weight as  $\leq 40$  kg and  $> 40$  kg.<sup>10</sup> Body mass index (BMI) was calculated by  $weight (kg)/(height (m))^2$  and categorized as according to WHO classification: under normal ( $<18.5$  kg/m<sup>2</sup>), normal weight (18.5–24.9 kg/m<sup>2</sup>) and overweight ( $\geq 25$  kg/m<sup>2</sup>).<sup>19</sup> Mid upper arm circumference measured by scale and categorized as  $<24$  cm and  $\geq 24$  cm.<sup>20</sup>

**Maternal and newborn factors:** Maternal birth order or parity was collected, the mother who has no live birth named as first birth, who has one live birth before titled as second birth and two live birth before categorized as third or higher birth and perinatal factors such as birth weight and gestational age were collected from clinic antenatal care registrar book. A child with birth weight  $< 2500$  g as low birth weight (LBW) and  $\geq 2500$  g considered as normal birth weight (NBW).<sup>9</sup> If the gestation was  $< 37$  weeks at birth categorized as preterm birth and  $\geq 37$  weeks as term birth.<sup>21</sup>

**Statistical Analysis:** Descriptive measures and statistical tests were performed for maternal anthropometric and maternal factors. Pearson correlation analysis and multiple logistic regression analysis was performed to identify the degree of intensity and observed the strength of association between LBW and preterm birth and each of variables and it was expressed as odds ratio (OR) with 95% confidence interval. Data were analyzed using SAS version 9.3 and 0.05% level of significance was considered.

## Results

Maternal and newborn characteristics outcome are shown in table 1. The mean age of respondents was 23.77 years and nearly half of them 185 (48.1%) had 8 years of education. Over half of mothers' 197 (51.2%) family monthly earned ten thousand taka or less. The first-born babies were 212 (60.92%) and multiparous women were 173 (49.71%) ranged from 1 to 3. The average gestational age was 38.71 weeks with range between 26 and 44 weeks. The birth weight ranged between 900 to 4000 gm with average was 2728.28 gm. The prevalence of LBW was 25.2% and preterm birth was 8.1%.

**Table 1: Descriptive statistics of mothers and newborns in an ANC hospital, Bangladesh**

Parameters	Mean (SD) or N (%)	Range
<b>Mothers</b>		
Age (years)	23.77 (3.65)	17 to 36
Height (cm)	1152.45 (5.11)	138 to 165
Weight (kg)	49.85 (9.27)	31 to 90
BMI (kg/m <sup>2</sup> )	21.41 (3.62)	13.01 to 35.16
MUAC (cm)	25.86 (2.68)	18.5 to 35
Family income (Tk)	15277.71 (12605.89)	4000 to 80000
<b>Newborns</b>		
Gestational age (weeks)	38.71 (2.32)	26 to 44
Birth weight (gm)	2728.28 (547.65)	900 to 4000
LBW (<2500 gm)	97 (25.2%)	-
Preterm birth (<37 weeks)	31 (8.1%)	-

The Pearson correlation coefficients between maternal characteristics, gestational age and birth weight are given in table 2. All maternal characteristics were not correlated with gestational age. On the contrary, all maternal characteristics were significantly positively correlated with birth weight except age of the participant.

**Table 2: Correlation coefficients of maternal characteristics with GA and BW**

Maternal Characteristics	Gestational Age	Birth Weight
Age	-0.027 (P = 0.595)	0.085 (P=0.097)
Height	0.033 (P = 0.515)	0.146 (P=0.004)
Preconception weight	0.019 (P = 0.714)	0.188 (P < 0.001)
MUAC	0.015 (P = 0.775)	0.199 (P< 0.001)
BMI	0.012 (P = 0.822)	0.151 (P = 0.003)

The effect of birth order, education and family income on gestational age and birth weight are given in table 3. Increasing birth order with increased birth weight significantly (p=0.031) as shown in table 3. Gestational age was not significantly associated with birth order. The low birth weight rate was decreasing as with increasing birth order but not significant. The number of years of education had no statistically significant effect on gestational age but had significant effect on birth weight. Family income had no statistically significant effect on gestational age but had significant effect on birth weight (P=0.037).

**Table 3: Effect of education, family income and birth order on GA and BW**

Parameters	Gestational age	P-value	Birth weight	P--value
<b>Level of education</b>				
0 to 8 years	38.88 (2.36)	0.130	2654.43 (519.16)	0.026
9 to 12 years	38.68 (2.35)		2753.43 (559.33)	
>12 Years	38.03 (1.95)		2897.94 (512.61)	
<b>Family Income</b>				
≤ 10000 tk	38.59 (2.44)	0.296	2675(547.05)	0.037
10001 to 20000 tk	38.98 (2.13)		2648.80 (496.77)	
>20000 tk Years	38.55 (2.31)		2850.8 (532.47)	

Parameters	Gestational age	P-value	Birth weight	P--value
<b>Birth Order</b>				
First birth	38.67 (2.46)	0.933	2634.14 (549.81)	0.031
Second birth	38.77 (2.27)		2789.12 (500.84)	
Third birth	38.77 (2.27)		2704.34 (501.23)	

Parameter estimates of logistic regression analysis of preterm birth was given in table 4. A multiple logistic regression conducted with saturated model. The likelihood ratio test suggest that the model contains the parameter age, BMI and preconception weight (Chi-square=10.85 and p value=0.03). And the

model correctly fits which confirmed by Hosmer and Leme show goodness of fit test (Chi-square= 1.73 and p value=0.94). Only preconception weight was the statistically significant. The probability of preterm birth was 2.08 times higher for the preconception weight less than or equal to 40 kg as compared to greater than 40 kg.

**Table 4: Multiple logistic regression analysis of risk factors for preterm birth**

Parameter	Odds Ratio (OR)	95% CI	P value
<b>Age (Years)</b>			
≤ 24	2.113	0.884 to 5.051	0.0924
> 24	-	-	-
<b>Body mass index (kg/m<sup>2</sup>)</b>			
Underweight	3.413	0.924 to 12.601	0.0964
Overweight	1.112	0.392 to 3.157	0.4093
Normal	-	-	-
<b>Preconception Weight</b>			
≤ 40 kg	2.08	1.067 to 2.805	0.0214
> 40 kg	-	-	-

Parameter estimates of logistic regression analysis of LBW given in table 5. A multiple logistic regression was conducted with saturated model. The likelihood ratio test suggest that the model contains the parameter family income and body mass index (BMI) (Chi-square=8.54 and p value=0.03). And the model correctly fits which confirmed by Hosmer and Leme show goodness of fit

test (Chi-square=0.89 and p value=0.93). Family income had the significant effect on LBW. The participant whose family income less than or equal to ten thousand taka the probability of having LBW was 1.622 times higher compared to family income greater than ten thousand taka.

**Table 5: Multiple logistic regression analysis of risk factors for LBW**

Parameter	Odds Ratio (OR)	95% CI	P value
<b>Family income (BDT)</b>			
≤ 10000	1.622	1.004 to 2.619	0.048
> 10000	-	-	-
<b>Body mass index (kg/m<sup>2</sup>)</b>			
Underweight	1.077	0.642 to 1.940	0.1696
Overweight	0.541	0.245 to 1.150	0.0789
Normal	-	-	-

## Discussion

This study investigates the prevalence and risk factors of gestational age and birth weight. We found 8.1% preterm birth and 25.2% LBW in the study population. And, the prepregnancy weight associated with preterm birth and family economy was significant for LBW.

The rate of premature birth in our research was in lines of Kader and Tripathi who found 10.79% babies were premature in Matlab, Bangladesh.<sup>22</sup> In the cultural context of Bangladesh, premature birth is difficult to identify, as women do not identify themselves as pregnant unless they are certain that they will be maintain their pregnancy.<sup>12</sup>

The prevalence of LBW varies widely across region and found 26.4 % during 2015 in Southern Asia.<sup>10</sup> We found over quarter of total women deliver LBW babies which was similar to NLBWS in 2015 which found 22.6%.<sup>14</sup> Another study found LBW rate was 29% in urban area.<sup>23</sup> But this rate is fluctuating due to study area and sample size. Overall, this rate is ranging from 20% to 36% as ever seen in Bangladesh.<sup>18,22</sup>

The etiology of preterm birth has been a major concern. Preconception weight was the determinant of preterm birth in this study. The possibility of preterm birth was increased if pre-pregnancy weight was  $\leq 40$  kg. Kosa *et al.* also showed that premature birth was generally associated with low maternal pre-pregnancy weight.<sup>24</sup>

Handsome family income is a sound strength to manage every corner of the expenses of family. In this study family income had a significant effect on birth weight. The probability of having LBW was 1.62 times higher for the family income less than or equal to ten thousand taka. Britto *et al.* reported that mother of lower family income almost twice times higher to give LBW babies.<sup>25</sup> This research is not free from limitations. Only three clinic considered for data collection, so this result was not generalizable. To generalize the result, need to include more clinic and government hospital.

## Conclusion

Preterm birth (PB) and LBW are the multifactorial issue in obstetrics. Even with technological improvements in the health care system, PB and LBW still remains a major concern for health officials. Child morbidity and mortality are associated with preterm birth and LBW.

Also, some adulthood diseases are consequences of preterm birth and child malnutrition. Authorities have tried to reduce the burden this morbidity. This investigation found significant rates of preterm birth and LBW in study population. Pre-pregnancy weight and family income was two respective determinants. Proper pre pregnancy diets and economic security may reduce the vulnerable situations in the study area.

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# Effectiveness of the Participatory Health Promotion Program for Improving Health Outcomes of Elderly with Non-Communicable Diseases in Municipalities, Thailand: An Experimental Study

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## Abstract

**Objective:** The objectives of this study were to evaluate the effectiveness of a participatory health promotion program for elderly with non-communicable diseases (NCDs) in municipalities, Thailand.

**Methodology:** This experimental study was conducted among elderly who suffering from diabetes and/or hypertension. The total samples of 84 of elderly with NCDs, of which 40 patients from 2 health centers were randomly allocated to the experimental group, whereas 44 from other 2 health centers were randomly allocated to a control group. Data were collected at baseline and 3 months after the implementation of a participatory health promotion program. The analysis of co-variance (ANCOVA) were used to determine effectiveness of the health promotion program.

**Results:** The results indicated an effectiveness of the participatory health promotion program. After adjusting the baseline and controlling other covariates, the experimental group demonstrated improving of outcomes including reduced triglyceride (adjusted mean different = -32.15, 95% CI: -57.28 to -7.02) and increased HDL (adjusted mean different = 4.01, 95% CI: 1.11 to 6.89).

**Keywords:** *Elderly health care, Municipality, Non-communicable disease, Participatory health promotion program, Self-management.*

## Introduction

The most common diseases among elderly in Thailand were hypertension, diabetes, arthritis/degeneration, emphysema, cardiovascular diseases, myocardial infarction, and paralysis<sup>1</sup>. More than 60% and 10% of the elderly aged 80 years old and over suffering with high blood pressure and diabetes, respectively. About 56% of the elderly reported that they had chronic diseases such as diabetes, high blood

pressure. 37% of males and 42% of females elderly reported of having 2 or more chronic diseases<sup>1-3</sup>. Regarding social problems, it was found that the rate of dependency of the elderly population towards 100 working people was 25.4 people in 2016 and expected that in 2027 and 2137 the rates will increase to 40.4 people and 54.95 people respectively. While 10% of the elderly living alone in the municipality<sup>1, 4</sup>. The policy recommendations were to increase the effectiveness of health promotion and disease prevention in the elderly, especially the on diabetes, hypertension, falls and mental health. We should enhance the role of local administrative organizations in developing a seamless health service system in the context of the area<sup>1, 5</sup>.

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Thailand has been in the process of rapid urbanization. A municipality is a local administrative

organization which responsible for managing development in its area. One of its authority and duties is to promote the development of women, children, youth, the elderly and the disabled. Nonthaburi Municipality locates in the vicinity of Bangkok. The total population is 255,315 people, with 149,383 households<sup>6</sup>, of which 21.8 % were the elderly population<sup>7</sup>. NCDs especially hypertension and diabetes, were found among more than 80% of these elderlies. Both diseases common risk factor: overweight, hypelipidemic, inappropriate health behaviors especially dietary, exercise, stress management, and taking medications as prescribed by the doctor. It was recommended that self-care for the elderly with chronic health problems should focus on maximizing independence, vigor, and life satisfaction. Health promotion in this population is vital to prevent complications and decrease risks that reduce life quality<sup>8</sup>.<sup>9</sup>. In addition, an effective health promotion model should be relevant with the environmental and economic context with create a balance between the need to use resources for health development and other developments<sup>8</sup>. The NCDs policy in 2017 of the Ministry of Public Health states that those with hypertension and diabetes must be able to control the diseases. One important measure to achieve that goal is community participation<sup>10</sup>.

Nonthaburi Municipality has 6 public health centers providing health promotion services, disease prevention, medical treatment, and rehabilitation. There are unclear system and network between the community and public health centers for promoting self-care of these patients<sup>7</sup>. There were limited roles of patients to plan and set goals for their self-care with medical personnel. The health personnel team need to develop skills in health behavior modification. There were recommended that increasing supports for patients to take care of themselves together with the participation of the community would result in the reduction and prevention of risks that lead to better health outcomes of the patients. Therefore, this study aimed to evaluate the effectiveness of the developed health promotion program for elderly with NCDs.

**Objective:** To evaluate the effectiveness of the participatory health promotion program in improving health outcome of elderly with NCDs in municipalities, Thailand.

## Method

This experimental study was conducted among elderly who suffering from diabetes and/or hypertension.

The sample size was calculated with the G\* Power program<sup>11</sup>. When assigned effect size at 0.55<sup>12</sup> alpha at 0.05 and power of test at 0.80 with on tail test, a sample size of the experimental and control group were 42 people in each group. In order to prevent the loss of samples, therefore, it was added to each group of 45 people, including a sample group of 90 people. Inclusion criteria were people aged 60-80 years old who were diagnosed with hypertension and/or diabetes by physician, able to communicate with researcher, voluntarily participate in the study and could be followed for 12 weeks. The study samples were 45 elderly with HT and/or DM who were randomly selected from 2 health center to an experimental group and another 45 patients who were randomly selected from other 2 health centers to a control group. After baseline data collection the experimental group received an intervention which was a health promotion program developed from the contribution of stakeholders and the suggestion of experts as an empowerment learning process, focused on how to help patients become more knowledgeable and take control over their bodies, disease, and treatment. The program initiated with building relationships with the elderly, learning about diabetes and hypertension, risk level, sharing self-care experience and determining alternatives for behaviour modification, dietary for diabetes and hypertension patients, forming a team for peer-assisted, setting self-care goals, making the next appointment. It aimed to inspire, inform, support and facilitate their efforts to identify and attain their own goals. The health record book was used for an individual to record their health data, learning, goals setting and planning for self-care, appointment, and having essential health knowledge. Instruments were a structured questionnaire, physical checkup and laboratory tests. The total samples who were completed data at the 12 weeks were 84 participants, 40 in the experimental group and 44 in the control group.

Both descriptive and inferential statistic were used for data analysis. Categorical data were analyzed presenting frequency distribution and percentage. Means, standard deviations, medians were analyzed for continuous data. An intention-to-treat protocol was used to determine the effectiveness of the participatory health promotion program. Mean difference with adjusted based line between the experimental and control groups were analyzed by the analysis of covariance (ANCOVA) presenting adjusted mean difference and 95% CI of the outcome variables.

## Results

**Demographic and Socioeconomic Characteristics of Elderly with NCD:** There was a total of 84 participants that completed the study protocol, of which 40 participants were in the experimental group whereas there were 44 in the control group. Majority of the elderly in control group were female (51.5%), married (68.1%) with the average age of  $68.2 \pm 5.44$  years old. In the experimental group 72.5% were females, married (45.0%) with the average age of  $68.9 \pm 5.39$  years old. More than half of both groups finished primary education (61.4% in control) and (52.5% in experiment). Most of them were unemployed/housewife (control =62.8%) and (experiment = 60.0%). The median monthly income

of the control group was 12,000 Baht (min: 600, max: 40,000), which not much different with that of the experimental group of 11,000 Baht (min: 600, max: 100,000).

**Effectiveness of the participatory health promotion program for elderly with NCDs:** After 3 months, the ANCOVA showed that the mean difference after adjusting the baseline data between control group and experimental groups of Triglyceride was reduced. In addition, HDL was increased when controlling age, gender, occupation, income, and economic status (Table 1).

**Table 1: Effectiveness of the Participatory Health Promotion Program for Elderly with NCDs**

Variables	Control (n=44)		Experimental (n=40)		Experimental comparison	
	Mean (S.D)	Mean Change from Baseline	Mean (S.D)	Mean Change from Baseline	Adjusted mean difference (95%CI)	P-value
<b>Triglyceride</b>						
Baseline	119.32(52.08)	-	153.30(76.63)	-	-	-
3 months	144.84(49.17)	20.94	121.30(66.20)	-39.33	-32.15(-57.28 to -7.02)	0.013
<b>HDL</b>						
Baseline	53.93(14.34)	-	52.02(15.42)	-	-	-
3 months	51.00(11.37)	-2.82	53.50(12.00)	1.36	4.01(1.11 to 6.89)	0.007
<b>Cholesterol</b>						
Baseline	202.50(36.09)	-	208.87(46.32)	-	-	-
3 months	196.43(58.39)	-1.80	196.15(40.58)	-13.72	-10.77(-31.40 to 9.85)	0.301
<b>LDL</b>						
Baseline	124.60(29.40)	-	133.04(58.35)	-	-	-
3 months	126.90(47.06)	4.08	118.44(36.40)	-15.47	-14.00(-32.88 to 4.87)	0.143
<b>HbA1c</b>						
Baseline	6.40(0.98)	-	6.34(0.79)	-	-	-
3 months	6.15(0.81)	-0.25	6.21(0.81)	-0.11	0.01(-0.11 to 0.32)	0.349
<b>Fasting plasma glucose</b>						
Baseline	118.36(19.59)	-	119.52(32.09)	-	-	-
3 months	104.88(30.60)	-13.46	107.50(29.31)	-10.84	2.45(-8.96 to 13.86)	0.669
<b>BMI</b>						
Baseline	25.29(2.97)	-	25.02(2.99)	-	-	-
3 months	25.26(2.88)	0.06	24.94(2.97)	-0.12	- 0.26(-0.82 to 0.29)	0.345
<b>Waist Circumference</b>						
Baseline	90.23(13.52)	-	87.23(9.16)	-	-	-
3 months	90.01(7.16)	0.52	87.01(8.66)	0.10	-1.92(-5.26 to 1.42)	0.256
<b>Systolic Blood Pressure</b>						
Baseline	132.79(17.52)	-	137.17(16.15)	-	-	-
3 months	139.18(20.26)	7.78	135.07(16.39)	-4.03	-6.15(-15.50 to 3.19)	0.193
<b>Diastolic blood pressure</b>						
Baseline	72.86 (8.21)	-	73.45 (9.22)	-	-	-
3 months	78.70 (12.79)	6.43	77.77 (9.67)	4.15	-0.37(-6.21 to 5.46)	0.898



## Discussion

The result indicated that the participatory health promotion program for elderly with NCD could help reduced Triglyceride and increased HDL after 3 months implementation. This result was similar to the finding from a study on the effects of a self-management support program for Thai people diagnosed with metabolic syndrome which found that swing arm exercise reduce of triglyceride and HDL. This could be due to the effectiveness of this health promotion program which included activities focused on how to help patients become more knowledgeable and take control over their bodies, disease, and treatment. This participatory health promotion program was in line with the suggested guideline from Foundation for Gerontology Research and Development Institute which stated that patients should be considered as patient center care by increasing the support them to be able to perform self-care management in the community as well as focusing on skill care development practices, sharing experience and lifelong learning<sup>1,13</sup>. Moreover, the support from local administration organization for budget on laboratory test and engaging in mobilization processes also influence the success of the program<sup>14, 15</sup>. This health promotion program was designed to improve participating and context of the areas<sup>16-18</sup>.

This study found no significant difference between the experimental and control groups in BMI, systolic blood pressure, diastolic blood pressure, waist circumference, HbA1C, cholesterol LDL. It was contrast with the results of the holistic health promotion program of the elderly<sup>19</sup> reported that the experimental group had significantly improvement on physical activity and exercise, BP, flexibility of shoulder, VO2max and QOL and BMI as well. This reason could due to difference of self-care behaviors as well as the different in evaluation criteria. The dietary habits also vary therefore it affected on BMI change as well as sugar level and HBA1C.

## Conclusion

The participatory health promotion program could help improve some help outcomes of elderly with NCD in the municipality areas. The participatory health promotion program for elderly with NCD focusing on the empowerment learning process and promoting self-management are effective to improve self-efficacy, self-care behavior, physical fitness, physical and mental health of the elderly. The municipality should continue with this program for the elderly as well as let them

reflect and set their own gals and strategies to improve their health behavior to achieve the preferable health outcomes.

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# Health Literacy, Occupational Health and Safety Factors and Quality of Life of Municipal Waste Collectors in the Northeast of Thailand

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## Abstract

Waste collectors usually expose to several occupational health and safety risks which may affect their health and wellbeing. Health literacy might help reducing occupational harms. Our aims were to assess the health status and to determine the influence of health literacy (HL) and occupational health and safety (OHS) factors on quality of life (QOL) of local administration organization waste collectors in Thailand. This cross-sectional study was conducted among 529 participants who were recruited by using a multistage random sampling from local administration organizations in 4 provinces of the Northeast of Thailand. A self-administered structured questionnaire was used to assess OHS factors, HL, socioeconomic status (SES) and QOL. The Generalized Linear Mixed Model (GLMM) was used to determine the association between OHS, HL and QOL when controlling for other covariates. 62.95% of the participants reports as had good health status. However, 51.04% had musculoskeletal disorders (MSDs), 36.37% had work related injuries and 20.04% had chronic disease. Only 42.53% had adequate to excellence level of HL and the same proportion had good QOL. The GLMM analysis indicated factors that were significantly associated with good quality of life when controlling the effect of regions of municipal waste collectors in the Northeast of Thailand were: did not have MSDs, had adequate to excellence levels of health literacy, had low level of stress related with social support on work, had higher level of education, had high level of knowledge on garbage collection work, had low stress related with job security. Less than half of municipal waste collection workers had good QOL. HL, free from MSDs, knowledge about waste collection, low levels of stress on job security, and social support on job had influence on QOL as well as educational attainment.

**Keywords:** Health literacy, Municipal waste collectors, Occupational health and safety, Quality of life.

## Introduction

Municipal waste collection is a job involves a variety of physical, chemical, and biological hazards<sup>1</sup>. The duties of waste collectors usually include picking-up waste from points of production, emptying waste

collecting containers onto trucks, and delivering the waste to disposal and processing facilities. The waste collection jobs are frequently lifting, carrying, pushing, and pulling of heavy objects<sup>1,2</sup> which put them at high risk of musculoskeletal disorders (MSDs). Other common injuries are fractures, ocular trauma, and bites, and diseases include skin and gastrointestinal disorders. Besides the recurrent heavy physical activity, waste collectors are also exposed to bacteria, fungus, endotoxins, dioxins, dust, allergens, irritant inhalants, mutagens vehicle exhaust, atmospheric conditions, noise, and psychological stress. Waste collectors can be protected by using safety procedures on and around

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garbage trucks and with personal protective equipment. However, many of them are not usually use the protective equipment<sup>1</sup>. These physical and psychological health problems have impact on their quality of life. WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment<sup>3</sup>. Health literacy might help reducing occupational harms, health literacy is the degree to which individuals have the capacity to obtain, process and understand basic health information and services need to make appropriate health decisions<sup>4,5</sup>.

There have been increasing trends of occupational health and safety, as the result the inability to work or absenteeism from work are increasing, for instance 22% of worker were absent from the job due to abnormalities in the skeletal and musculoskeletal system<sup>6</sup>. Moreover, among the employees with daily hiring, the frequency of taking leave or absence from work which resulted in terminating their jobs, making them shortage of incomes to support families<sup>7</sup>. The impact of occupational health and safety problems caused terminated job or fired from job which influence on the quality of life. Many previous studies conducted on the relationship between health literacy, occupational health and safety problems with the quality of life of people in various occupations except waste collectors. In the Northeast of Thailand, the biggest region, there are no comprehensive study on quality of life among this group. This study aimed to assess the health status and the relationships of health literacy (HL) and occupational health and safety (OHS) problems, with quality of life (QOL) of local administration organization waste collectors in Thailand.

## Material and Method

**Study Design:** This cross-sectional study was conducted among 529 participants who were recruited by using a multistage random sampling from local administration organizations in 4 provinces of the Northeast of Thailand, including Udonthani, Nakhon Ratchasima, KhonKaen, Mahasarakham provinces. The inclusion criteria were, municipal waste collectors, who were working in the sanitation department for at least one-year work experience and willing to cooperated.

Workers who had underlying conditions including osteoporosis, osteoarthritis, myasthenia gravis, SLE, gout, systematic inflammation, nerve injury, a history of MSDs due to injuries, psychological disorders were excluded. A self-administered structured questionnaire was used to assess OHS, HL, socioeconomic status (SES) and QOL.

**Data Analysis:** A simple logistic regression was used to identify individual the association between each independent variable and weight loss products use. The independent factors that had p-value <0.25. were processed to a multivariable analysis using the generalized linear mixed model (GLMM) to identify the association between OHS, HL and QOL when controlling the effect of other covariates, of which 4 provinces were selected to include as random effects. The magnitude of association was presented as adjusted odds ratio (Adj.OR), 95% confidence interval (CI) and p-value <0.05 as statistically significant level.

## Results

Among a total of 529 municipal waste collectors, all males with the average age 42.50 years old. Nearly 70% was married and more than half was a head of his family. Their average monthly income was 10,399.38 Baht and almost 60% was in-debt. Around 70% of them was temporary workers. Most of them were smoking (70.13%) and consuming alcohol (84.88%). Most of them report having had adequate physical activity (62.19%) and had no sleep problems (70.80%). The average working experiences was around 10 years, and the average daily working hours was 7 hours per day. Almost 60% of them had low to moderate levels of knowledge on garbage collection work. However, more than 70% of them had moderate level of attitude related to garbage collection work. For health literacy, nearly half of them had adequate and excellent levels of health literacy.

Most of the participants reported as having good health status (62.95%). Almost a quarter (24.38%) were overweight and as high as (35.35%) were obese. Around 20% had chronic diseases (hypertension, diabetes, allergy, asthma CVD, peptic ulcer), 36.67% had work related injuries, and 51.04% suffering MSDs. Less than half of the municipal waste collectors in the Northeast of Thailand had good QOL 42.53%. Majority of them had fair QOL (56.90%) (Table 1).

**Table 1: Number and percentage of Quality of Life (QOL) of Municipal Waste Collectors in the Northeast of Thailand (n=529)**

QOL	Number	Percent	95% CI
Poor level (26-60 scores)	3	0.57	0.18-1.75
Fair level (61-95 scores)	301	56.90	52.63-61.07
Good level (96-130 scores)	225	42.53	38.37-46.80

The GLMM indicated six factors that were significantly associated with good quality of life among municipal waste collectors in the Northeast of Thailand. These factors were; did not have MSDs (adj.OR 2.72, 95% CI=1.83-4.05), had adequate and excellence levels health literacy (adj.OR 2.26, 95% CI=1.53–3.33), had low level stress related with social support on work

(adj.OR 2.34, 95% CI=1.53–3.58), had higher level of education (adj.OR 1.95, 95% CI=1.31–2.91), had high level of knowledge on garbage collection work (adj.OR 1.56, 95% CI=1.05–2.32), had low level of stress related with job security (adj.OR 1.56, 95% CI=1.06–2.30), when controlling the effect of regions (Table 2).

**Table 2: The Multi variable Analysis of Factors Associated with Quality of Life among Municipal Waste Collectors in the Northeast of Thailand using the GLMM, a Model Presenting Odds Ratios, Adjusted Odds Ratios, 95% CI and P-value. (n = 529)**

Factors	Number	% Good QOL	Crude OR	Adjusted OR	95%CI	p-value
<b>Musculoskeletal disorders (MSDs)</b>						<0.001
Yes	270	31.85	1	1		
No	259	53.67	2.45	2.72	1.83-4.05	
<b>Health Literacy</b>						
Inadequate - problematic	304	33.22	1	1		<0.001
Adequate - Excellence	225	55.11	2.50	2.26	1.53–3.33	
<b>Work related stress with social support</b>						<0.001
Moderate-High	172	27.33	1	1		
Low	357	49.86	2.69	2.34	1.53–3.58	
<b>Education</b>						0.001
Lower education	280	37.86	1	1		
Higher education	249	47.79	1.56	1.95	1.31–2.91	
<b>Knowledge on garbage collection work</b>						0.028
Low–Moderate	338	39.05	1	1		
High	191	48.69	1.41	1.56	1.05–2.32	
<b>Work related stress with job security</b>						0.024
Moderate-High	226	37.61	1	1		
Low	303	46.20	1.46	1.56	1.06–2.30	

## Discussion

Less than half of municipal waste collectors in the Northeast of Thailand had good QOL (42.53%). This might explain by the multivariable analysis identified 6 factors that have influence on having good QOL of the municipal waste collectors. The finding from this study

was in line with a study of the quality of life of Thai workers in a dyeing factory in 5 provinces near Bangkok reported that 50.9% of the worker had average level of quality of life and 49.1% were at good level<sup>8</sup>. However, it was not consistent with a study in China which was conducted among construction workers, found that 67.50% of them had low quality of life<sup>9</sup>. The reasons

for different result might due to the different in social and economic conditions of China and Thailand as well as job characteristics and work environments as well as HL, knowledge, attitude and stress.

This present study illustrated that more than half of the participants had MSDs (51.04%), 36.37% had work related injuries and 20.04% had chronic disease. These findings were similar to the results of a study in Northwest Ethiopia among rubbish cleaners 2015, indicated that 34.3% of rubbish collectors were injured<sup>10</sup>. More over the study from the Taiwan which found that 37% of garbage waste collector had been injured from a sharp object<sup>11</sup>. It might be because of the working as garbage collector is heavy work and it must be done in an dangerous environment, in addition this kind of job, some of them need to work by trapezing on trucks<sup>1</sup>. In addition, another reason for the high injury rate and increased severity was working without personal protective equipment in a hazardous environment<sup>12</sup>. More than 60% of them were absence of work-related injury and diseases and 51.04% got MSDs. It was not difference from the study among waste collectors in Iran which showed the abnormalities in the structure of the musculoskeletal system<sup>13</sup>. Due to waste collectors' job is a labor-intensive job combined with lifting, carrying, pushing, and hanging while moving vehicles that lead to have problem on the musculoskeletal system<sup>14,15</sup>. Moreover, absence of MSDs was strongly associated with good quality of life. Similar finding were from many studies indicated that abnormal skeletal and MSDs were commonly found in the waste collectors<sup>16-18</sup>. Due to physical illness, feeling sick, physical discomfort always affects the quality of life among people with MSDs than those without the disorder.

The result of our study showed that 42.53% had adequate to excellence levels of HL, this finding was consistent with a study in Spain found 50.88% of the general population had health intelligence. This may be health literacy covers the access to health information, understanding, appraise and making decision on their health<sup>19</sup>. Difference outcomes of good health which influenced not only HL but also personal factors, social status and education<sup>20</sup>. In addition, this study showed waster collectors who had adequate-excellence levels of health literacy were more likely to have good quality of life than those with inadequate-problematic health literacy. May be due to better access to health information and understanding the health information via health providers and mass media could influence

them to apply to improve their health behaviors which had impacts on their QOL. Previous studies also stated that HL especially access to health information and services are related to health-related quality of life<sup>21,22</sup>.

The municipal waste collectors who had low level of stress on job security and social support were more likely to have good quality of life. This maybe because of appropriate welfare and compensations for garbage collectors. Therefore, they had good living conditions as well as having enough income to sustain life. Through interaction and network among each other in community, waste collectors can develop themselves to have good social capital. This is consistent with some studies found that having a high level of social capital leads to better quality of life and well-being<sup>23,24</sup>.

It is recommended that health sectors should work with local administration organizations need to work systematically to improve health literacy, knowledge and attitude of the municipal waste collectors. Administration organizations should improve occupational health and safety especially to prevent MSDs and injuries. Better communication and supports on job security, and social support on job were in needed.

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# Health Risk Assessment on Human Exposed of Nitrogen Dioxide in Adults Around Steel Industry

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## Abstract

**Background:** Nitrogen dioxide (NO<sub>2</sub>) is a pollutant gas that can cause symptoms that are bad for the environment and human health. As a result of exposure to nitrogen dioxide in humans through inhalation will cause acute and chronic respiratory disorders. Sources of nitrogen dioxide emissions can come from repeated combustion processes in the steel industry using coal as an iron reducing agent in the furnace.

**Objectives:** This study aims to evaluate the public health risks around the steel industry in the village of Sukadanau, West Cikarang sub-district.

**Method:** Anthropometric characteristics and activity patterns are used to calculate intakes. Intake (*Ink*) and Reference Concentration (R/C) produce RQ (*Risk Quotion*) with RQ *real time* > 1 indicating the existence of health risks so that risk management is needed.

**Results:** Adults who live around the steel industry are at risk of exposure to nitrogen dioxide gas in the surrounding air. The study found that at a radius of <500 meters from the industry having RQ<sub>real time</sub> > 1 and found signs respiratory disorders to respondents.

**Conclusion:** With the method of analyzing environmental health risks from exposure to nitrogen dioxide, it is known that there are significant health risks for the community that can be used as preventive measures to prevent worse health problems.

**Keywords:** Nitrogen dioxide, health risk, steel industry, human exposure.

## Introduction

Indonesia is the 3<sup>rd</sup> largest steel importer in the world, at 11 million tonnes in 2016 for all steel product<sup>1</sup>. One of steel industries that plays a role in Southeast ASIA is located in West Cikarang and is in the center of community settlements in the administrative area where the industry is located has 25,817 people who have the potential to have an effect from emissions released by

the industry into ambient air. The use of fossil fuel in the iron and metal (steel) industry will increase greenhouse gas emissions. Production activities in the iron and steel industry tend to go through high temperature processes with very large fuel consumption, as a result most of these processes are sources of NO<sub>2</sub> emissions especially those produced from equipment technology such as boilers and furnaces<sup>2</sup>.

Previous and recent epidemiologic studies consistently indicate associations between short-term increases in ambient NO<sub>2</sub> concentrations and increases in respiratory effects aggregated across specific conditions such as asthma, COPD, and respiratory infections<sup>3</sup>. This study is going to use health risk assessment method of U.S. EPA is used to evaluate health risk from a model prediction data following four steps as Hazard

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identification, Dose-response, Exposure assessment and Risk characterization. Normally, health assessment includes health issues that can be measured, such as chemical and pollution exposure concentrations while focusing less on qualitative information such as community perceptions of health issues<sup>4</sup>.

### Materials and Method

This research is descriptive with a study design in *cross sectional* which exposure and outcome are collected at the same time or in a certain time.

The population is adults who live around the location of the steel industry. Samples taken were adults, with criteria aged > 18 years and living at least 1 year in a location around the industry, Cikarang Barat, Bekasi. The sample in this study was determined using the calculation of estimation of proportions. Based on the calculation the sample size in this study was 94 samples. Samples in this study were divided based on Radius < 500 m, 500 - 1000 m and > 1000 m with the steel industry. From each radius, the population of each radius is calculated using the formula proportional stratified random sampling.

This research uses a method approach in the form of Environmental Health Risk Analysis which is based on the Guidelines for assessing human health risks from environmental hazards by enHealth (2012) consisting of 4 stages namely Hazard Identification, Exposure Analysis, Dose-Response Analysis and Risk Characterization. This method cannot see the correlation between variables so it is limited to the presence or absence of health risks that will arise in humans.

Frequency distribution analysis is carried out to see the size of the mean, minimum and maximum values for nitrogen dioxide concentration data, age, activity pattern data and anthropometric data. Conduct a health risk analysis by calculating the NO<sub>2</sub> exposure intake to respondents to calculate the amount of intake received by an individual by the formula:

$$Intk = \frac{C \times R \times t_E \times f_E \times D_t}{W_b \times t_{avg}}$$

Ink : Intake (intake), the number of risk agents entering the human body (mg/m<sup>3</sup>/day)

C : concentration of risk agents (mg/m<sup>3</sup>)

R : rate of intake (0.83 m<sup>3</sup>/hour)

t<sub>E</sub> : time of exposure (hour/day)

f<sub>E</sub> : frequency of exposure (day/year)

D<sub>t</sub> : duration of exposure, length of stay (years)

W<sub>b</sub> : respondent's weight (kg)

t<sub>avg</sub> : average time period (30 x 365 days/year for non-carcinogenic substances)

Next look at the risk characteristics expressed by RQ. Individuals are declared to have a health risk if RQ > 1 and declared not to have risk if RQ < 1. The RQ formula is as follows:

$$RQ = \frac{\text{Intake}}{RfC \text{ (Reference Concentration)}}$$

Risk management needs to be done in risk groups with RQ > 1 by calculating the maximum NO<sub>2</sub> concentration limit, t<sub>E</sub>, f<sub>E</sub> and D<sub>t</sub> with the following equation:

Concentration limit	$C_{max} = \frac{RfC \times W_b \times t_{avg}}{R \times f_E \times t_E \times D_t}$
Time limit	$t_E = \frac{RfC \times W_b \times t_{avg}}{R \times C \times f_E \times D_t}$
Frequency limit	$f_E = \frac{RfC \times W_b \times t_{avg}}{R \times C \times t_E \times D_t}$
Duration limit	$D_t = \frac{RfC \times W_b \times t_{avg}}{R \times C \times t_E \times f_E}$

## Results

### Hazard Identification:

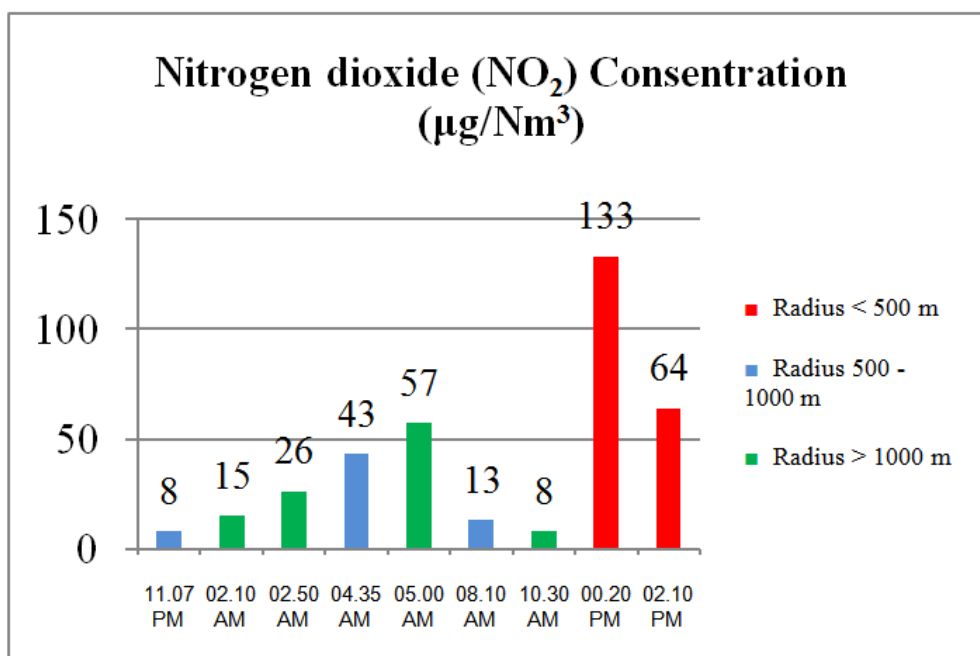


Fig. 1: NO<sub>2</sub> Concentration in 9 Location

**Exposure Analysis:** Based on the results of the study, several results were obtained regarding the characteristics of 94 adult respondents. Characteristics of respondents in the study include: weight, daily

exposure, frequency of exposure, exposure duration and intake NO<sub>2</sub> real time calculated using the *Kolmogorov-smirnov test* in table 1.

Table 1. Univariate Analysis Results

No.	Anthropometric Variables & Activity Patterns		Min	Max	Mean	SD	p-value Kolmogorov-smirnov
					Median		
1	Weight (kg)	(W <sub>b</sub> )	41	100	66.35* 64.50	13.21	0.060
2	Daily exposure (hours/days)	(t <sub>E</sub> )	7	24	21.53 24.00*	4,08	0.000
3	Frequency of exposure (days/year)	(f <sub>E</sub> )	305	365	357.33 359.00*	11.92	0.000
4	exposure Duration (years)	(D <sub>t</sub> )	1	65	20.24 23.00*	15.47	0.000
5	Intake NO <sub>2</sub> real time (mg/kg/day)	(I)	0.0000	0.3567	0.0037 0.0018*	0.0057	0.000

Note: \*mean used

The distribution of anthropometric characteristics of adult respondents is shown in table 2 based on test *Kolmogorov-smirnov*.

**Table 2. Distribution of Anthropometric Characteristics of Adult respondents**

Anthropometric Characteristics	Amount (Person)	Percentage (%)
<b>Weight (Kg)</b>		
<66.35	50	53.2
≥ 66.35	44	46.8
<b>Exposure Time (hours/day)</b>		
<24 hours	33	35.1
24 hours	61	64.9
<b>Frequency of Exposure (day/year)</b>		
<359	43	45.7
≥ 359	51	54.3
<b>Duration of Exposure (year)</b>		
<23	46	48.9
≥ 23	48	51.1
<b>NO<sub>2</sub> intake<sub>2</sub> real time (mg/kg/day)</b>		
<0.0018	43	45.7
≥ 0.0018	51	54.3

**Dose-Response Analysis:** A dose-response analysis is carried out to establish quantitative values of the toxicity of a risk agent for each form of chemical species. The size of the toxicity of a *risk agent* with the effects of non-carcinogens in Environmental Health Risk Analysis (EHRA) for inhalation represented by RfC (*Reference Concentration*). Rated RfC for NO<sub>2</sub> has been available in the EPA/NAAQS 1990 of 0,02 (mg/kg/day) with crisis effects of respiratory tract disorders.

**Risk Characterization:** Risk characterization are efforts to determine whether the exposed population has a risk of *risk agents* entering the body expressed as RQ (*Risk Quotient*). Health risk is stated to exist and needs to be controlled if RQ > 1.

**Table 3. Risk Level of NO<sub>2</sub> Exposure based on Radius from Steel Industry Point**

Radius	Level of Risk		Total
	RQ ≤ 1 real time (n)	RQ > 1 real time (n)	
< 500 m	3 (50%)	3 (50%)	6
500 – 1000 m	20 (100%)	0 (0%)	20
> 1000 m	68 (100%)	0 (0%)	68
Total	91	3	94

In the RQ *real time* from the number of 6 respondents in the radius < 500 there are 3 people (50%) respondents who have a RQ *real time* value > 1 which means the need for risk control or management.

**Risk Management:** Risk management is a way of controlling risk by selecting and implementing risk mitigation caused by environmental hazards<sup>5</sup>. Some possible risk controls to reduce the risk of non-carcinogenic exposure to NO<sub>2</sub> in adults around the steel industry namely reducing concentration of NO<sub>2</sub>, reduce exposure time, reduce the frequency of exposure and duration of exposure. The calculation respondents that has  $aRQ_{real\ time} > 1$  is as follows:

**Table 4. Maximum Limit Value for Risk Management**

	Respondent	1	2	3
Individual Characteristic	C(mg/m <sup>3</sup> )	0.133	0.133	0.133
	RfC(mg/kg/day)	0.02	0.02	0.02
	W <sub>b</sub> (kg)	64	65	73
	t <sub>E</sub> (hour/day)	24	24	24
	f <sub>E</sub> (day/year)	337	365	365
	D <sub>t</sub> (years) <sub>life span</sub>	30	30	30
Maximum Limit Value	C <sub>max</sub> (mg/m <sup>3</sup> )	0.070	0.065	0.073
	t <sub>E</sub> (hour/day)	12.56	11.78	13.23
	f <sub>E</sub> (day/year)	176	179	201
	D <sub>t</sub> (years)	15.7	14.7	16.5

**Discussion**

The steel industry in Sukadanau Village is one of the largest industries and plays an important role in the Southeast Asian region. In one year the industry can produce 1.2 million tons of steel. In line with this,

emissions from production activities from boiler and furnace machines are produced continuously. The repeated heating activity of steel production and the use of large fuels can produce pollutants sources of NO<sub>2</sub><sup>2</sup>. In accordance with Yu Liu's research, that in his research found the most prominent source of NO<sub>2</sub> comes from fossil fuels that are burned from industrial processes<sup>6</sup>.

Based on WHO's Global Air Quality Guideline in 2005 on the guideline value for NO<sub>2</sub> the normal limit of the concentration of NO<sub>2</sub> is 200 µg/Nm<sup>3</sup> in air ambient<sup>7</sup>. It can be seen that from nine measurement locations none exceeded the normal limit with the highest value in the location <500 m of the steel industry with a value of 133 µg/Nm<sup>3</sup> or equivalent to 0.133 mg/m<sup>3</sup>. However, the estimated risk due to exposure to NO<sub>2</sub> can occur due to differences in anthropometric characteristics and activity patterns.

Evidence shows that adverse health effects remain at concentrations of pollutants that are below current air quality standards and at low air pollution levels in many countries. In addition, air pollution is an important concern in many developing countries, where emissions have increased without strict air quality policies. This has added to the worsening air quality conditions, especially in urban areas<sup>8</sup>.

Nitrogen dioxide concentrations are taken for one hour at each point of measurement location. Starting at 11:00 pm until 03.10 pm in the morning. The concentration of NO<sub>2</sub> has increased starting from the first measurement in the morning until late afternoon, and increasing at night with measurements at 00.10 pm. This diurnal trend of NO<sub>2</sub> is consistent with EPA's explanation for NO<sub>2</sub> that this is caused by meteorological influences, with concentrations increasing at night when atmospheric mixing decreases due to low wind speeds and low mixing layer heights<sup>3</sup>.

In table 1 it can be seen that the frequency of respondent exposure is 24 hours/day on average. In table 2 it is also known that the highest frequency of exposure is 24 hours/day. This is because most of the study respondents were housewives in residential locations so that most of their activities were in the area where they lived.

Calculations *Intake* there are variations from each respondent due to differences in anthropometric characteristics and activity patterns. The highest value of intake on respondents obtained from respondents

with the duration of exposure (D<sub>i</sub>) 24 years exceeds the average of 23 years.

In the calculation of RQ (*Risk Quotion*) there are 3 respondents who have a value of  $RQ_{real\ time} > 1$ . Of all respondents who have an  $RQ_{real\ time} > 1$  are respondents who live in a radius of <500 m from the steel industry. This is influenced by the concentration of NO<sub>2</sub> at a radius of <500 m from the steel industry which is very high at 0.133 mg/m<sup>3</sup> and decreases after more than 500 m distance. This is consistent with the theory that the concentration of NO<sub>2</sub> will decrease at a distance of 500 m from the source of emissions<sup>3</sup>. This is not much different from the results of Masito's research which says that the distance of 300 m is the area affected from the point of taking NO<sub>2</sub><sup>9</sup>.

$RQ_{real\ time} > 1$  is where the result is an insecure value (potentially causing non-carcinogenic effects) in the surrounding community in the steel industry area. So that there is a need for risk management measures using an economic and social approach, a technology approach and stakeholders<sup>10</sup>. Based on the calculation it can be seen that the maximum safe concentration for a period of 30-year exposure (projected *lifespan*) is taken from the respondents most at risk with the highest  $f_E$  value and the lowest concentration of 0.065 mg/m<sup>3</sup>. The limit is the safe concentration limit to avoid health risks. Furthermore, at the concentration of exposure using a maximum value of 0.133 mg/m<sup>3</sup>, then the maximum safe time is 11.78 hours/day the frequency of safe exposure is 176 days/year and the duration of safe exposure is 14.7 years. The difference in values is due to the different anthropometric characteristics and activity patterns of the respondents. The risk group can do this by managing the time, frequency and duration of exposure so as not to pose a health risk.

The effects arising from exposure to NO<sub>2</sub> tend to cause respiratory disturbances because the dominant exposure pathway is through inhalation. In this study it was found that respondents with  $RQ_{real\ time} > 1$  experienced symptoms of respiratory disorders such as coughing and phlegm. Research in Italy shows that there is a relationship between the concentration of NO<sub>2</sub> and impaired lung function using a spirometer. FER statistical test results ( $FER = FEV_1/FVC$ ) have a significant correlation with NO<sub>2</sub> ( $p < 0.001$ )<sup>11</sup>. Further evidence supporting the short-term relationship between NO<sub>2</sub> and an increased risk of death from respiratory disease has also been widely reported, especially in urban areas of China<sup>12,13</sup>.

## Conclusions

Measurement of health risks from the concentration of NO<sub>2</sub> in adults around the steel industry in Sukadanau Village, Cikarang Barat District resulted in  $RQ_{real\ time} > 1$  at a radius of <500 m. Respondents with  $RQ_{real\ time} > 1$  are known to experience symptoms of respiratory disorder in the form of coughing and phlegm, so there is a need for risk management to anticipate worse health problems. Risk management can be done by reducing the exposure time to no more than 11 hours/day and the frequency of exposure to 176 days/year.

Efforts of relevant institute to reduce emissions in ambient air are needed to overcome health problems that are getting worse. Local government efforts in reducing industrial exhaust emissions can be done by making and realizing policies for industries that do not conduct periodic audits and issue emissions exceeding the normal limits.

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# The Relationship of Nutritional Status and Gingivitis in Elementary School Children

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## Abstract

**Background:** Gingivitis is an inflammatory condition that occurs in oral cavity soft tissue named gingiva. Inflammation of the oral cavity can affect the general condition of the body, both in adults and children. Children's general condition can also be influenced by nutritional status. In Surabaya, Indonesia, underweight is a serious nutritional problem with a high prevalence in elementary school children.

**Objective:** Analyzing the relationship between nutritional status and gingivitis in children aged 11-12 years in the city of Surabaya.

**Method:** This observational analytic study was conducted on elementary school age children in 5 regions in Surabaya. The gingiva is examined by probing the gingival sulcus. Nutritional status checks were carried out by measuring Body Mass Index which was then converted to z scores. The data was then processed through descriptive statistical method and cross tabulation between gingivitis and nutritional status in children.

**Results:** The prevalence of gingivitis in Surabaya in elementary school children is 46.30%. Most children in Surabaya have normal nutritional status. However, the problem of underweight nutrition in Surabaya is classified as a high prevalence of 11.11%. These conditions indicate a serious nutritional problem.

**Conclusion:** From this study, it can be concluded there is no significant relationship between gingivitis and the nutritional status of children. However, descriptively, children who have less nutritional status are more likely to experience gingivitis.

**Keywords:** *Gingivitis, Nutritional Status, Children.*

## Introduction

Gingivitis is a periodontal disease that is often overlooked. Indonesian Basic Health Survey data shows that there are more than half the cases of gum disorders in Indonesia do not get treatment<sup>1</sup>. Gingivitis can be

experienced by children and adults. The gingivitis cases and its severity increases from childhood to adolescence and adulthood.<sup>2</sup> The peak prevalence of gingivitis from children is in children aged 11-13 years which is 80%<sup>3</sup>. Beimstein et al. and Amran et al. show that the prevalence of gingivitis in puberty children are higher than in children aged 5 years<sup>2,3</sup>. In East Java, the prevalence of gum disorders in 12-year-old children is 1.2%<sup>4</sup>.

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Underweight in East Java is still a serious public health problem. WHO shows that public health problems are considered serious if severe travel is less than 10-14%, and is considered very high if it is 15%<sup>5</sup>. The prevalence of lean according to BMI/A (Body Mass

Index by Age) in children aged 5-12 years in East Java is 11.2% which consists of 4% very thin and 7.2% thin. The prevalence of thinness in East Java is higher than the national prevalence<sup>6</sup>.

Gingivitis can be prevented and reversible. However, if it is left untreated, it causes more complex damage to the resorption of alveolar bone called periodontitis. Based on epidemiological studies, 60-70% of cases of gingivitis in children with infectious diseases at a young age will develop into periodontitis as adults. This is related to the risk of microbial-host interactions at a young age<sup>3</sup>. Periodontitis is one of the most common causes of tooth loss<sup>7</sup>. In addition, periodontitis has a relationship with cardiovascular disease<sup>8</sup>. Early diagnosis and immediate treatment can effectively prevent the development of this disease. WHO in the Global Goal 2020 dental and oral health encourages national, regional, and local governments set dental and oral health standards, one of which relates to periodontal disease<sup>9</sup>.

Gingivitis is an inflammatory condition in the gingiva. Even, minor inflammatory reactions can affect the overall condition of the body with a systemic immune response. Goehler et al. state that interleukin-1 $\beta$  is the main inflammatory mediator in gingivitis<sup>10</sup>. Circulation of interleukin in the blood affects the vagus abdominal nerve and causes depression in the appetite mechanism. Decreased appetite causes reduced food intake, resulting in decreased nutritional status<sup>4</sup>. Interleukin-1 $\beta$  also causes an increase in corticotropin releasing factor (CRF) in blood circulation and a decrease in neuropeptide y (NPY) in the blood which can cause a weight loss effect<sup>11</sup>. In addition, interleukin-1 $\beta$  activates mitochondria in cells that are inflamed so that the release of energy at these locations increases causing weight loss<sup>12</sup>. Weight loss is an indicator of decreased nutritional status.

Nutritional status affects the life and development of children. Children with underweight or underweight conditions have a greater risk of mortality. Children who experience growth disorders or shortness caused by poor diet and recurrent infections have a higher risk of morbidity and mortality. These conditions also affect school performance, intellectual capacity, and affect mental development<sup>13</sup>.

Based on this background, the relationship between nutritional status and gingivitis in children aged 11-12 years in Surabaya is important to be investigated. Therefore, it can provide information and additional

knowledge and become the basis for consideration of strategies for improving nutritional status through oral and dental health.

## Method

This research used observational analytic cross-sectional study design. The study population was all elementary school students aged 11-12 years in Surabaya in August 2017. The number of research subjects was determined by cluster sampling technique with a minimum number of 34 children. In this study, gingivitis is an independent variable with a nominal data scale. Gingivitis was measured by a modified WHO Community Periodontal Index (CPI). Nutritional status is a dependent variable with a nominal data scale. Nutrition status classification is based on BMI/A.

The data collection process begins by providing an explanation of the aims and objectives of the study, as well as agreement with the guardian's parents that the children will be the subject of the study. Research subjects and guardian parents were welcomed to fill out questionnaires containing about age, sex, food intake, activity, and history of the child's illness, as well as the level of parental education. Research subjects measured height and weight using a stepping scale and microtoise. Subsequent research subjects were examined by gingiva using a mouthpiece and probe. After the data collection has been completed proceed to the data processing. Data were processed and tested using descriptive and cross-sectional statistics to determine the relationship between gingivitis and nutritional status.

## Results

The study was conducted in 6 elementary schools in the Surabaya region which were randomly selected with a total of 54 research subjects. In the primary school group, 23 children (27.38%) are boys and 31 children (36.90%) are girls. The results of the examination are presented below.

**Table 1. Nutritional Status of Respondents**

Nutritional Status	N	%
Underweight	2	3.70
Light	4	7.41
Normal	26	48.15
Overweight	11	20.37
Obesity	11	20.37
<b>Total</b>	<b>54</b>	<b>100</b>

Table 1 shows that most respondents had normal nutritional status, while the least was light nutritional status.

**Table 2. Distribution of respondents based on Nutrition Status by sex**

		Nutritional Status				
		Underweight	Light	Normal	Overweight	Obesity
Sex	Male	2(8.7%)	0(0.0%)	9(39.1%)	4(17.4%)	8(34.8%)
	Female	0(0.0%)	4(12.9%)	17(54.8%)	7(22.6%)	3(9.7%)
Total		2(3.7%)	4(7.4%)	26(48.1%)	11(20.4%)	11(20.4%)

Table 2 shows that the majority of respondents' nutritional status of men and women is normal. The distribution of very thin nutritional status is mostly in

men. Distribution of thin nutritional status is mostly in women. Table 3. Gingiva Status among Elementary Students

Group	N	Gingivitis		No gingivitis	
		n	%	N	%
Elementary School	54	25	46.30	29	53.70

Table 3 shows the status of gingiva in elementary school students showing that respondents experiencing very high gingivitis.

**Table 4. Distribution of gingival status by sex**

		Gingival Status		Total	OR
		No Gingivitis	Gingivitis		
Sex	Male	10(43.5%)	13(56.5%)	23(42.6%)	2.058
	Female	19(61.3%)	12(38.7%)	31(57.4%)	
Total		29(53.7%)	25(46.3%)	54(100%)	

Table 4 shows that men have a 2-fold higher risk of gingivitis than women.

**Table 5. The risk of gingivitis is based on the nutritional status of children**

Nutritional Status	Gingival Status		Total	Prevalence Ratio	CI
	No Gingivitis	Gingivitis			
	n (%)	n (%)	N (%)		
Less	16(50%)	16(50%)	32(100%)	0,846	(0,518-1,382)
Good	13(59,1%)	9(40,9%)	22(100%)		

Table 5 shows the percentage of gingivitis in nutritional status that is more or less higher, when compared with good nutritional status. However, based on the value of the Prevalence Ratio, nutritional status is not a risk factor for gingivitis.

**Discussion**

In this study, gender was not a risk factor for poor nutritional status because the intake of food in boys and girls was the same. These results are different from

the research by Ndiku et al. (2011) which state that the nutritional status of men is better than women. In this case, the amount of food intake of men is greater than women<sup>14</sup>.

The results of the measurement of nutritional status in elementary school students show the problem of underweight and obese nutritional status. Referring to WHO, this condition is classified as a nutritional problem with a very high prevalence because it is  $\geq 15\%$ . While



the prevalence of underweight nutritional status in the elementary group is 11.11%. According to WHO, this condition is classified as a serious nutritional problem because its prevalence is in the range of 10-14%. The prevalence of elementary school students is 20.37% which shows a serious nutritional problem.

Gingival status in this study was examined by probing the gingival sulcus of each tooth. Bleeding on probing (BOP) is a sign of gingivitis. The high prevalence in elementary children can be due to hormonal factors at puberty<sup>15</sup>. At puberty, the volume of gingival crevicular fluid (GCF) increases. An increase in GCF volume is an indication of gingival inflammation. This is explained by the mechanism of androgen hormones that affect vascular permeability in the gingival sulcus. Hormone-related inflammation at puberty is also explained by an increase in the number of proinflammatory cytokines TNF- $\alpha$  and IL-1 $\beta$  in GCF that are affected by increased progesterone hormones in women<sup>16</sup>.

In this study, the distribution of gingivitis was more common in boys than girls. This is because women have a higher concern for appearance than men. The results of this study are in accordance with research by Furuta (2011) stating that men have a greater risk of gingivitis. That is due to knowledge and oral hygiene behavior factors. Knowledge and behavior of maintaining good dental health can reduce plaque accumulation so that the prevalence of gingivitis in women is lower<sup>17</sup>. In other studies, there were no differences in the percentage of gingivitis by sex because the frequency of brushing teeth in men and women in the study was the same<sup>18</sup>. In this study, parental education status was not related to gingivitis in children. From the results of the cross tabulation between parent education and the frequency of children's toothbrushes, the frequency of toothbrushes for children with higher education is lacking. This can explain why in this study parental education is not a risk factor for gingivitis. This is consistent with previous studies that high parental knowledge is not a determining factor in tooth brushing habits<sup>19</sup>.

The results of this study indicate that nutritional status is not a risk factor for gingivitis, because the inflammatory conditions in the gingiva of the study subjects are not chronic. The inflammatory immune response affects food intake and energy release in chronic inflammation which can cause weight loss<sup>20</sup>. In this study, there were no examinations that showed chronic gingival inflammatory conditions.

The results of cross tabulation between nutritional status with gingivitis in the elementary group showed that children with very thin nutritional status could experience gingivitis. Enwonwu (1994) states that children with underweight nutritional status disrupt the response of proteins to tissue damage that hinders the healing process caused by a lack of protein to form immune cells<sup>21</sup>. These results are consistent with the study of Muhammad (2015) which shows gingivitis in children with poor nutritional status is higher than children with good nutritional status<sup>22</sup>.

The results of this study show that increasing nutritional status will decrease the prevalence of gingivitis. While the prevalence of gingivitis increases in the group of obesity nutritional status. Al-Zahrani et al. (2003) state that obesity is a risk factor for gingivitis<sup>1</sup>. In conditions of obesity, there is an increase in the number of proinflammatory cells<sup>2</sup>. The interaction between proinflammatory cells and bacteria in plaque is an etiological factor of gingivitis<sup>20</sup>. This explains the increased prevalence of gingivitis in children with obese nutritional status. One of the factors causing gingivitis is bad oral hygiene. Poor oral hygiene is characterized by plaque accumulation. One of the factors that influence plaque accumulation is tooth brushing behavior. The descriptive analysis shows that in the elementary group who seldom brush their teeth can experience gingivitis. Children with good tooth brushing frequency have a lower percentage of gingivitis. Newman (2015) states that gingivitis is an interaction between microorganisms found in dental plaque biofilms, tissue, and host inflammatory cells<sup>23</sup>. Therefore, if plaque accumulation is reduced, the risk of gingivitis is reduced.

This study has several limitations, namely that in cross-sectional studies, it cannot include chronic conditions of gingivitis and daily food intake. The food intake studied in this study cannot describe micronutrient intake in children. Crowded teeth and poor sanitary conditions need to be included in the exclusion criteria in the study. Based on this study, it can be concluded that there is no significant relationship between nutritional status and gingivitis. However, the nutritional status of elementary school children can have a greater chance of experiencing gingivitis. In subsequent studies, it is expected to be able to obtain socioeconomic data, chronic conditions of gingivitis, and oral hygiene data. Exclusion criteria in the form of poor sanitation conditions can be added.

**Ethical Clearance:** This study was approved by the Airlangga University Faculty of Dental Medicine Health Research Ethical Clearance Commission.

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**Conflict of Interest:** Nil.

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# Major Stunting Determinants in Infants: A Prevention Model

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## Abstract

The number of stunting cases in West Aceh Regency increases every year. This study was an observational study with case-control design to examine the dominant stunting factors among toddlers in West Aceh Regency. This study was conducted from February 10 to June 30, 2018, in *Johan Pahlawan* District of West Aceh Regency of Aceh Province. The location was chosen through a purposive sampling technique by observing the highest number of children under five experiencing stunting in West Aceh Regency. The number of samples in this study was 192 children. The results of this study showed that there was a significant relationship between the occurrence of stunting in children under five and the number of family members; parental height; Socioeconomic status (SES); low birth weight (LBW); nutritional knowledge; and food intake, where the p-value < 0.05.

**Keywords:** Dominant factor, stunting, toddler, number of family members, socio-economic status.

## Introduction

In 2012, the World Health Assembly Resolution 65.6 embraced a Comprehensive implementation plan on maternal, infant and young child nutrition<sup>1</sup> which indicated six worldwide nourishment targets for 2025.<sup>2</sup> This policy briefly achieves the first objective of a 40% stunting decrease in children under five years old<sup>1</sup>. Stunting during childhood is one of the massive obstacles to human improvement internationally influencing around 162 million children under five years old. Stunting, or being unreasonably short for one's age, is characterized as a height that is in two standard deviations underneath the World Health Organization (WHO) child growth standards.<sup>1</sup>

Stunting is an issue of perpetual malnourished health which is brought about by a long-time absence of supplement consumption because of mistaken

feeding practice that does not meet the nourishing needs. Indonesia positioned on the fifth for the children with stunting conditions. More than 33% of Indonesian children under five years in Indonesia are underneath average height. The National Medium Term Development Plan or '*Rencana Pembangunan Jangka Menengah Nasional*' (RPJM) and Strategic Plan or '*Rencana Strategis*' (RENSTRA) 2015-2019 has set the goal to decrease stunting in children under five years old by 9.5%. Meanwhile, in 2013, the stunting rate is 37% implies that there is a 28.5% decrease in monetary decline, and this should urgently be solved shortly.<sup>3</sup>

The Nutrition in the First 1,000 Days State of the World's Mothers (2012) elicits that the condition influenced the causes during 1000 days of a child's life beginning from the womb until their two years of age.<sup>4</sup> Specifically, the predominance of stunted children in Aceh in Aceh area in 2016 was 41.5%, increasing from 2017, which was 37.2%.<sup>5</sup> One of the indirect reasons for stunting cases is the number of members in the family. This number of a family is under recent research results which have reasoned that the aspects influencing the stunting case incorporated with the number of family members,<sup>6-7</sup> parents' height,<sup>8</sup> Socio-economic status (SES),<sup>9</sup> and history of Low Birth Weight (LBW).<sup>10</sup>

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In deliberation of the depiction narrated above, the objective of this study was to examine the dominant stunting factors among toddlers in West Aceh Regency.

**Materials and Method**

This study is an observational study with a case-control design. This study was conducted from February 10 to 30 June 2018 in Johan Pahlawan District of West Aceh Regency of Aceh Province. The location was chosen through a purposive sampling technique by observing the highest number of children under five experiencing stunting in West Aceh Regency. The number of samples in this study was 192 children. The instrument used to measure the variables was a structured questionnaire for interviews; to measure height was a height meter with a precision level of 0.1 cm, and to measure food intake

was a 24-hour diet recall. A body length according to age with a Z-score less than -2 SD was to determine stunting in children.<sup>11</sup> The data analysis performed by univariate and bivariate analysis using the chi-square test. The test used the confidence intervals (95% CI) and significance level  $p < 0.05$ . The multivariate analysis was carried out by a logistic regression test. The sample of this study was 182 children who divided into two groups; 96 children for the control group and 96 children for the case group.

**Results**

Table 1 below explains that the food intake and parental height (paternal and maternal) differed significantly between the case group and the control group.

**Table 1. Frequency of Variable Distribution**

Variable	Cases (n=96)		Control (n=96)	
	n	%	n	%
<b>Number of Family Member</b>				
a. >Three persons	73	76.56	30	31.25
b. Three persons	23	23.44	66	68.75
c. ≤ Three persons				
<b>Paternal Height</b>				
a. 155 cm	25	26.56	90	93.75
b. ≤ 155 cm	71	73.44	6	6.25
<b>Maternal Height</b>				
a. >145 cm	23	23.44	80	83.37
b. ≤ 145 cm	73	76.56	16	16.63
<b>Socio-economic (SES)</b>				
a. High (> UMP)	24	25	69	71.88
b. Low (< UMP)	74	75	27	28.12
<b>Low Birth Weight (LBW)</b>				
a. LBW	80	83.38	30	31.25
b. Normal	16	16.62	66	68.75
<b>Nutritional Knowledge</b>				
a. Good	32	33	63	65.62
b. Not Good	64	67	33	34.38
<b>Food Intake</b>				
a. Good	17	17.7	72	74.94
b. Not Good	79	82.3	24	25.06

\* significant  $p < 0,05$ , PMW = Province Minimum Wage or UMP (Upah Minimum Provinsi)

Table 1 explains that there was a significant relationship between the occurrence of stunting and the food intake; parental height; nutritional knowledge; SES; the history of LBW; and the number of family members. The highest OR found in food intake, with 8.09, which indicated that children who had poor food intake had an opportunity for 8.09 for stunting. It followed by maternal height (6.12), paternal height (5.43), nutritional knowledge (4.93), SES (4.79), LBW (3.78), and the number of family members (3.56).

**Table 2. Bivariate Analysis of Variables**

Variable	Toddler Height				p-Value	OR (95% CI)
	Stunting		Normal			
	n	%	n	%		
<b>Number of Family Member</b>						
a. >Three persons	73	76.56	30	31.25	0.03	3.56 (1.4-2.78)
b. Three persons	23	23.44	66	68.75		
c. ≤ Three persons						
<b>Paternal Heigh</b>						
a. > 155 cm	25	26.56	90	93.75	0.002	5.43 (1.6-3.36)
b. ≤ 155 cm	71	73.44	6	6.25		
<b>Maternal Heigh</b>						
a. >145 cm	23	23.44	80	83.37	0.001	6.12 (1.03-7.23)
b. ≤ 145 cm	73	76.56	16	16.63		
<b>Socio-economic (SES)</b>						
a. High (>PMW)	24	25	69	71.88	0.007	4.79 (2.01-4.82)
b. Low (<PMW)	74	75	27	28.12		
<b>Birth Weight (LBW)</b>						
a. LBW	80	83.38	30	31.25	0.03	3.78 (1.2-3.12)
b. Normal	16	16.62	66	68.75		
<b>Nutritional Knowledge</b>						
a. Good	32	33	63	65.62	0.005	4.93 (1.97-3.89)
b. Not Good	64	67	33	34.38		
<b>Food Intake</b>						
a. Good	17	17.7	72	74.94	0.00001	8.09 (2.82-9.67)
b. Not Good	79	82.3	24	25.06		

\*Significant  $p < 0,05$ , PMW=Province Minimum Wage or UMP (Upah Minimum Provinsi)

**Table 3. Logistic regression analysis**

Variable	Model 1 OR 95% CI	Model 2 OR 95% CI	Model 3 OR 95% CI	Model 4 OR 95% CI	Model 5 OR 95% CI
<b>Number of Family Member</b>					
a. >three persons	2.77	2.04	3.02	2.67	3.19
b. ≤ 3 people	(0.22-7.98)	(0.33-7.82)	(0.68-10.05)	(0.43-7.56)	(0.95-10.98)
<b>High of Father</b>					
a. > 155 cm	5.60	4.73	4.54	5.54	4.83
b. ≤ 155 cm	(1.03-12.96)	(0.98-10.86)	(0.84-10.95)	(1.08-12.76)	(1.30-12.01)
<b>High of Mother</b>					
a. >145 cm	6.70	5.73	4.03	6.54	5.83
b. ≤ 145 cm	(1.53-13.96)	(1.09-12.86)	(0.64-11.94)	(1.48-13.85)	(1.10-12.31)
<b>Socio-economic</b>					
a. high (>PMW)	3.88	3.57	4.05	3.57	4.85
b. Low (< PMW)	(0.53-10.97)	(0.68-9.86)	(0.98-11.65)	(0.73-11.56)	(0.91-11.91)

Variable	Model 1 OR 95% CI	Model 2 OR 95% CI	Model 3 OR 95% CI	Model 4 OR 95% CI	Model 5 OR 95% CI
Birth Weight					
a. LBW	3.65	2.84	3.25	2.97	4.19
b. Normal	(0.72-9.98)	(0.38-8.82)	(0.78-11.05)	(0.43-8.56)	(0.95-11.98)
Nutritional Comprehension					
a. Good	4.78	3.57	4.95	3.59	4.45
b. Not Good	(0.93-11.96)	(0.68-9.86)	(0.94-11.05)	(0.78-11.76)	(0.71-11.01)
Food Supply					
a. Good	7.15	7.98	8.32	6.65	9.87
b. Not Good	(2.97-17.07)	(2.99-20.87)	(3.18-22.15)	(2.87-18.01)	(3.57-26.64)
R <sup>2</sup> (%)	0.23	0.27	0.19	0.18	0.34
n	182	182	182	182	182

\*PMW=Province Minimum Wage or UMP (Upah Minimum Provinsi)

This study used multivariate logistic regression analysis where this test would describe the most appropriate model to be used to explain the relationship between independent variables and dependent variables. The bivariate test results of all independent variables in this study can be included in multivariate analysis because all of their p-values were <0.25.

### Discussion

Further, the information about these research results provided. The relationship between the occurrence of stunting and the numbers of a family member, parental height, SES, BLW, parents’ nutritional knowledge, and food intake examined carefully, and the discussion is as in the following.

First, there is a relationship between the number of family members and the occurrence of stunting. The result of bivariate analysis demonstrated that there was a noteworthy connection between the number of families and the stunting case (Table 2). The variable number of relatives incorporated into multivariate analysis since the value of bivariate analysis demonstrated p <0.25 or value of 3.16. This result implies that families with more than four individuals had 3.19 occasions the danger of having a stunted child compared to families with under four individuals (Table 3). This outcome is following an investigation that recommends that there is a connection between the number of family members and the occurrence of stunting.<sup>12-14</sup>

Second, the result of this study also demonstrated that parents’ height (both father’s and mother’s)

altogether identified with the occurrence of stunting (p-value<0.05), which can be found in Table 2. The parents’ height can be incorporated into multivariate analysis since its result of a bivariate analysis indicated p < 0.25, and it was discovered that the paternal height of <150 cm had 4.83 occasions the risk of getting a stunted child (OR = 4.83) (Table 3). Another research recommends that being born from short parents is also a factor for stunting.<sup>15-16</sup> The other study also suggests that parental height is altogether related to the occurrence of stunting.<sup>17</sup>

Third, the result of this study demonstrated that there was a critical connection among SES and the occurrence of stunting in children under five years old (p-value<0.05), which can be found in Table 2. Another investigation likewise proposes that SES identified with the occurrence of stunting in children under five years old five.<sup>18</sup> It further expressed that SES is the predominant factor in stunting case caused by the arrangement of nutritious food is unfulfilled.<sup>19</sup> SES is related to parents’ salary to address family needs so that SES impacts the capacity of families to meet the healthful nutritional needs of children under five years old and different sorts of supplementary nourishment.

Fourth, the result of this study further demonstrated that there was a significant connection between LBW and the occurrence of stunting in children under five years old (p-value<0.05), which can be found in Table 2. Children with a background marked by LBW had 4.19 occasions the risk of stunting. This result supported by a study about the prevalence and determinants of

malnourished children and stunting in the area of Brazil which expresses that there is a noteworthy connection between children with LBW (<2,500 gr) and stunting occurrence.<sup>20</sup> A few studies demonstrate that children with LBW are at a high risk to experience neurological abnormalities and deferred growth and development in the long periods of life.<sup>21</sup> Consequently, it influences the development of their height. Another study likewise demonstrates that children with a weight of <2,500 gr connected to the occurrence of stunting.<sup>22</sup>

Fifth, the results of the bivariate analysis demonstrated that there was a significant connection between nourishing knowledge and the occurrence of stunting. It indicated that parents who had poor dietary knowledge had 4.93 occasions higher risk to have their children experience a lack of healthy food compared to children whose parents are well-informed about nourishment in food. On the contrary, the individuals who have inadequate information will give their children unseemly vitality and protein consumption and not as needs be to children's healthful needs. This finding is following a study that proposes that nutritional knowledge of parents identified with the occurrence of stunting.<sup>23-25</sup> Also, a study suggests that the woman's knowledge about health, in general, brings about having more beneficial effects on their children as it can minimize the occurrence of stunting.<sup>26</sup> The absence of nutritional knowledge of mothers in West Aceh regency caused a high pace of stunting in children under five years old.

Finally, the result of this study demonstrated that food intake is also related to the stunting occurrence. This information can be seen in Table 2, where the p-esteem is 0.00001 as well as OR value= 8.09, which demonstrated that children under five years old with inadequate food intake had 8.09 occasions the risk of stunting. There was a suggestion that there is a connection between food intake and the occurrence of stunting.<sup>27</sup> Nourishment security in families is essential toward the appearance of stunting in children under five years old. Pregnant mothers who consume low supplement food intake and experience infectious diseases will deliver birth to babies with LBW and underneath standard body length. The factor of good condition, particularly toward the fantastic start of a child, can augment the genetic potential so that they can come to their ideal height.<sup>26</sup> Further, Wondimagegn states that it is important to enhance people's cultural beliefs and cultural realities to decline the stunting rate.<sup>27</sup>

## Conclusion

In conclusion, the results obtained in this study showed that there was a significant relationship between the occurrence of stunting in children under five and the number of family members; parental height; SES, LBW, nutritional knowledge; and food intake with p-value <0.05. The results of multivariate analysis obtained R<sup>2</sup> in the fifth model which indicated that the variable of the number of family members, parental height, SES, LBW, nutritional knowledge and food intake contributed 34% to the occurrence of stunting in West Aceh Regency of Aceh Province.

**List of Abbreviations:** ES: Socioeconomic status; LBW: low birth weight; RENSTRA: *Rencana Strategis*; RPJMN: *Rencana Pembangunan Jangka Menengah Nasional*; PMW: Province Minimum Wag; UMP (*Upah Minimum Provinsi*).

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# Association of Manganese Level in Drinking Water and Other Factors with Hypertension in the Around Landfill Population in Depok, Indonesia

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## ABSTRACT

**Background:** Hypertension is a risk factor for cardiovascular disease, such as stroke and heart disease. Hypertension is also a silent killer which has caused 9 million preventable deaths and 1.3 billion people have hypertension worldwide. In Indonesia, cardiovascular disease is the second leading cause of death. One of the hypertension factors still under study is excessive manganese intake. The landfill is a source of release of manganese into the environment. This study aimed to determine the relationship and risk of manganese level and other factors on hypertension in the people who live around the landfill in Cipayung, Depok.

**Method:** The study design was cross sectional with 107 respondents who consumed ground water as raw material for drinking water. Measurement of manganese in water used the method (SNI) 6989.5: 2009 on how to test manganese by Atomic Absorption Spectrophotometry (AAS).

**Result:** The results showed significant results on the variables of obesity (0.042, OR: 2,460) and age (0,0001, OR: 10,675) on hypertension. The level of manganese in drinking water to hypertension did not show significant results, but as a controlling variable (0.450, OR: 1.584). While other variables (blood sugar levels, smoking, ethnicity, family history, socioeconomic and gender) did not show significant results, but had an OR more than 1, which were respectively 2.05, 2.48, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96 and 2.45.

**Conclusion:** The conclusion from this study is no relationship between manganese levels in drinking water with hypertension, but obesity and age have a significant relationship to hypertension.

**Keywords:** *Manganese, drinking water, hypertension, landfill.*

## Introduction

Hypertension or high blood pressure is a serious medical condition that can significantly increase the risk of disease, such as heart, brain, kidney and other diseases. Around 1.13 billion people worldwide suffer from hypertension, most (2/3) living in low and middle

income countries. Hypertension is a leading cause of premature death worldwide<sup>1</sup>. In 2030, the United Nations (UN) is committed to reducing 1/3 of premature deaths from non-communicable diseases<sup>2</sup>.

In Indonesia, hypertension in the population aged  $\geq$  18 years (measurement results) in 2018 has increased, reaching 34.1%. While the province of West Java ranks second as the province with the most hypertension sufferers which exceeds the national figure<sup>3</sup>. In Depok, in 2016 there were 34,244 cases of hypertension reported out of 759,710 of patients taking blood measurements<sup>4</sup>. Based on the sequence of disease patterns, most outpatients (aged 45-75) in all Depok hospitals in 2017, hypertension ranks third (10.05%) after diabetes

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mellitus and Congestive Heart Failure (CHF) and ranks sixth (19,590 patients, 6.61%) in all age groups in general. In the primary health care, hypertensive outpatients reached 141,084 (14.91%) and ranked the second highest disease<sup>4</sup>.

High blood pressure is also called the “silent killer” because it often has no signs or symptoms and many people do not know that they suffer from hypertension<sup>5</sup>. Hypertension, also known as high blood pressure which is a condition in which blood vessel pressure is constantly increasing<sup>1</sup>. Blood pressure is divided into 3 categories namely, normal ( $\leq 120/80$  mmHg), prehypertension (systolic: 120-139 mmHg and diastolic 80-89 mmHg) and hypertension  $\geq 140$  mmHg<sup>6</sup>. Risk factors for hypertension include prehypertension, diabetes, kidney disease, high sodium and low potassium diets, high fat diets, low consumption of vegetables and fruits, lack of physical activity, obesity, excessive alcohol consumption, smoking, age over 65 years, history family, sex, race or ethnicity<sup>5,1</sup>.

In addition to the above risks, one of the chemical elements that can affect blood pressure is Manganese (Mn) although the results of the study are still controversial. Based on population studies in Korea, that Mn levels in the blood are positively related to increasing hypertension<sup>7</sup>. However, another study states that manganese is negatively correlated with blood pressure<sup>8</sup>. Most studies on the relationship between manganese and blood pressure have been carried out from the perspective of manganese toxicity. These studies report that manganese levels in the blood are high, because excessive manganese exposure increases blood pressure<sup>8</sup>. Based on the study of Kostial et al (1974) reported that manganese increases blood pressure in animal studies. However, Šarić and Hrustić (1975) report that low blood pressure in workers exposed to manganese. In particular, it is difficult to explain the mechanism behind the correlation between manganese intake and blood pressure. However, it has been reported in several studies that abnormal manganese levels decrease manganese-SOD activation, which inhibits the anti-oxidative function of this enzyme and decreases the defense capacity of vascular endothelium dysfunction and causes hypertension<sup>8</sup>.

Mn is a metal group element in the form of gray solids<sup>9</sup>. Mn is an essential element needed by the body to maintain health, but in excessive amounts can cause various health problems<sup>10</sup>. Mn organ targets include

the respiratory system, central nervous system, blood and kidneys<sup>9</sup>. Landfill is one of the main sources of groundwater contamination in the area around the landfill due to the presence of leachate flow. These contaminants come from organic materials, inorganic macro components, heavy metals, metalloids and Xenobiotic Organic Compounds (XOCs)<sup>11</sup>. Leachate contains high concentrations of anionic and inorganic cations (eg bicarbonate, sulfate, iron, manganese, sodium, chloride) and dissolved organic matter (eg aldehydes, alcohols, short sugar chains)<sup>12</sup>.

Cipayung Depok Final Disposal Site has been built since 1984 with an area of  $\pm 10.8$  hectares with an area of 5.1 hectares of landfill consisting of pond A (2.1 hectares), pool B (2.4 hectares) and ponds C (off 0.6 hectares). In 2011 pool C was closed because landfill conditions were too high and too dependent on residents' housing, so it only depends on zones A and B. In 2015 Cipayung landfill Depok increased landslides into the central area so zones A and B became one with elevations reaching  $\pm 30$  meters<sup>13</sup>.

The purpose of this study was to study the relationship of Mn content in soil air and other factors (obesity, blood sugar levels, age, smoking, ethnicity, family research, socioeconomic and sex) to hypertension in the study community community living in the area around Places Cipayung Depok Final Disposal (Landfill). The population is in two kelurahan, namely Cipayung Kelurahan and Pasir Putih Kelurahan.

## Method

The research method used cross sectional. The research sample consisted of 107 people who were administratively scattered in 2 Kelurahan namely Cipayung Kelurahan and Pasir Putih Kelurahan. Sampling is done by cluster sampling. The inclusion criteria of the research were, a minimum stay of 5 years, used ground water as a source of drinking water, and had a life span of 18-60 years. While the exclusion criteria were, respondents who had a history of hypertension before living in the area around the Cipayung Landfill Depok and had a history of blood clots (hemophilia).

Testing of Mn content in ground water as a source of drinking water used the Indonesian National Standard (SNI) method 6989.5: 2009 on how to test Mn by Atomic Absorption Spectrophotometry (AAS) in the range of Mn levels of 0.1 mg/L to 10 mg/L with a wavelength of 279.5 nm. Blood pressure meter measurements used the

ABN series and blood sugar measurements when using the GCU easy touch. Obesity measurement was done through Body Mass Index (BMI) measurement which was the result of weight distribution (kg) by height squared (meters) and other characteristic data through questionnaires.

### Results

A significant relationship between risk factors for hypertension and hypertension is indicated by the age variable (0,0001, OR 9.58). While other variables (obesity, blood sugar levels, smoking, ethnicity, family history, socioeconomic, Mn levels in groundwater and gender) did not show significant results, but had an OR of more than 1, which were 2.05, 2.48, respectively, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96, 1.31 and 2.45.

**Table 1. Prevalence of Hypertension Based on Cluster Sampling.**

Cluster Points	Hypertension		Total
	No	Yes	
1	13 (24.5%)	13 (24.1%)	26 (24.3%)
2	18 (34.0%)	19 (35.2%)	37 (34.6%)
3	14 (26.4%)	15 (27.8%)	29(27.1%)
4	8 (15.1%)	7 (13.0%)	15(14.0%)

Based on the sampling cluster, the most hypertension occurred in cluster number 2, namely 19 people (35.2%). A total of 16 people consumed ground water with Mn> 0.4 mg/L and 9 of them had blood pressure> 120/80 mmHg (Table 1).

**Table 2. Final Multivariate Modeling**

Variable	Sig	Odds Ratio (OR)	CI (95%)
Body Mass Index (BMI)	0.042	2.460	1.033-5.860
Age	0.001	10.675	3.240-35.169
Mn concentration in groundwater	0.450	1.584	0.481-5.222

In multivariate modeling, of the 10 variables analyzed 6 of them could be entered into the model because the significance is less than 0.25, including obesity (0.066), blood sugar levels (0.189), age (0.0001), active smoking (0.140), passive smoking (0.144) and gender (0.144). While the ethnicity, family history and socioeconomic variables were not included in the modeling because the significance exceeded 0.25. The level of Mn in ground water had a significance of more than 0.25,

but substantively the level of Mn in ground water was considered necessary with regard to hypertension, so that the variable was still included in the modeling. The final results of the modeling obtained, that the variables that were risk factors for hypertension in the community living around landfills are obesity (0.042 OR: 2,460) and age (0,0001, OR: 10,675), while the Mn variable in ground water was a variable controller (OR: 1.584) (Table 2).

### Discussion

Obesity has a significant relationship (0.042) with hypertension and has a greater risk of 2,460 to experience hypertension. Obesity is a major risk of hypertension<sup>14,15</sup>. Based on Wang’s research (2014) that obesity has a very strong relationship with the incidence of hypertension<sup>16</sup>. Being overweight, especially when associated with increased visceral adiposity, is a major cause of hypertension, accounting for 65% to 75% of the risk of human primary (essential) hypertension<sup>17</sup>.

In the study results found that blood sugar levels> 140 mg/dL have a greater risk of 2.482 experiencing hypertension. This is consistent with other studies that cystotic pressure has a significant relationship with plasma glucose and fasting blood glucose<sup>18,19</sup>. In etiology, diabetes and hypertension share common pathways such as SNS (Sympathetic Nervous System), RAAS (Renin Angiotensin Aldosterone System), oxidative stress, adipokines, insulin resistance, and PPAR (Peroxisome Proliferator Activated Receptor)<sup>20</sup>.

Age> 35 years has a greater risk of experiencing 10,675 hypertension. This is consistent with CDC data that the prevalence of hypertension increases according to age group, age group 18–39, 7.5%; 40–59, 33.2%; and 60 and over, 63.1%<sup>21,22</sup>. People who smoke actively (OR 3,188) and passive (OR 1,786) have a risk of developing hypertension. This is in accordance with the research of Thuey et al (2009) that hypertension has a relationship with smoking dose<sup>23,24</sup>.

People with a family history of hypertension had a greater risk of 1,122 to develop hypertension. This is in accordance with the research of Liu et al (2015) that family history has a significant relationship with hypertension<sup>25</sup>. Higher prevalence in family history with hypertension is also associated with the prevalence of obesity, central obesity and metabolic syndrome<sup>26</sup>.

Mn concentration> 0.4 mg/L in ground water used

as a source of drinking water has a risk of 1,314 to cause hypertension, although several studies have different results. The results of this study are similar to those of Lee and Kim (2011) that the concentration of Mn in the blood is associated with an increased risk of hypertension in a representative sample of the adult population in Korea<sup>7</sup>. While the study of Wu et al (2017) the concentration of Mn in urine has a negative correlation ( $p < 0.01$ ) with systolic pressure and diastolic<sup>27</sup>. Based on the results of this study, found a greater risk of hypertension in men than woman is OR 2,450. These results are in accordance with research of Choi et al (2017) the prevalence of hypertension was higher in men (34.6%) than in women (30.8%)<sup>28</sup>. However, after the age of 60 years, hypertension was more prevalent in females than in males. Based on the research of Alhawari et al (2017) significant gender differences in systolic pressure (= 0.003) with mean differences = 18.08 mmHg (CI: 16.13 to 19.9) and diastolic pressure (= 0.011) with differences in mean mean = 3.6 mmHg (CI: 2.06 to 5.14), higher in men than in women<sup>29</sup>.

### Conclusions

There is no relationship between manganese levels in drinking water with hypertension, but obesity and age have a significant relationship with hypertension. The variables of obesity (0.042, OR: 2,460) and age (0,0001, OR: 10,675) showed significant with hypertension. The level of manganese in drinking water to hypertension did not show significant results as a controlling variable (0.450, OR: 1.584). The variables, blood sugar levels, smoking, ethnicity, family history, socioeconomic and gender did not show significant results, but had an OR more than 1, which were respectively 2.05, 2.48, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96 and 2.45.

**Ethical Considerations:** This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Universitas Indonesia (Ket-698/UN2.F10/PPM.00.02/2019).

**Competing Interests:** The authors declared that no competing interests exist.

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# The Influence of Probiotic *Lactobacillus reuteri* on Changes in Levels of Cytokines IL 23 Puerperal First Day on MUS Musculus Exposed to Bacteria *Staphylococcus aureus*

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## Abstract

Puerperal infection is inflammation of all genitalia in the puerperium caused by aerobic and anaerobic bacteria, one of which is *Staphylococcus aureus* which can attack and survive in epithelial cells and endothelial cells, then recognized by the Presenting Cell Antigen (APC). The APC will secrete cytokines as triggers for the activation of Thais, Th1, Th2, Treg and Th17. Interleukin-23 (IL 23). The purpose of this study was to prove the effect of *L. reuteri* probiotics on increasing levels of IL-23 cytokines in puerperal mice induced by *S. aureus* on the first days.

True Experimental research method post test Only Control group in vivo 40 tails Balb/c pregnant 10th day was divided into 4 groups K-, K+, P1, P2. Then performed surgery to take blood from the heart which will then produce blood plasma after centrifugation followed by measurement of IL 23 levels by the ELISA kit method with no. Catalog M2300 R & D brand

Analysis of data using the Independent Sample T Test with the help of SPSS For Windows 23 software. The results of the comparison between the negative control (K-) with the treatment group on the first day proved that an increase in IL 23 cytokine levels occurred, a comparison between groups observation on the first day proved to be an increase in IL 23 cytokine levels, the results of a comparison test between P1 and P2 on the first day there was an increase in IL 23 cytokine levels an increase but not statistically significant the administration of *L. reuteri* probiotics can increase the levels of cytokines IL 23 in puerperal mice induced by *S. aureus* therefore probiotics can be useful in the puerperium to increase body immunity to prevent infection during the puerperium

**Keywords:** *Lactobacillus reuteri*, *Staphylococcus aureus*, IL 23.

## Introduction

The incidence of puerperal infection is 13% higher because operative delivery/cesarean cesarea is compared to vaginal delivery while operative delivery is currently occurring mostly due to medical indications and on its

own request. The puerperal infection is inflammation of all genitalia in the puerperium caused by aerobic and anaerobic bacteria, one of which is *Staphylococcus aureus* (*S. aureus*) which spreads through the perineal wound and endometrial surface.<sup>(1)</sup>

*S. aureus* has polysaccharide capsules or thin membranes that play a role in bacterial virulence. Infections originating from external sources such as open sores from the mucosa (vaginal mucosa etc.).<sup>(2)</sup>

Treatment of infections due to *S. aureus* bacteria initially using antibiotics but in recent studies found that *S. aureus* isolated from hospitals are generally resistant

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to circulating antibiotics, more than 85% of patients experience resistance to oxacillin. Therefore natural remedies as an alternative antibiotic that have been studied are one of them is probiotics namely normal flora bacteria in the mouth, gastrointestinal tract and urogenital tract obtained through fermented probiotic intake (for example cheese, yogurt, olive oil). The results of a study by Evrard, that the effect of probiotics on dendritic cells at high treatment doses on *Lactobacillus rhamnosus* (*L. rhamnosus*) Lcr35 causes monocyte immune responses in humans resulting from immature dendritic cells. Induction increase in the production of Th1/Th17 proinflammatory cytokines such as TNF, IL 1 $\beta$  and IL 23. The produced IL 23 will make Th0 differentiate into TH 17 which releases IL 17 and IL 22 cytokines as proinflammatory cytokines.<sup>(3)</sup>

In reproductive health services the use of *L. reuteri* probiotics as a treatment for urinary tract infections, vulvovagina candidiasis, bacterial vaginosis in humans while the target of a recent infectious disease therapy through differentiation from Th 17 cells on stimulation of IL 23 cytokines which will produce IL cytokines 22 so that the researchers wanted to know the effect of *L. reuteri* probiotics as prevention of puerperal infection as evidenced by increased levels of IL 23 and IL 22 cytokines in postpartum mice induced by *S. aureus* <sup>(4)</sup>

### Material and Method

- a. **Animal Try:** The experimental animals in this study were *Mus musculus* strain Balb/c pregnant female 10th day obtained from Biotech Laboratorial Laboratory of Malang State Islamic University as many as 40 animals, divided into 4 groups. The animals were adapted for 1 day. first day and control groups, first and third day *S. aureus* groups, *L. reuteri* first groups, group *L. reuteri* + *S. aureus* first day.
- b. **Probiotic *Lactobacillus reuteri*:** Probiotics used in this study were *L. reuteri* with ATCC 6475 strain obtained from the American Type Culture Collection (Manassas, VA 20108 USA), then cultured in Mrsbroth media. *L. reuteri* is given through oral sonde at a dose of 1 x 10<sup>10</sup> CFU/mouse as much as 250  $\mu$ l/mouse every day (once a day) from gestational age 13 days to post partum on the first day.
- c. ***Staphylococcus aureus* bacteria:** It is a type of gram-positive bacteria obtained from the

Microbiology Laboratory of the Faculty of Medicine, Universitas Brawijaya, then cultured with a nutrient broth and rinsed with NaCl, then induced into the vagina of the postpartum mice intravaginally with a 1cc syringe which is replaced with a lo section of surfloo. dose of 5 x 10<sup>7</sup> as much as 200  $\mu$ l/mice at 0 to 12 hours post partum or immediately after giving birth

- d. **Measurement of IL cytokine levels 23:** Observed from blood plasma taken from cardiac blood which is carried out systematically then measured levels of IL 23 with the Elisa kit method with no. Catalog M2300 R & D brand
- e. **Statistical Analysis:** All research data were analyzed statistically with significance level  $p \leq 0.05$  and 95% confidence level using SPSS software vs 23.0. The data were tested for normality using the Saphiro-Wilk test followed by the parametric test T test (independent sample t test)

### Findings:

- a. **Comparison result of the control group with treatment (-) on the first day:** Based on the results of the free sample t test (independent sample t test) data IL-23 levels in the puerperal model mice are displayed in full in the table below

**Table 1 comparison if control groups (-) with treatment on day 1**

Observation Group	IL Level-23 (pg/mL)	
	Mean $\pm$ SD	p - value
K-	49.45 $\pm$ 5.07	-
K+	76.51 $\pm$ 2.92	0.000
P1	100.70 $\pm$ 7.73	0.000

### Information:

- K- = Negative Control Group (no treatment given)
- K + = group given *S.aureus* treatment
- P1 = group given *L.reuteri* treatment

Showed that there was a significant difference ( $p$ -value = 0,000 <) the average IL-23 level in puerperal mice between negative control groups (K-) (49.45  $\pm$  5.07 pg/mL) and positive control groups (K +) (76.51  $\pm$  2.92 pg/mL), there is a significant difference ( $p$ -value = 0.000 <) the average level of IL-23 in puerperium model mice between the negative control group (K-) (49.45  $\pm$  5.07 pg/mL) with the group giving *L. reuteri* probiotics ( P1) (100.70  $\pm$  7.73 pg/mL) means that the treatment of *L. reuteri* probiotics in puerperal mice can increase IL-23 levels.



**b. Comparison test results between groups of observation on day 1:** Based on the results of the free sample t test (independent sample t test) data IL-23 levels in the puerperal model mice are displayed in full in the table below

**Table 2: Comparison between groups of observations day 1**

Observation group	IL Level-23 (pg/mL)	
	Mean ± SD	p - value
K+	76.51±2.92	-
P1	100.70±7.73	0.001
P2	129.33±15.14	0.000

**Information:**

- K + = group given S.aureus treatment
- P1 = group given L.reuteri treatment
- P2 = group given L.reuteri + S. aureus treatment

Showed that there was a significant difference (p-value = 0.001 <) the average IL-23 level in puerperium mice between positive control groups (K +) (76.51 ± 2.92pg/mL) with the group giving L. reuteri probiotics (P1) (100.70 ± 7.73 pg/mL), there is a significant difference (p-value = 0.000 <) the average IL-23 level in puerperal mice between positive control groups (K +) (76.51 ± 2.92pg/mL) with the group giving Probiotic L. bacteria reuteri + S. aureus (P2) (129.33 ± 15.14 pg/mL) means that the administration of L. reuteri + S. aureus bacteria is more able to increase IL-23 levels than only the administration of S. aureus bacteria in puerperium mice.

**c. Comparison test results between groups of L.reuteri probiotics with giving of L.reuteri + S.aureus probiotics on day 1:** Based on the results of the free sample t test (independent sample t test) data levels of IL-23 and IL-22 levels in the puerperium model mice are displayed in full in the table below

**Table 3 Comparison between groups giving L. reuteri probiotics with L. reuteri + S. aureus Probiotics on day 1**

Observation groups	IL Level-23 (pg/mL)	
	Mean ± SD	p - value
P1	100.70±7.73	-
P2	129.33±15.14	0.015

**Information:**

- P1 = group given L.reuteri treatment
- P2 = group given L.reuteri + S. aureus treatment

Showed that there was a significant difference (p-value = 0.015 <) the average levels of IL-23 in puerperal mice between the groups giving probiotic L. reuteri (P1) (100.70 ± 7.73 pg/mL) with the group giving Probiotic L. reuteri + S. aureus (P2) (129.33 ± 15.14 pg/mL), means that the administration of L. reuteri + S. aureus Probiotics is more able to increase IL-23 levels than the administration of L. reuteri probiotics alone in puerperium mice

**Discussion**

In the negative control group there was absolutely no treatment whatsoever but it appeared that on the third day observation the IL-23 level was greater than the first day observation according to Figure 5.3. The puerperal period Mus musculus Balb/c strain occurs within 24 hours where on the third day there has been a change in the reproduction of mice from the puerperium to the estrus period so that the immune system changes in the body of mice increased levels of IL 23 on the third day in the control group This is because the mice are in the estrous period. (5)

Complications of genetal infection due to S. aureus in puerperal mothers mostly occur on the third day, S. aureus is the most common vaginal pathogen which is one of the most frequently involved bacteria in infection, S. aureus colonization of the vaginal mucous membranes can cause Toxic Shock Syndrome which has an impact on maternal mortality. (6)

Local and systemic immune cell response mechanisms for S colonization. nasal aureus as a prevention of disease entry does not fully explain how this bacterium can die, although there are some clues in emphasizing local proinflammatory cytokines to provide signals that facilitate colonization of settled bacteria(7). S. aureus bacteria that are in dendritic cells are able to stimulate the production of cytokines IL 6, IL 1 and IL 23 which will all encourage the differentiation of CD4 + T cells towards Th 17 cells (5)

Th17 cells are a different strain from CD4 + T cells characterized by IL 17 release. In addition Th 17 also excludes IL 22 as a member of IL 10. The expression of IL 22 begins with changes in signaling in growth factors β in IL 6 and other proinflammatory cytokines. IL 22 production will depend on IL 23 production(8)

Normal flora have a role in developing protective host mechanisms. Resident bacteria that are not

pathogenic require ecological needs for their lives so that pathogenic bacteria (non-residents) that will proliferate in locations inhabited by normal flora will have difficulty competing with resident bacteria<sup>(9)</sup>. But if the normal flora is depressed, the growth of pathogenic bacteria will be more rapid and can cause disease, *S. aureus* is one of the most pathogenic bacteria found in the vagina and is one of the bacteria that causes most infections. This bacterial colonization of the vaginal mucosa can be a cause of toxicoseptic shock<sup>(10)</sup>

### Conclusion

There an effect probiotics *Lactobacillus reuteri* on changes in the nature of all that and the keeping up of 23 on mice parturition of being exposed to the staphylococcus bacteria aureus

**Ethical Clearance:** Ethical clearance of this study was taken from Ethical Committee of Poltekkes Kemenkes Malang, Indonesia.

**Source of Funding:** This study was self funding by authors.

**Conflict of Interest:** There is no conflict of interest in this study

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# Analysis of Working Period and Working Time to Health Complaints of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019

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## Abstract

Burning is very dominant process to accruing material pollutants. The smoke produced from burning coconut shells of fish smoking industry is a problem that can cause health complaints of fish smoking workers, it can produce pollutants such as CO<sub>2</sub>, HC, NO<sub>2</sub>, and particulates. It is necessary to analyze the working period and time of workers's health complaints. The purpose of this study is to analyze the working period and time of health complaints of fish smoking workers. The design is cross sectional, data collected by interviews using quisionare, analysis until bivariate stage. The results, form 65 total sample, mostly workers (60 people,92.3%) working > 5 years, mostly workers (61 people, 93.8%) working > 8 hours/day, mostly workers have a health complaints (47 people, 72.3%), there is no significant relationship between working period and health complaints (pv 0.611), there is no significant relationship between working time and health complaints (pv 0.061).

**Keywords:** Working period, working time, health complaints.

## Introductions

Air pollution is an important factor of environmental pollution. Air pollution consists of outdoor air pollution and indoor air pollution. One of source outdoor air pollution is industrial smoke<sup>1</sup>. Many kind of industy, both home industry or large industry have grown rapidly in terms of quantity and type. It obviously have a negative impact to the environment, such as water, air, and soil pollution<sup>2</sup>.Air pollution, especially particulate matter can affect human's health even in low concentrations<sup>3</sup>. Estimated that more than two million deaths per year are caused by exposure to air pollutions<sup>4</sup>.

Fish smoking is one of home industries that can cause air pollution. One of the centers of fish smoking industry is in Bandarharjo, Kelurahan Semarang Utara, Kota Semarang. The smoke produced by burning coconut shells as fuel for fish smoking, and that is a problem in the fish smoking room. From Gordon<sup>5</sup> in Nisrinah<sup>6</sup> health effects caused by indoor pollution which is use

of solid fuels for cooking are chronic lung diseases including chronic obstructive pulmonary disease and bronchitis. One of the pollutants found in the smoke from combustion can cause pneumonia, respiratory system disorders, eye irritation, allergies, chronic bronchitis<sup>7</sup>. A study from Ghaffari<sup>8</sup> mentions that exposure from particulates is more dangerous to human than exposure from ozone, carbon monoxide and nitrogen oxides. Health complaints at fish smoking workers can be influenced by factors from the characteristics of workers. The factors that can cause health complaints there are sex, age, disease history, working period, working time, smoking activities, nutritional status of workers, and physical activity<sup>9</sup>. From Nirmala<sup>10</sup> workers who have worked > 5 years have a potential to suffers lung function disorders compared to workers who have a working period of <5 years. The working process of fish smoking, requires workers to be in a work environment with exposure to smoke that lasts for quite a long time, as a result workers become very vulnerable to health complaints<sup>11</sup>. The

aim of this study is to find out the relationship between working period and working time to health complaints of fish smoking workers. The benefit of this study is to provide information regarding health complaints caused by working period and working time of fish smoking workers.

**Material and Method**

The population of this study is workers of smoking fish Bandarharjo, Kota Semarang consisting of 25 houses of the fish smoking industry with 151 workers. In this study, the proportion of previous studies was 55.6%<sup>12</sup> Based on the formula Lemeshow<sup>13</sup> the number of research samples with a confidence level of 95%, 10% precision and a proportion of 0.556 are 58 people. To avoid missing answers from respondents, it is necessary to add 10% of the total sample obtained so that the total sample size are 65 people. The samples taking by simple random sampling method to provide opportunities for samples to be able to participate in research. This study used a cross sectional design, data collected by interviews using quisionare about individual characteristic such as gae, gender, health complaints, working time, working period, weight, and height. Data analysis until bivariate stage.

**Findings:**

**General Description of the Research Area:** Kelurahan Bandarharjo, Semarang is directly borders to the Java Sea, and that is the estuary area of Semarang River. One of the main livelihoods at Kelurahan Bandarharjo is fishermen. Total of Bandarharjo fish smoking home industries are 25 houses, which are divided into small, medium and large scale. The division of the scale or type of fish smoking house is based on the number of stoves, number of workers, and production capacity per day. The production process is carried out every day from 6:00 to 18:00 WIB. If the fish material not abundant due to the season, some industry owner save the needs of the fish by freezing the fish to ice. The raw materials for fish come from local fishermen. The total amount of smoked fish per day is around 50-100 kg. The fuel used in the fish smoking industry is coconut shell, which is included in the category of hardwood species consisting of lignin, cellulose, hemicellulose and ash with a moisture content of 6% -9%<sup>14</sup>.

The stages of smoked fish production start from the

preparation of coconut shells that have been dried as fuel, then clean and wash the fish cleanly, and finally the process of smoking the fish. The time range for fish smoking process from 15 to 30 minutes depending on the type of fish. The indicator of the fish is depend of a color change. Some of the smoke from fish smoking industry come out through the chimney that is found in each of the fish smoking houses and some out through the door, or some of the smoke billows in the fish smoking room.

**Working Period of Fish Smoking Workers:** There are 65 total respendent of this study.

**Table 1. Working Period of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019**

Working Period	Total	Percentage (%)
≤5 year	5	7,7
>5 year	60	92,3
<b>Total</b>	<b>65</b>	<b>100</b>

Source: Primary data

Based on table 1, most of the workers have worked> 5 years, which is 60 people (92.3%).

**Working Time of Fish Smoking Workers:** The frequency distribution of working period fish smoking workers can be seen in table 2.

**Table 2. Working Time of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019**

Working Time	Total	Percentage (%)
≤8 hour/day	4	6,2
>8 hour/day	61	93,8
Total	65	100

Source: Primary data

Based on table 2, most of workers worked> 8 hours/ day, which is 61 people (93.8%).

**Health Complaints of Fish Smoking Workers:** The existence of health complaints on workers is a subjective complaint that is felt when working both complaints of breathing or eye complaints. Identification of eye complaints experienced by workers is painful eye complaints, watery eyes and red eyes. Meanwhile identification of respiratory complaints experienced by workers is nasal irritation complaints, shortness of breath, coughing and coughing up phlegm.

**Table 3. Health Complaints of Fish Smoking Workers Bandarharjo, Kota Semarang 2019**

Health Complaints	Total	Percentage (%)
With complaints	47	72,3
No complaints	18	27,7
Total	65	100

Source: Primary data

Based on table 3, there are 47 workers (72,3 %) have a health complaints and 18 workers (27,7 %) have no health complaints.

Complaints to the eye caused by exposure to the smoke from the coconut shell combustion in the process of fish smoking continuously for more than 8 hours each day, so that can cause irritation in those characterized by red eyes, painful eyes and watery eyes<sup>15</sup>. Meanwhile workers who have respiratory complaints such as nasal irritation, shortness of breath and coughing. Respiratory complaints arise due to a disturbance in the respiratory tract which is exposed to air pollutants such as PM2.5 which is found in the smoke from burning coconut shell<sup>10</sup>.

A fish smoking who have health complaints are caused by the concentration of pollutants contained in the smoke from the combustion of coconut shell which exceeds the quality standard. Based on a study by Nirmala 2014, workers who were in the fish smoking place with a concentration of PM 2.5 that exceeded the quality standard experienced a painful eye complaint (61.5%) and experienced shortness of breath.

**Analysis of Working Period to Health Complaints of Fish Smoking Workers:** The analysis of working period to health complaints of fish smoking workers was carried out descriptively using cross tabulation.

**Table 4. Analysis of Working Period to Health Complaints**

Health Complaint	Working Period (Year)		N	OR (95%)	PV
	>5	≤5			
With complaints	44	3	47	1,833 (0,280-11,996)	0,611
No complaints	16	2	18		
Total	60	5	65		

Based on table 4, there are 44 workers who have health complaints with a working period of > 5 years, and 3 workers have health complaints with a working period of <5 years. Meanwhile workers who have a working period of > 5 years and have no health complaints are 16 people, and workers who have a work period of <5 years with no health complaints are 2 people. Working period variabel and workers health complaints have categorical data scales with a significance level of 95%, then the statistical test used is Fisher Exact to test the relationship of worker health complaints, so that the value of p value is 0.611 because the p value > 0.05, then the results of the analysis can be concluded that there is no relationship between the period of working and the health complaints of fish smoking workers. The results of the analysis also obtained OR = 1,833, meaning that workers who worked > 5 years had odds of 1,833 for not having health problems compared to workers who worked <5 years.

There was no significant relationship because this study was only carried out on a small scale (the data obtained was less varied). Workers with a working period > 5 years are more at risk of experiencing health complaints. Based on Nirmala<sup>10</sup> states that, the longer a person have to works, the more workers are exposed to the danger posed by the work environment. Exposure to dust contained in the smoke from combustion will continue and be inhaled and accumulated by workers within years, as a result it can lead to health complaints.

However, health complaints for fish smoking workers can also come from other factors such as weather conditions, workload, individual endurance, vitamin intake and food consumed by workers so that there are other factors that have not been studied in this study which can be a factor affect the health complaints experienced by Bandarharjo fish smoking workers. This is in line with the research conducted by Ode<sup>16</sup> which states that there is no relationship between the period of work with health problems, especially the vital capacity of lung traffic police.

**Analysis of Working Time to Health Complaints of Fish Smoking Workers:** The results of working time analysis on health complaints of fish smoking workers can be seen in table 5.

**Table 5. Analysis of Working Time to Health Complaints**

Health Complaints	Working time (hour/day)		n	OR (95%)	PV
	>8	≤8			
With complaints	46	1	47	9,200 (0,889-95,221)	0,061
No complaints	15	3	18		
Total	61	4	65		

Based on table 5, there are 46 workers who have health complaints with a working time of > 8 hours/day, and only 1 worker has a health complaint with a working time of <8 hours/day. Meanwhile workers who have work time > 8 hours/day and have no health complaints are 15 people, then workers who have work time <8 hours/day and no health complaints are 3 people. Work time variables and health complaints workers have categorical data scales with a significance level of 95%, then the statistical test used is Fisher Exact to test the relationship between working time and workers health complaints, so that the value of p value is 0.061 because the value of p value > 0.05, the results of the analysis can be concluded that there is no relationship between work time and workers’s health complaints fish smoking. From the results of the analysis also obtained the value of OR = 9,200, meaning that workers who working > 8 hours/day have odds of 9,200 for not experiencing health problems compared to workers who work <8 hours/day.

No relationship between working time and worker’s health complaints caused by the length of a person’s work hours is not in line with the amount of exposure. Based on observations, it was shown that even working hours between one worker and another worker almost same, but the exposure dose received was different. For example, one health problem that arises is lung function disorders. A worker who, despite the long working hours, maybe have normal lung function if his working period is still short and does not have a smoking habit. This research is in line with the research by Pinugroho<sup>17</sup> which concluded that there was no correlation between duration of exposure to pulmonary function disorders with p = 0.740. In this study, might be happend bias selection. It caused by there are some respondents ignore to participate at this research. And then, the most of workes are women, so it make the homogeneous data. And also might be happend bias information, caused by relying on the respondent’s memory such as the question

of age, and many workers have forgotten when they started working as Bandarharjo fish smoking workers.

**Conclusion**

The results of this study, the most workers there are 60 people (92.3%) working > 5 years, most workers there are 61 people (93.8%) working > 8 hours/day, most workers have a health complaints, there are 47 people (72.3%), there is no significant relationship between working period and health complaints (pv 0.611), there is no significant relationship between working time and health complaints (pv 0.061). for next study, the number of respondents is expected to be more so that the data obtained becomes heterogeneous. Questions related to health complaints are further deepened, for example by conducting a direct health check to get clearer information so that the analysis can be as expected.

**Conflict of Interest:** There is no conflict of interest at this research.

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**Ethical Clearance:** In this study, respondents were given the freedom to determine whether they were willing or unwilling to participate in a series of activities voluntarily. Information obtained from respondents is kept confidential and is only used for research purposes. During the study, respondents were free from discomfort and insecurity. If the respondent feels insecure and uncomfortable during the study so that can cause psychological problems, the respondent can stop as a participant in the study. The ethics of this study is in accordance with the ethical protocol issued by the Department of Environmental Health and has passed the ethical review with number: Ket 349/UN2. F10/PPM.00.02/2019.

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# Efforts to Improve the Health Status of Junior High School Students Through the Development of School Health Programs

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## ABSTRACT

One form of health promotion for school students is the school health program in every region in Indonesia. The purpose of School Health according to the Ministry of Education and Culture in 2012 is to improve the quality of education and student achievement by improving the quality of clean and healthy life and health status of students and creating a healthy environment. This research was conducted using qualitative descriptive method with the aim of developing a model of implementing school health programs. Respondents in this study were students from junior high schools managed by the government and junior high schools managed by private parties implementing school health programs. The results of this study are expected to support existing models by improving school health management through a systems approach so that students can improve their performance through improving clean and healthy living behaviors and a healthy environment.

**Keywords:** Health promotion, health school, development, junior high schools, systems approach.

## Introduction

School-age children are faced with very complex and diverse health problems. Various kinds of health problems arise in elementary school-age children, but problems that are commonly associated with healthy living behavior (Nugraheni, 2019)<sup>(1)</sup>. While for middle school and high school age children, the problem is related to risky behaviors such as drug abuse (Narcotics, Psychotropic and other addictive substances), unwanted pregnancies, unsafe abortion, sexually transmitted diseases (STDs), including HIV/AIDS, adolescent reproductive health, accidents, and other trauma (MOH, 2004)<sup>(2)</sup>. Efforts to foster school-age children can be done through the School Health program in every region in Indonesia. The School Health is one vehicle for improving student health status (Nugraheni, 2019)<sup>(1)</sup>. The target is students and other school communities with the aim of improving students healthy life skills. School health services that involve all relevant parties such as students, families, and community service providers, school nurses and school doctors play a more complex role to prevent, facilitate and handle health problems

to improve the education of all students (Kolbe, 2019)<sup>(3)</sup>. So students can learn, grow and develop optimally and become quality human resources. According to Suliha (2002) the aim of School Health is to improve the ability of healthy living and the health status of students as early as possible and create a healthy school environment so as to enable harmonious and optimal growth and development of children in the context of quality Indonesian human formation<sup>(4)</sup>.

Based on the Principles for the Development School Health that have been determined by the government, School Health has three main programs known as "TRIAS UKS". The three programs include health education, health services and fostering a healthy school environment. School Health activities must be carried out at all levels of education, from the level of kindergarten, elementary school, Junior High School (JHS) to Senior High School (SHS) and vocational education, both under the guidance of the Ministry of National Education and the Ministry of Religion, including Islamic boarding schools and out-of-school education channels (MOH, 2004)<sup>(2)</sup>.



The fundamental problems that occur in the development and development of School Health include: Clean and Healthy Life Behavior has not reached the expected level, the existence of health problems in school-age children, limited human resources, available facilities and infrastructure, lack of optimal coordination between agencies, lack of the optimal role of the School Health Advisory Team, as well as the limited rules and regulations governing the management of School Health (Ministry of Education and Culture, 2012)<sup>(5)</sup>.

The implementation's problem of School Health in Banyuwangi is not much different from the problems raised by the Ministry of Education and Culture. Strong effort and solid cross-sectoral cooperation are needed to implement the School Health program in accordance with established legislation so that the benefits of implementing the School Health program such as the realization of healthy schools and the creation of the next generation that are physically, mentally and spiritually healthy for a prosperous life.

Based on these conditions, it is necessary to take concrete steps to optimize the implementation of the School Health program, especially in service activities. So the need for innovation in the development model of the School Health program in an effort to improve the health of JHS students in Banyuwangi. The development innovation was carried out by optimizing all elements in the School Health program service and integrated with teaching and learning activities in schools. So as to be able to create personal students who have the ability and awareness of the importance of health.

### **Material And Method**

This research use descriptive qualitative approach. This approach is used with the aim of delving deeply into the knowledge, opinions, opinions and views on the current implementation of the School Health program and exploring more information about the partnerships that have been built in optimizing the implementation of the School Health program. Data collection was carried out in four JHS in Banyuwangi which consisted of two public JHSs and two private JHSs for three months, starting April - June 2016. This study used in-depth interviews and FGD method conducted through several stages, namely situation analysis and primary data collection.

The variables of this study consisted of the characteristics of the informants, the knowledge of the

informants, opinions, and views of informants about the implementation of School Health, management of School Health implementation, obstacles experienced, strengths possessed, future expectations regarding the implementation and utilization of School Health specifically implementing "TRIAS UKS".

**Findings:** There are three main activities of the School Health activity that are commonly known as the "TRIAS UKS". School Health is a form of health promotion and education efforts in the school environment. In modern school health programs include 10 interactive components such as health education, physical education and physical activity, environmental and nutritional services, health services, counseling, psychological and social services, physical environment, social and emotional climate, family involvement, community involvement, and health employee (Kolbe, 2019)<sup>(3)</sup>. For this reason, the implementation of School Health is based on the awareness of increasing the welfare of the school community in particular. In terms of this, School Health has an important role in health development in schools to prepare a healthy, smart and prosperous generation.

**A. Implementation of the School Health Middle School Program in Banyuwangi Regency:** To achieve School Health goals, promotive, preventive, curative and rehabilitative efforts are carried out as early as possible in accordance with the "TRIAS UKS", such as:

1. **Health Education in School:** Health education is a dynamic process of behavior change, where the change is not just the process of transferring material or theory from one person to another and not a set of procedures, but these changes occur because of the awareness of the individual, group, or society itself (Wahid IM & Nurul C, 2009: 9-10)<sup>(6)</sup>. The health education program must also emphasize behavioral change skills, such as goal setting and self motivation, to positively impact students' physical activity behavior (Dai, 2019)<sup>(7)</sup>. The results of the study show that in most of the JHS in Banyuwangi have implemented School Health programs in the field of health education such as:
  - a. Increase knowledge, behavior, attitudes and skills for a clean and healthy life.
  - b. Planting and habituating clean and healthy

life and deterrence of bad influences from outside.

- c. Cultivating a healthy lifestyle so that it can be implemented in everyday life.

In addition, health education can be carried out through intracurric and extracurricular activities. The intracurric activity is a part of the school curriculum such as health science subjects, physical education and health subjects or subjects that can be inserted in health sciences. While extracurricular activities are health education that can be included in activities outside of school hours in order to instill student's healthy behavior.

**2. School Health Services:** School Health service activities are minimum standard service activities in schools. Health services can help health education for students (Giri, 2018)<sup>(8)</sup>. Not only the provision of material and information to students regarding their health, but also practice through relationships with health workers. School health also services include regular health examinations, open-door clinic, acute medical care for minor symptoms or injuries, some specialist care as well as the promotion of wellbeing and safety at school (Kivimaki, 2018)<sup>(9)</sup>. The results of interviews with School Health services can be seen that the information stated that there were services provided by School Health in schools. The implementation of School Health services in Banyuwangi includes:

- a. Early Growth and Stimulation Detection and Intervention
- b. Health screening and periodic health checks
- c. Dental and oral examination and treatment.
- d. Development of Clean and Healthy Life Behavior
- e. First Aid In Accident/First Aid In Disease
- f. Provision of immunization
- g. Physical Fitness Test
- h. Eradication of Mosquito Nest
- i. Adding blood tablets
- j. Giving worm medicine
- k. Use of the school yard as a family medicine park/live pharmacy.
- l. Health education and counseling

- m. Guidance and supervision of healthy canteens
- n. Nutritional information
- o. Post-illness recovery
- p. Health referrals for public health center/hospitals.

**3. Development of a Healthy Environmental Life:**

The development of the school environment aims to create a healthy environment in the school that allows every citizen of the school to achieve the highest degree of health in order to support the achievement of a maximum learning process for each student (Ministry of Education and Culture, 2012)<sup>(5)</sup>. Fostering a healthy school environment includes:

- a. Implementation of cleanliness, beauty, comfort, order, security, longing and kinship.
- b. Development and maintenance of environmental health including smoke free, pornography, psychotropic narcotics and other addictive substances and violence.
- c. Fostering cooperation between school communities.

Based on the explanation above, the "TRIAS UKS" activities have run quite well, although not yet as a whole. The School Health implementation team is still focused on the "TRIAS UKS" activities and the fulfillment of School Health facilities and infrastructure, in addition to the rather heavy extracurricular activities in JHS.

**B. Model of School Health Program Development in Middle School:**

The program is a collection of real, systematic and integrated activities, carried out by one government agency or more or in the framework of cooperation with the community or which is the active participation of the community in order to achieve the goals and objectives that have been set (Pramono, 2011: 45)<sup>(10)</sup>.

One example is the substance of special service management engaged in health at the school scope, namely School Health Unit. This school service management is basically made to facilitate learning and can meet the special needs of students at school. The implementation of School Health activities still refers to the "TRIAS UKS". There has been no development of the middle school health program. The following is the identification of the expectations of the School Health

**Implementation Team:**

1. Obtain School Health guidelines
2. Medication assistance
3. The presence of medical personnel at the School Health
4. Repair of rooms and School Health facilities
5. Training a small doctor
6. Implementation of the School Health Competition as a form of existence and mutual motivation
7. Education about the dangers of free sex, HIV and drugs.
8. The activity of forming the character of independence
9. Involvement of educational institutions

Based on the identification of the above expectations, it can be concluded that the development of School Health at the Implementing Level is strengthening the input components and enriching activities in the process components. While the implementation of School Health activities at the District and District Guidance Team Levels is still focused on organizing and coordinating the Team Builder mechanism. So, the function of fostering and developing School Health has not been implemented optimally.

WHO in Notoatmodjo (2012) launched five (5) health promotion strategies in schools, namely advocacy, cooperation, capacity building, research and partnerships<sup>(11)</sup>. Thus, the model of developing the JHS School Health in accordance with the conditions of the JHS in Banyuwangi is strengthening the management of School Health with a systems approach. The following is a scheme for strengthening the management of JHS School Health in Banyuwangi Regency.

**Caption:**

**1. Input:** In the implementation of the School Health program in Banyuwangi Regency, the staff who organized this program were the School Health Implementation Team (headmaster, supervisor of School Health, teacher council, Student Council, School Health administrators), the savings team of the School Health level and the district level supervisors team. For facilities that support the

implementation of this program such as the School Health room, administration desk, mattress, pillow, bolster, blanket, registration book, cupboard, medicines and so on. The implementing of the School Health program is using manual method. All of these input factors must work together in order to realize behavior change to achieve optimal health status.

**2. Process:** The management function is starting from planning, organizing, actuating and controlling.

**a. Planning:** Planning is the initial stage in the management process. Planning according to Koontz and O'Donnell (1964) is “*involving selecting the objectives and policies, programs and procedures for achieving them-either for the entire enterprise or for any organized part*”<sup>(12)</sup>. Planning includes decision-making activities because it includes the selection of decision alternatives.

Implementation of the School Health program planning in Banyuwangi, planning was carried out by the School School Health Implementation Team but was not integrated with the District and District Head of the School Health Development Team because the organizing of the School Health Development Team in Banyuwangi didn't work. This can occur because there is no planning for public health center specifically for School Health at the District Level.

While the planning of School Health guidance at the District Level is integrated with the Health Office and the majority is joined by the public health center's program. So that the planning of the JHS School Health program in Banyuwangi is only limited to planning by the School Health Implementation Team itself.

**b. Organizing:** Organizing can be formulated as an overall management activity in grouping people and assigning tasks, functions, authorities, and responsibilities of each with the aim of creating useful and effective activities in achieving predetermined goals (Manullang, 2008)<sup>(13)</sup>. According to Terry (2006) Organizing includes<sup>(14)</sup>:

1. Divide the components of activities needed to achieve goals into groups
2. Dividing tasks to someone manager to hold the grouping

3. Establish authority between groups or organizational units

The School Health executive team that came from students namely 7th, 8th and 9th grade students fulfilled the requirements after the School Health training. In line with the organization of the School Health program implementation team in schools, it was not balanced with the organization of District and District advisory teams. Because the sub-district advisory did not know about the team implementing this development. Thus, it resulted in the non-implementation of the task of School Health Guidance Teams in conducting the development of School Health in Banyuwangi.

**c. Actuating:** Activation and Implementation (actuation) is an action to make all group members want to try to achieve organizational goals in accordance with planning (Prayitno, 1997)<sup>(15)</sup>. In management, other terms will often be encountered for mobilization and implementation functions, namely motivating, directing, influencing, commanding.

The implementation of School Health must be in accordance with the health needs of students. Implementation of these activities can be in the form of "TRIAS UKS". These needs can cover physical, psychological, social and spiritual needs. The implementation of health business activities can be carried out well if all the residents of the school, supporting facilities and infrastructures and various cross-sectoral agencies can contribute to the success of this activity.

**d. Controlling:** Planning is closely related to the function of supervision or control because it can be said that the plan is a standard or tool of supervision for the work being done. George R Terry (2006) suggested "*control is to determine what is accomplished, evaluate it, and apply corrective measures, if need, to insure result in keeping with the plan*". Furthermore, Newman said "*control is the performance that conforms to plan*"<sup>(14)</sup>.

Control of purpose of school health activities includes monitoring and evaluation efforts supported by recording and reporting. Control must be carried out periodically and continuously, one of the method used by the Government (Regional) in monitoring and evaluating the implementation of health activities in

schools. The main objective of control is to make what is planned become a reality (Manullang, 2008)<sup>(13)</sup>.

The supervision of the School Health program in Banyuwangi is carried out by the implementation team and the subdistrict and district development team. At the supervisory level, the evaluation is carried out in each semester. However, supervision of the sub-district and district supervisors team did not work due to barriers to integration with monitoring programs in the puskesmas.

**3. Output:** The output factor of the implementation of this school health business is the change in behavior from unhealthy habits to clean and healthy living habits and a healthy environment.

**4. Outcome:** The outcome factor of the implementation of this school health effort is the increasing quality and achievement of students both academically and non-academically according to the purpose of education at school.

**5. Impact:** The impact of the results of the implementation of health business is expected to increase the level of health of students so that the growth of students continues to increase and free from sources of disease.

## Conclusion

Based on the results and finding of research on the development of the School Health program in JHS in Banyuwangi it can be concluded that the planning of the School Health program is still routine which results in less optimal organization. However, the implementation of the School Health program is in accordance with the "TRIAS UKS" and its supervision is already good at the level of the implementation team. It's just that the School Health program development has not been implemented optimally.

Therefore it is necessary to make efforts to optimize the implementation of the School Health program in accordance with the Policy Principles for the Development and Development of School Health and the School Health Development Team. With the model of developing a JHS School Health program in Kabupaten Banyuwangi, "*Strengthening School Health Management with a System Approach*" is expected to be able to optimize the implementation of the School Health program.

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# Particulate Matter 10 $\mu\text{m}$ (PM<sub>10</sub>) Exposure and Lung Function Disorder of Workers in Traditional Ceramic Industry Plered, Indonesia

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## Abstract

The purpose of this research is to explain the correlation between workers health risks level (risk quotient/RQ) (influenced by the concentration of particulate matter 10  $\mu\text{m}$  (PM<sub>10</sub>) exposures), characteristics and patterns of individual activities (including age, sex, smoking behaviors, and working periods) to lung function disorder of workers in traditional ceramic industry.

This research was a quantitative study that used a cross sectional study design and was conducted in July-September 2019. Measurement of PM<sub>10</sub> concentration in the air used High Volume Air Sampling (HVAS) with gravimetric method. The number of sample of workers was 107 workers. Interviews through questionnaires were conducted to the 107 workers. While the spirometry test (lung function measurement) by using a spirometer was conducted only to 30 sample of workers with the criteria of longest working period.

There is a correlation between PM<sub>10</sub> concentration and worker health risks level (risk quotient/RQ). However, there is no correlation between RQ, age, sex, smoking behaviors and working periods toward lung function disorder incidence.

**Keywords:** PM<sub>10</sub>, risk quotient/RQ, characteristics and patterns of individual activities, lung function, traditional ceramic industry.

## Introduction

PM<sub>10</sub> can come from several sources, including natural activities and the effects of human activities in industry, transportation, and agriculture.<sup>1</sup> Many studies have reported that PM<sub>10</sub> has become a problem in the world, including Indonesia, since when PM<sub>10</sub> emissions are generated, but not managed properly, it may cause air pollution, which can risk the human health. Traditional Ceramic Industry Plered is a home industry where the process and technology used was still simple, so that the

PM<sub>10</sub> emissions resulted has not yet concerned.

The study concerning air pollution by particulates has been conducted by Ahmad *et al.*<sup>2</sup> in Haripur, Pakistan. That study used PM<sub>10</sub> and PM<sub>2.5</sub> measurement method which obtained from the activity in the cement industry. Eighty percent of the samples (both PM<sub>10</sub> and PM<sub>2.5</sub>) were over the National Environmental Quality Standards (NEQS), set by Pakistan. Similar study has also been conducted by Fongmoon *et al.*<sup>3</sup> in Thailand, focused on the toxic effects of PM<sub>10</sub> toward genes and mouse lungs collected from ceramics factories. The study showed that PM<sub>10</sub> was not mutagenic toward *S. typhimurium* but could harm rat lung tissue.

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## Materials and Method

- 1. Participants:** The number of sample of workers was 107 workers.

**2. Data Collection:** The 107 sample of workers were interviewed using a questionnaire concerning characteristics and patterns of individual activities including age, sex, smoking behaviors, and working periods. Measurement of PM<sub>10</sub> concentration in the air used High Volume Air Sampling (HVAS) with a gravimetric method according to SNI 7119.15: 2016 guidelines.<sup>4</sup> Measurements were conducted for 1 hour at six observation points which represent six villages in this study location.

**3. Measurement and Statistical Analysis:** RQ was calculated through an Environmental Health Risk Assessment.<sup>5</sup> Exposure analysis is an important part of the risk assessment, which by measuring or calculating the risk agent intake. Intake (I) for non-carcinogens was calculated using an equation.

$$I = C \times R \times t_E \times f_E \times D_t / W_b \times t_{avg}$$

- I : intake mg/kg/day
- C : risk agent concentration, mg/m<sup>3</sup> for air medium, mg/L for drinking water, mg/kg for meals
- R : intake or consumption rate, m<sup>3</sup>/hour for inhalation, L/day for drinking water, g/day for meals
- t<sub>E</sub> : exposure time, hour/day
- f<sub>E</sub> : exposure frequency, day/year
- D<sub>t</sub> : exposure duration, year (real time or projection: 30 years for residential default values)
- W<sub>b</sub> : body weight, kg
- t<sub>avg</sub> : average time period (30 years x 365days/year for non-carcinogenic substances, 70 years x 365days/years for carcinogenic substances)

Health risks characterization is expressed as risk quotient (RQ). Health risks are stated exist and need to be controlled if RQ>1.

$$RQ = I / RfC$$

The spirometry test (lung function measurement) using a spirometer was performed toward only 30 sample of workers (5 people at each observation point) with the longest working period criteria. The lung function is normal if the value of % FVC (FVC/pred) = ≥ 80 and % FEV (FEV<sub>1</sub>/FVC) = ≥ 75. Whereas restriction lung function disorder if %FVC (FVC/pred) < 80 and % FEV (FEV<sub>1</sub>/FVC) = ≥ 75 and obstruction lung function disorder if % FVC (FVC/pred) = ≥ 80 and % FEV (FEV<sub>1</sub>/FVC) < 75.<sup>6</sup>

The analysis used in this study were univariate analysis, bivariate analysis (correlation and linear regression test and independent T test), and also multivariate analysis in the form of logistic regression.

### Results

From the 107 sample of workers, 70 workers (65.42%) were male, of which 36 male workers (33.64%) were smokers and the rest of 71 workers were not-smokers (66.36%). The average age of workers was 44.9 years and the working period average of workers was 15 years (Table 1).

**Table 1. Workers distribution based on the variable including age, sex, smoking behaviors, and working periods**

Variable	Frequency			Mean	SD	Min-Max	95% CI
	Male	Female	Total				
<b>Age</b>							
< 44.9 years	39	17	56	44.9	13.515	18-78	42.31-47.49
	36.45%	15.89%	52.34%				
≥ 44.9 years	31	20	51				
	28.97%	18.69%	47.66%				
Sex	70	37	107				
	65.42%	34.58%	100.00%				
<b>Smoking Behaviors</b>							
Not Smoking	34	37	71				
	31.78%	34.58%	66.36%				
Smoking	36	0	36				
	33.64%	0,00	33.64%				

Working Periods							
< 15 years	35	16	51	15	12.234	1-50	14.99-19.68
	32.71%	14.95%	47.66%				
≥ 15 years	35	21	56				
	32.71%	19.63%	52.34%				

The results of PM<sub>10</sub> concentration measurements at six observation points shows that PM<sub>10</sub> average concentration at six observation points is 0.2 mg/m<sup>3</sup> which exceeds the Threshold Value (NAV) of 0.1 mg/m<sup>3</sup>.<sup>7</sup> Due to the result obtained which exceeds the Threshold Value (NAV) there was a risk that need to be controlled.

Then the calculation of worker health risks level (risk quotient/RQ) was conducted. From the calculation, it has been found that the average RQ is 0.0036 (Table 2). Based on the guidelines if the value does not exceed 1, it can be said that there is no risk that needs to be controlled.<sup>5</sup>

**Table 2. Worker health risk level (risk quotient/RQ)**

Variable	Mean	SD	Minimal-Maximal	95 % CI
Worker Health Risk Level (risk quotient/RQ)	0.0036	0.00587	0-0.02	0.0024-0.0047

Furthermore, using the correlation and linear regression test, the researchers tried to find the correlation between PM<sub>10</sub> concentration and RQ. The correlation showed a strong correlation (r= 0.440) and had a positive pattern, it means that by the increasing PM<sub>10</sub> concentration, RQ also increases. The coefficient value with a determination of 0.193 means that the

obtained regression line equation can explain 19.3% of the variation in RQ or the obtained line equation is good enough to explain the variable of RQ. The result of statistical test found that there was a significant correlation between PM<sub>10</sub> concentration and RQ (p=0,000) (Table 3).

**Table 3. Correlation analysis and regression concentration of PM<sub>10</sub> with worker health risk level (risk quotient/RQ)**

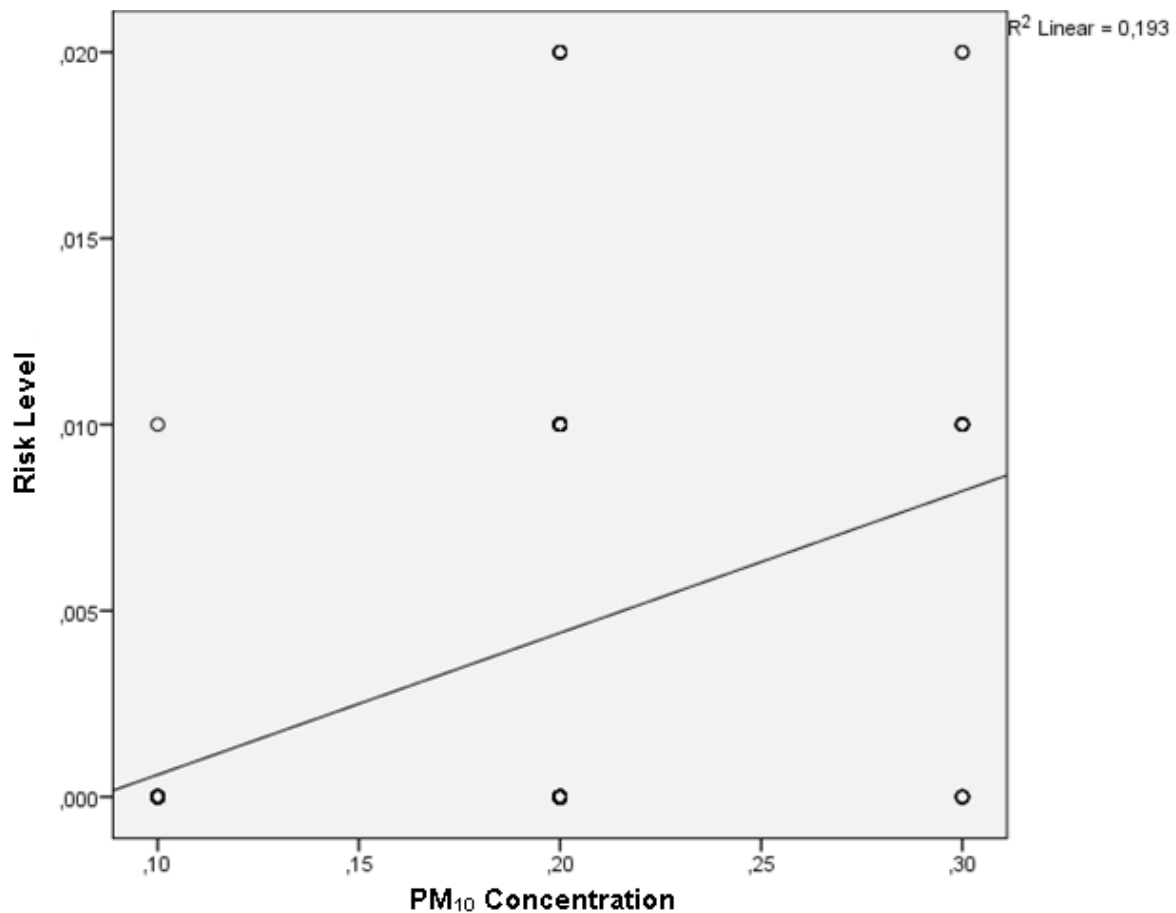
Variable	r	R <sup>2</sup>	Line equation	P value
PM <sub>10</sub> concentration	0.440	0.193	Worker Health Risk Level (risk quotient/RQ) = 0,003+0,038* PM <sub>10</sub> concentration	0.000

From the line equation obtained, the researcher could predict the relation of the dependent variable (worker health risks level (risk quotient/RQ) with the independent variable (PM<sub>10</sub> concentration) (Figure 1).

By referring to the correlation between PM<sub>10</sub> concentration and worker health risks level (risk quotient/RQ), then spirometry tests or lung function

tests on 30 workers were performed with the longest working period criteria. Of the 30 sample of workers, 26 workers (86.67%) were male, of which 9 male workers (30%) were smokers and the rest were non-smokers as many as 21 people (70%). 27 workers (90%) suffer from lung function disorders. The average age of workers was 44.9 years and the working period average was 15 years.





**Figure 1. Prediction diagram of the relationship between PM<sub>10</sub> concentration and worker health risk level (risk quotient/RQ)**

While the 30 workers distribution based on the variables including age, sex, smoking behaviors, and working periods toward lung function disorders were the majority of workers suffer from lung function disorder (abnormal lung function) as many as 23 men (76.77%), the workers who not smoker were 18 people (60%) and the workers with working time  $\geq 15$  years were 18 people (60%). As for the age variable, between workers aged  $< 49.7$  years and those aged  $\geq 49.7$  years, the proportion was spread evenly between those who have normal lung function and those who suffer from lung function disorder (abnormal lung function).

Referring to the finding of lung function disorder happen in 27 workers (90%) then by using an independent T test, the researchers tried to find a relation between the worker health risks level (risk quotient/RQ) and lung function disorder. In Table 4, it is known that from the result of the T test was obtained  $p=0.736$  which means that statistically there was no significant difference in the

average worker RQ between workers who suffer from lung function disorders (abnormal lung function) with those not (normal lung function). Even the average RQ in workers who suffer lung function disorder (abnormal lung function) was even lower than workers who have normal lung function.

**Table 4. Worker health risk level (risk quotient/RQ) according to worker’s lung function**

Lung Function	Mean	SD	P value
Normal	0.0067	0.01155	0.736
Abnormal	0.0041	0.00572	

The researchers suspected there were other factors that cause a high incidence of lung function disorders in 30 workers. Therefore, by using logistic regression analysis, the researchers tried to find out other factors that cause a high incidence of lung function disorders. Logistic regression analysis was carried out with other

independent variables including age, sex, smoking behaviors and working period. However, in Table 5, it is known that there was no variable that have  $p < 0.05$ , so

there were no variables that were significantly related to the incidence of lung function disorder.

**Table 5. Logistic regression modeling results**

Variable	B	P Value	OR	95 % CI
Worker Health Risk Level (risk quotient/RQ)	93.046	0.624	2,57E+40	0.000-9.999E+201
Age	0.021	0.829	1.021	0.847-1.229
Sex	20.315	0.999	0.000	0.000
Smoking Behaviors	20.675	0.999	952915768.58	0.000
Working Periods	0.121	0.438	0.886	0.654-1.202

### Discussion

Through correlation and linear regression test in this study, a strong correlation and positive pattern between  $PM_{10}$  concentrations and worker health risk level (risk quotient/RQ) was found. This result was similar to that in the study conducted by Kowalska *et al.*<sup>8</sup> in Poland that confirmed a significant increase in daily fine particulate matter concentration in the air affect to the increase of the health risks. However, in the case of the relation between RQ and lung function disorder which were analyzed using the independent T tests, the statistic result was obtained, that there was no significant difference RQ average between the worker who suffer lung function disorder (abnormal lung function) and those that were not (normal lung function).

Meanwhile, the researchers suspected there were other factors that caused a high incidence of lung function disorders in 30 workers. Logistic regression analysis was performed with other independent variables including age, sex, smoking behaviors, and working period. But the result showed that there was no variable that have  $p < 0.05$ , it means no variable which was significantly related to the incidence of lung function disorder.

For the age variable, the result was similar to that in the study conducted by Pruthy and Multani<sup>9</sup> in one of the hospitals in India. The study has resulted that the values of all conducted lung function tests, including FVC, FEV1, PEF, FEV1/FVC, SVC and MVV toward 50 people with the average age of people was < 30 years old, showed a correlation with age, a negative correlation in this case ( $r = -0.446, -0.495, -0.427, -0.312, -0.392$  and  $-0.919$ , respectively). So it can be concluded that

lung function decreases significantly with age. While in this study, the average age of worker samples was < 49.7 years which was actually quite strongly related to the occurrence of lung function disorder.

In the case of sex variable, the result was similar to that in the study conducted by Umakaapa, Rahim and Saleh<sup>10</sup> in Indonesia toward the worker of textile industry. Based on statistical tests, the result has showed that the worker sex had no relation with lung function disorder. However, a different matter has been conveyed by Oviara, Jayanti, and Suroto<sup>11</sup> in their study toward the worker of wood processing industry in Indonesia which found that after bivariate analysis, a relation between sex and vital capacity was obtained ( $p$ -value 0.007). After further review, that relation was influenced by proportion variations between men and women in the sample. In the study that got results there was no relation between sex and lung function disorder, it was caused by one of the sex more dominant. While the study that found a relation between sex and lung function disorder, the proportion between men and women tended to evenly spread.

In the case of smoking behaviors variable, the result was not similar to that in the study conducted by Willemse *et al.*<sup>12</sup> in Europe, which found that smoking behaviors was related to lung function disorder, where smoking can cause lung function disorder, such as chronic obstructive pulmonary disease which clinically known COPD toward 15-20% of smokers. Meanwhile, this study was similar to that in the study conducted by Wardhani, Rachmawati, and Rinawati<sup>13</sup> in Indonesia toward the worker of casting factory which resulted that there was no relation between smoking behaviors and

lung function disorder. Similar to this study, in that study, there were more worker samples who not smoking.

In the case of working periods variable, the result of this study was not similar to that in the study conducted by Umakaapa, Rahim, and Saleh<sup>10</sup> in Indonesia toward the worker of textile industry. Based on statistical tests, the study showed that there was a relation between working periods ( $p = 0.095$ ) and lung function disorder. The working periods determines the exposure duration of the worker facing the dust which can affect lung function disorder. The longer the working period is more likely the worker get the risks. But the result of this study was not in accordance with the above hypothesis, but similar to that in the study conducted by Pinugroho and Kusumawati<sup>14</sup> to ward furniture workers in Indonesia. The result showed the exposure duration variable ( $p=0.740$ ) had no relation with lung function disorder. This can be explained that the longer the working period does not mean the worker get longer exposure. Field findings showed that although working hours were generally the same between the workers, they got different exposure doses. In addition, the workers who have a long working period, had lower risk due to they did not have the smoking habit.

### Conclusion

Thus, the conclusion is that factors including worker health risks level (risk quotient/RQ), age, sex, smoking behaviors, and working periods are not related to lung function disorder incidence. Hence, there may be other factors that may cause lung function disorder such as other exposure sources or other factors that have not been included in this study, such as nutritional status, medical history, mask use behavior, occupation history, consumption patterns, and physical activity.

**Conflict of Interest:** No declared.

**Ethical Clearance:** This research has been approved by the Ethics Committee of the Faculty of Public Health, Universitas Indonesia.

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# ICSI Pregnancy Outcomes Following Hysteroscopic Tubal Electrocoagulation Versus Laparoscopic Tubal Disconnection for Patients with Hydrosalpinges

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## Abstract

**Objective:** To investigate Intracytoplasmic sperm injection (ICSI) pregnancy outcomes and success rate of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among patients who have laparoscopic contraindications.

**Method:** A prospective study was conducted among patients who had unilateral or bilateral hydrosalpinges identified on hysterosalpingography and vaginal ultrasonography, and who were undergoing ICSI cycles at the Department of Obstetrics and Gynecology, Faculty of Medicine, Cairo University, Egypt, between March 1, 2017 and May 31, 2018. All patients were divided in two groups; group 1 consisted of patients who had contraindications for laparoscopy was scheduled for hysteroscopic tubal electrocoagulation while group 2 consisted of the other patients who underwent laparoscopic tubal disconnection. Hysterosalpingography was performed 3 months after their procedure for all patients, to evaluate the success of the operation. After tubal occlusion being confirmed by HSG, an ICSI cycle was started with the long protocol with assessment of chemical pregnancy rate (quantitative BHCG 14 days after embryo transfer).

**Results:** Among 50 enrolled patients, 25 underwent hysteroscopic tubal electrocoagulation and 25 underwent laparoscopic tubal disconnection. The procedure was successful in terms of tubal occlusion for 29 (85.2%) of 34 hydrosalpinges in group 1 and 38 (97.43%) of 39 hydrosalpinges in group 2 ( $P = 0.091$ ). And there were no intraoperative or postoperative complications were reported in either of the two groups.

Chemical pregnancy rate was 50 % in the first group and 58.3% in the second group ( $p = 0.580$ ).

**Conclusion:** Hysteroscopic tubal electrocoagulation was found to be a good alternative to laparoscopic tubal disconnection for management of hydrosalpinges before ICSI cycles when laparoscopy is contraindicated with comparable chemical pregnancy rate.

**Keywords:** Hydrosalpinx, Hysteroscopy, Infertility, Pregnancy outcome, Intracytoplasmic sperm injection, Laparoscopy.

## Introduction

High rate of infertility is one of the most common

and under appreciated health problems in developing countries.<sup>1</sup> The most common cause of female infertility is tubal factor infertility that can occur due to occlusion and or peritoneal pathology causing adhesions and it was diagnosed in approximately 30% to 35% of younger and older infertile women.<sup>2</sup>

10–30% of women with infertility due to tubal factors were found to have hydrosalpinx, corresponding to approximately 5% of infertile women.<sup>3,4</sup>

A large reduction (about 40–50%) in pregnancy

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rates was associated with hydrosalpinx, following in-vitro fertilization, embryo transfer (IVF-ET),<sup>5</sup> Many theories suggest the way by which hydrosalpingial fluid impacts implantation and pregnancy but the exact mechanism is unknown. Some authors suggested that the milieu fluid may be embryo toxic,<sup>6</sup> while others assumed that disintegration of the fertilized implanting embryos occur due to the refluxed fluid that causes a physical and mechanical barrier.<sup>7</sup>

Physical inhibition of the implantation and impairment of the expression of factors essential for the development and differentiation of the endometrium, such as  $\beta$ -integrin, leukemia inhibitory factor, and HOXA10 mRNA occur due to the presence of hydrosalpinx fluid in the endometrial cavity.<sup>8,9</sup>

Studies focusing on endometrial receptivity have long been sought after to improve the results of IVF.<sup>10</sup>

Since the hydrosalpinx fluid is in free communication with the uterine cavity, any surgical intervention interrupting this communication could improve the pregnancy rates for patients who attempt IVF with hydrosalpinx,<sup>11</sup> and this could be achieved by either noninvasive or invasive surgical techniques.

Invasive surgical techniques have been demonstrated to be an effective option including laparoscopic salpingectomy and laparoscopic proximal tubal occlusion,<sup>12</sup> but with many drawbacks, including its invasiveness, the possibility of surgical injury (e.g. visceral injury, vascular damage, or unintended laparotomy), the potential risks from general anesthesia, and technical difficulty if there are pelvic adhesions.<sup>13</sup> The proximal occlusion of a hydrosalpinx by hysteroscopy might offer a feasible therapeutic alternative when laparoscopy is technically difficult or contraindicated.

Essure has been widely used for sterilization as it was known to achieve hysteroscopic tubal occlusion.<sup>14</sup> At 31 May 2017 it had been decided to discontinue sales of Essure as by early May 2017 the United States Food and Drugs Administration had received over 27 000 reports of possible Essure-related problems.<sup>15</sup>

So, the aim of the present study was to investigate the use, success rate and pregnancy outcome of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among patients undergoing ICSI who have laparoscopic contraindications.

## Materials and Method

The present prospective study was conducted among women with hydrosalpinx-related tubal infertility undergoing ICSI cycles at the Department of Obstetrics and Gynecology, Faculty of Medicine, Cairo University, Egypt, between March 1, 2017 and May 31, 2018. The Research Ethics Committee approved the study protocol, and informed consent was obtained from all participants.

For all participants hydrosalpinx was diagnosed by hysterosalpingography (HSG) as distally occluded fallopian tube that was pathologically dilated and by vaginal ultrasonography (mid-cycle) as an elongated tubular mass with echogenic wall and linear echoes in the lumen (Figure 1).

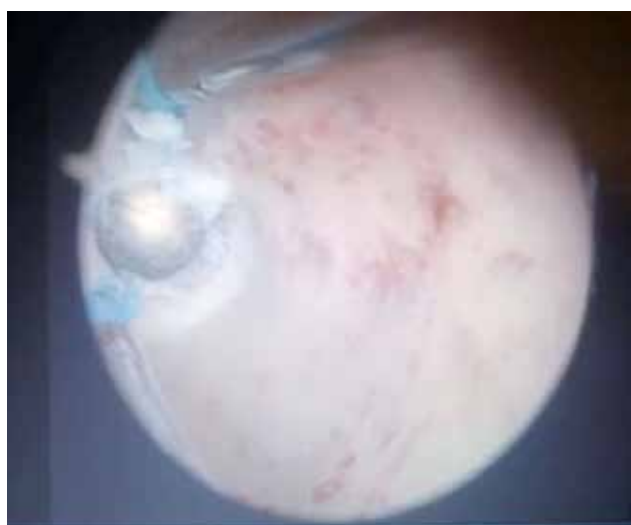


**Figure 1: ultrasound picture showing hydrosalpinx**

Patients who were included in group 2 underwent Laparoscopy to confirm the presence of the hydrosalpinx, and unilateral or bilateral tubal disconnection was performed when technically feasible by using bipolar coagulation and a proximal tubal cut. The other patients who were included in group 1 who had contraindications for laparoscopy as extensive abdominal or pelvic adhesions of various etiologies (e.g. previous surgery, pelvic inflammatory disease, and pelvic endometriosis) and morbid obesity were scheduled in the second week of their cycle to undergo hysteroscopic tubal electrocoagulation under general anesthesia. Unilateral or bilateral electrocoagulation of the cornual end of the tube and the surrounding part of the uterine horn was performed using a hysteroscopic electrocoagulation roller ball (Karl Storz Endoscopy, Tuttlingen, Germany) using a coagulating current of 40 to 50 Watts which was applied on each tubal ostia for 3 seconds (Fig. 2 and Fig. 3). HSG was repeated 3 months for all patients after their procedure to evaluate the success of the operation in form of proximal tubal occlusion.



**Figure 2:** The electrocoagulation roller ball.



**Figure 3:** Hysteroscopic tubal electrocoagulation.

After tubal occlusion being confirmed by HSG (Fig. 3), an ICSI cycle was started with the long protocol with assessment of quality of eggs retrieved, quality of embryos and chemical pregnancy rate (quantitative BHCG 14 days after embryo transfer).



**Figure 4:** Showing HSG before (A) and after (B) laparoscopic tubal disconnection of a case with bilateral hydrosalpinges.

Data was analyzed using IBM SPSS Advanced Statistics version 22.0 (SPSS Inc., Chicago, IL). Quantitative data were expressed as mean and standard deviation or median. Qualitative data were expressed as frequency and percentage. The chi-square test was used to examine the relation between qualitative variables. For quantitative data, comparison between the two groups was done using 099:0421416Independent T-Test. A p-value < 0.05 was considered significant.

**Results**

50 patients undergoing ICSI cycles with unilateral or bilateral hydrosalpinges were included in this study. Overall, 25 patients had contraindications for laparoscopy were scheduled for hysteroscopic tubal electrocoagulation (group 1), while the other 25 patients underwent laparoscopic tubal disconnection (group 2). There was no significant difference between the two groups in age, type of infertility, (Table 1).

**Table 1: Characteristics of participants.**

Variable	Hysteroscopic tubal electrocoagulation (n = 25)	Laparoscopic tubal disconnection (n = 25)	P value
Age, y	28.84± 3.325	28± 4.301	0.444
Primary infertility	12(48)	14 (56)	0.571
Secondary infertility	13 (52)	11(44)	0.571

Values are given as mean ± SD or number (percentage).

The pre-procedure HSGs confirmed that there were no significant differences between groups (Table 2) regarding the number of patients with unilateral or bilateral hydrosalpinges .

**Table 2: Pre- and post-procedure hysterosalpingography findings.<sup>a</sup>**

Findings	Hysteroscopic tubal electrocoagulation (n = 25)	Laparoscopic tubal disconnection (n = 25)	P value
<b>Pre-procedure</b>			
Unilateral hydrosalpinx	16 (64)	11 (44)	0.156
Bilateral hydrosalpinx	9 (36)	14 (56)	0.156
Total hydrosalpinges	34	39	
<b>Post-procedure</b>			
Occlusion	29 (85.2)	38(97.43)	0.091

Values are given as number (percentage).

Overall, the procedure was successful in terms of tubal occlusion for 29 (85.2%) in 20 patients of 34 hydrosalpinges in 25 patients in group 1 and 38 (97.43%) in 24 patients of 39 hydrosalpinges in 25 patients in

group 2 as shown in, with no significant difference between the two groups (P = 0.091). No intraoperative or postoperative complications were reported in either of the two groups.

**Table 3:**

Variable	Hysteroscopic tubal electrocoagulation (n = 20)	Laparoscopic tubal disconnection (n = 24)	P value
Positive	10 (50.0%)	14 (58.3%)	0.580
Negative	10 (50.0%)	10 (41.7%)	

Values are given as number (percentage).

Chemical pregnancy rate was 50 % in the first group and 58.3% in the second group as shown in figure 21, there was no significant difference between the two studied groups regarding the proportion of chemical pregnancies (p = 0.580)

**Discussion**

In the present study, hysteroscopic tubal electrocoagulation was scheduled for 25 patients with unilateral or bilateral hydrosalpinges and contraindications for laparoscopy. After the procedure, the percentage of unilateral or bilateral tubal occlusion did not differ between patients who had undergone hysteroscopic tubal electrocoagulation and those who had undergone laparoscopic tubal disconnection. And, there was no significant difference between the two groups regarding the success rate of the procedures.

Hysteroscopic procedures (either an Essure insert or electrocoagulation) are considered simpler and safer in contrast to the cumulative risks of laparoscopic procedures (salpingectomy or proximal tubal disconnection) for patients intending to undergo IVF in spite of their proven efficacy.<sup>16</sup>

A case report in which the ESSURE set was used for tubal occlusion was the only hysteroscopic route used as a method for tubal occlusion in cases with hydrosalpinx and it was a successful trial but this method is more expensive than the method we used.<sup>17</sup> Although an Essure device is an effective method of sterilization, the Essure coil might trail into the uterine cavity, with possible effects on both implantation and pregnancy, and the nickel titanium elastic outer coil might affect the developing embryo so there is some apprehension regarding its use in the treatment of a hydrosalpinx before IVF, in addition to the cost of the device.<sup>18</sup>



There was a prospective comparative study to determine the efficacy and feasibility of hysteroscopic tubal occlusion of functionless hydrosalpinx prior to IVF/ICSI compared with laparoscopic tubal occlusion, they applied electro-coagulation of tubal orifices. Once the peritubal bulge was clearly seen, a roller ball electrode (size: 3 mm) was introduced inside it and activated at 50 Watts for about 8 s. They achieved complete occlusion in 9 cases out of 13. Pregnancy was achieved in 4 cases (31%).<sup>19</sup>

A pilot study previously compared hysteroscopic roller ball and needle electrode coagulation of the cornual end of the tubes for occlusion of a communicating hydrosalpinx among 10 patients scheduled for IVF. In the roller ball group (6 tubes/4 patients), one tube was successfully closed, three tubes remained partially open, and two tubes were found to be completely open. The needle electrode group (10 tubes/6 patients) had a 90% success rate of occlusion (only one tube was found to be open). However, that study had a very limited number of cases.<sup>20</sup>

A prospective clinical trial had investigated the success rate of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among a relatively large number of patients with laparoscopic contraindications undergoing IVF. Overall, the procedure was successful in terms of tubal occlusion for 25 (93%) of 27 hydrosalpinges in the hysteroscopic group and 78 (96%) of 81 hydrosalpinges in the laparoscopic group, with no significant difference between the two groups. These results are close to our study results and that may be due to some common points that were used in both studies, as all the hysteroscopic procedures in both studies were performed in the early follicular phase and the instruments used were close to each other, as they used in this previous study the electrocoagulation roller ball as we used in our study.<sup>21</sup>

A recent study retrospectively analyzed data from 10 women with hydrosalpinx, who were unable to undergo laparotomy due to extensive pelvic adhesion and treated by operative hysteroscopy prior to IVF-ET. The total of 10 women underwent the fulguration of the internal orifice of the uterine tube. After their hysteroscopy operation, 5 out of 10 patients acquired clinical pregnancy.<sup>22</sup>

Hysteroscopic tubal electrocoagulation might replace the Essure device for hydrosalpinx treatment before ICSI cycles. However, hysteroscopic monopolar surgery is associated with both the potential risk of electrosurgical injury and complications of distending media. In the present study, we have been using the lowest possible power setting with proper insulation to avoid electrosurgical injury, fluid input and output were monitored properly to avoid complications of distending media with keeping the uterine cavity distention pressure below the mean arterial pressure to avoid fluid and electrolyte disturbances. And so there was no intraoperative or postoperative complications reported in the present study.

The present prospective study has investigated the success rate and ICSI pregnancy outcomes of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among a considerable number of patients with laparoscopic contraindications undergoing ICSI. To differentiate between tubal spasm and true tubal occlusion to avoid the false-positive results of the HSG, water-soluble dye and antispasmodics were used in pre- and post-procedure HSGs, and we used the findings from pre-procedure HSG as a control.

## Conclusion

Hysteroscopic tubal electrocoagulation was found to be a successful alternative to laparoscopic tubal disconnection for treatment of hydrosalpinx before ICSI when laparoscopy is contraindicated. But its universal use is still a question that needs more randomized studies to be well answered.

**Conflict of Interest:** The authors have no conflicts of interest.

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**Ethical Committee Approval:** Ethically approved by the department.

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# Working Environment Dust to Disorders of Lung Function of Workers Textile Industry Spinning

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## Abstract

**Background:** Many factors affect the impaired lung function capacity. One of the pollutants in the air that is dangerous is the level of dust. Open the irritation of the upper respiratory tract. Exposure to dust in textile industry workers can pose a risk of pulmonary function disorders.

**Aim:** The purpose of the study was to determine the effect of work environment dust exposure on pulmonary function disorders in textile industry spinning workers.

**Method:** Analytical observational research design, with a cross sectional approach. The population is all 96 spinning workers in the textile industry. The sampling technique uses purposive sampling of 35 people, this study uses a spirometer to determine pulmonary function disorders. Low Volume Sampler (LVS) to measure dust levels in the work environment. Measurements were made at 6 different points in the spinning area.

**Results:** The measurement results obtained with an average working environment dust of 0.395 mg/m<sup>3</sup> which is classified above the NAV based on the Minister of Manpower Regulation No. 5 of 2018. 35 workers who became spinning section respondents, there were 27 respondents (77.14%) did not experience pulmonary function impairment and 8 (22.86%) experienced interference. The results showed that the work environment dust exposure had a significant effect on pulmonary function impairment with a p-value of 0.016 (p-value <0.05). The results of the measurement of the dust content of the work environment is still classified above the NAV, the company should immediately take steps to control the dust exposure source hierarchy.

**Keywords:** Environment Dust, Lung Function, Textile Industry.

## Introduction

The textile industry is an industry that produces air pollution products, one of which is dust. Exposure to dust on textile industry workers can pose a risk of lung dysfunction<sup>1</sup>. Health effects of lung function have

been documented in workers exposed to dust in small, medium and large industries<sup>2</sup>.

Occupational lung disease is a group of diseases that are caused by long or single repeated exposure, severe exposure to irritating or toxic substances that cause acute or chronic respiratory disease<sup>3</sup>. Occupational diseases are caused by pathological responses from patients to their work environment<sup>4</sup>. There is a growing consensus about the adverse effects of organic dust on respiratory symptoms and functions of industrial workers<sup>5</sup>.

With respect to cotton dust exposure, chest tightness was the most common respiratory symptom (20.3%). About 14.2% of cotton processing workers were encountering byssinosis<sup>6</sup>. Moreover, working in

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the department where there is higher exposure of cotton dust such as spinning and weaving and being aged were found to be the risk factors for respiratory problems related to cotton dust.<sup>7</sup>

Braun (1999) explains that there are many cities, especially in developing countries where the level of urbanization is growing rapidly, there is air pollution that has damaged the respiratory system, especially for people who are older, younger, smokers and those who suffer from chronic diseases respiratory tract<sup>8</sup>.

The pathogenesis of bisinosis is the release of protein molecules that are part of the immune response released during an allergic reaction (histamine) that causes symptoms on the first day of work after a Sunday holiday. Exposure to cotton dust which continues for years causes irritation of the upper respiratory tract of the bronchi. After continued exposure chronic obstructive pulmonary disease occurs. Means it can be interpreted the longer the working period the more cotton dust settles in the respiratory tract, so the more severe the bisinosis disease suffered<sup>9</sup>.

ILO data (2013) shows that every year there are more than 250 million accidents in the workplace and 160 million become sick because of the hazards at work. What's more, around 1.2 million workers die from accidents and occupational diseases. New materials for the production process are distributed annually in the workplace. But apparently many of them cause lung disease<sup>10</sup>.

Indonesia is one of the developing countries that has many companies that produce dust as a result of the production process. Occupational lung disease is one group of occupational diseases whose target organs are lung<sup>9</sup>.

The textile industry PT X is a textile company engaged in yarn spinning production activities. This industry produces cotton dust which is a risk factor for lung function disorders.

The results of the initial survey conducted at 3 points in the spinning/textile spinning production area showed the highest working environment dust levels of 0.24 mg/m<sup>3</sup> and the lowest 0.19 mg/m<sup>3</sup> with an average of 0.21 mg/m<sup>3</sup>. This figure is above the threshold value (NAB) of work environment dust with the type of cotton in the workplace which is equal to 0.2 mg/m<sup>3</sup>.

Based on these problems the researchers aimed to determine the effect of work environment dust exposure on lung function disorders.

## Materials and Method

This study used an observational analytic design. The research approach uses a cross sectional study<sup>11</sup>. This research was conducted from November 2017 to July 2018 on spinning workers in the textile industry. The workforce population is 96 workers. After sampling used purposive sampling techniques with inclusion and exclusion criteria, the number of samples was 35 workers. The inclusion criteria were female laborers, non-smokers, no history of pulmonary disease and wearing masks when working.

The independent variable in this study is exposure to work environment dust, while the dependent variable is obstructive, restrictive and mixed pulmonary function disorder. Measurement of work environmental dust levels carried out at 6 points of the spinning area measured using a Low Volume Sampler (LVS) tool. The measurement procedure for environmental dust is based on SNI 16-7058-2004 regarding measurement of total dust.

Disorders of pulmonary function disorders are classified into three namely obstructive, restrictive and mixed based on % FVC and % FEV1 measured using a spirometer. Spirometer is a tool used to determine the percentage of Forced Vital Capacity (FVC) and Forced Expiratory Volume/Expiration Volume that is forced in the first second (FEV1). Normal lung function if % FVC  $\geq$  80 % and % FEV1  $\geq$  70 % and experience obstructive disorders if % FVC > 80 % and % FEV1 < 70 %, restrictive interference if % FVC < 80 % and % FEV1  $\geq$  70 %, mixed interference if % FVC < 80 % and % FEV1 < 70 %.

Data analysis used univariate analysis to distribute respondent characteristics and bivariate analysis by spearman correlation test to find out the relationship between variables and to see the correlation strength of these two variables.

## Results

The characteristics of the respondents consisted of the age at work and the exercise habits of the respondents. Table 1 shows the characteristics of respondents where the average age of respondents is 45.11 years, minimum

age is 22 years and maximum is 52 years. For the working period the respondents have worked for 25.91 years with a minimum work period of 3 years and a maximum of 30 years. For the distribution of exercise habits there are 7 respondents who have exercise habits and 28 people who do not exercise regularly.

**Table 1. Characteristics of Workers in the Textile Industry Spinning Section**

Variable	Minimum (Years)	Maksimum	Average
Age	22	52	45,11
Work Periode	3	30	25,91
	Routine	Not a routine	
Sports habits	7	28	35

Source: Primary Data, 2018

Table 2 shows the point of reference for environmental dust levels. The results of the measurement of the highest dust levels are located on the location of the winding with results of 0.665 mg/m<sup>3</sup>, and the lowest at the location of the ring frame with the results of 0.263 mg/m<sup>3</sup> with an average work environment dust level of 0.395 mg/m<sup>3</sup>.

**Table 2. Point and Results of Measurement of Work Environment Dust Level in the Textile Industry Spinning Section**

Measuremet Points	Measurement Results	Average
Drawing	0,341	0,395
Blowing	0,370	
Ring Frame	0,263	
Carding	0,407	
Roving	0,321	
Winding	0,665	

Source: Primary Data, 2018

**Table 3. Lung Capacity of Workers in the Textile Industry Spinning Section**

Lung Function Capacity	N	%
Normal	27	77,14
Obstruktif	1	2,86
Restriktif	6	17,14
Mixed	1	2,86

Source: Primary Data, 2018

Table 3 contains pulmonary function disorders and it is known that the highest number of respondents is

in normal conditions or there are no lung abnormalities, namely 27 respondents or 77.14%. Most pulmonary function disorders are in the type of restrictive disorders with the number of 6 respondents or 17.14%. For types of obstructive and mixed abnormalities, there is 1 respondent or 2.86% respectively.

Table 4 contains the results of statistical tests between work environment dust and obstructive, restrictive and mixed pulmonary function disorders getting p-value = 0.016 (p <0.05) which means there is a significant relationship, and r = -0.403 with the direction of the relationship negative (-). This shows the significance of the work environment dust with obstructive, restrictive and mixed pulmonary function disorders with moderate levels of relationship. The direction of the negative relationship shows that the higher the level of dust in the work environment, the lower the value of FVC and FEV1 which are used as indicators to determine lung function disorders.

**Table 4. Effect of Dust Content on Lung Function Disorders of the Textile Industry Spinning Section**

Variabel	r	p-value
Work Environment Dust Level	-0,403	0,016
Dissorders of Lung fungction		

Source: Primary Data, 2018

### Discussion

Measurement of work environment dust at 6 points at PT X obtained an average yield of 0.395 mg/m<sup>3</sup>. The measurement results for the whole point are above the NAB, which is 0.2 mg/m<sup>3</sup> every 8 working hours per day for the type of cotton dust based on RI Permenaker No. 5 of 2018 concerning occupational safety and health in the work environment, attachment 3 NAB Chemical Factors<sup>12</sup>. Workers in the textile industry are at risk of lung dysfunction from exposure to cotton dust or cotton dust so as to cause the risk of disease. Of the total sample of 35 workers, the majority were in normal conditions namely 27 respondents (77.14%). The total workforce experienced pulmonary dysfunction 8 workers (22.86%). Most pulmonary function disorders are in the type of restrictive disorders with the number of 6 respondents or 17.14%. For types of obstructive and mixed abnormalities, there is 1 respondent or 2.86% respectively.

The mechanism of accumulating dust in the lungs begins with breathing, air containing dust enters the

lungs. Dust between 5-10 microns will be held by the upper respiratory tract, while 3-5 microns in size are held by the middle of the respiratory tract. Particles between 1 and 3 microns will be placed directly on the surface of the pulmonary alveoli. Particles measuring 0.1 micron are not so easily perched on the surface of the alveoli, because particles of this size are not easily deposited on the surface. Particles which have less than 0.1 micron in mass are too small, so they do not settle on the surface of the alveoli or linder membrane, because of Brown's movement, which causes such dust to move out of the alveoli<sup>8</sup>.

Suma'murin 2014 also explained that exposure to cotton dust which continues for years causes irritation of the upper respiratory tract of the bronchi. After continued exposure chronic obstructive pulmonary disease can be interpreted the longer the working period, the more cotton dust settles in the respiratory tract, so that the more severe bisinosis disease that is suffered.

Republic of Indonesia Ministry of Health (2003), explained that dust can cause lung damage and fibrosis if it is inhaled during continuous work<sup>13</sup>. When the alveoli hardens, as a result it reduces elasticity in accommodating air volume so that the ability to bind oxygen decreases. To determine the effect of exposure to work environment dust and obstructive, restrictive and mixed pulmonary function disorders used the Spearman correlation test. Correlation test results show the results of the p-value of 0.016, which means that between the two variables shows a significant effect. according to research by Yulaekah where there is a relationship between dust exposure and lung function disorders, with the results of significance of 0.036, 0.020 and 0.002 which means that it has a significant relationship because the p-value <0.05. This result is also in accordance with research by Qian that there is a relationship between dust exposure and pulmonary function disorders<sup>14,15</sup>.

In this study we found that there was a significant relationship between dust exposure and pulmonary function reduction, this result is consistent with the study conducted by Mohammadein et al and Said et al. Showed that there was a significant relationship between exposed workers dust with pulmonary function disorders where workers exposed to dust have a higher risk than those not exposed to dust<sup>16,17</sup>.

Guyton as a person ages, pulmonary function will decrease. age is related to the aging process or increasing

age where the older a person is, the more likely there is lung function capacity. Guyton and Hall explained that at the age of 20-40 years is the maximum muscle strength in a person and will be reduced by 20% after the age of 40 years. the older the age of a worker, the higher the risk of pulmonary function disorders<sup>18,19</sup>.

The longer a person is at work, the more he has been exposed to the danger posed by the work environment, including exposure to cotton dust. RI Ministry of Health explained that chronic disorders occur due to exposure dust in a workplace that is quite high and for a long time

usually is annual and not infrequently the symptoms of lung function disorders appear after more than 10 years of exposure.

A person's nutritional status influences a person's immune system to maintain health from being attacked by various diseases such as coughs, colds, diarrhea and also the body's ability to detoxify foreign bodies such as dust entering the body, which will automatically affect the function and performance of the lungs, which also interrupted<sup>20</sup>. one assessment of a person's nutritional status is by calculating the Body Mass Index .(Leone et al also explained that obesity is a very strong component of its influence and is associated with respiratory disorders<sup>21</sup>.

Guyton and Hall, lung capacity can be influenced by a person's habit of exercising that someone who exercises regularly can increase blood flow through the lungs which will cause pulmonary capillaries to get maximum perfusion, so that oxygen can diffuse into the capillaries to the maximum<sup>18</sup>.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** The study was approved by the ethical committee of Medicine Faculty Sebelas Maret University. All subjects were fully informed about the procedures and objectives of this study and each subject prior to the study signed an informed consent form.

## Conclusion

Many factors in the textile industry that contribute to impaired lung function such as dust, years of service, age and exercise habits. one of the controls on these factors is the use of personal protective equipment in the form of masks according to the standard as a dust filter

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# Urine Serotonin in Sleep Deprivation Children

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## Abstract

**Background:** Sleep deprivation can cause significant medical and behaviour morbidities. Many factors influenced sleep deprivation. One of the biological factors that influenced sleep deprivation was serotonin that was not clearly understood yet. 5-HIAA was serotonin metabolite, the increasement in urine reflect whole body serotonin increasement.

**Objective:** To analyze correlation between urine serotonin and sleep deprivation. Method Cross sectional study was done in Airlangga I Elementary School Surabaya, Indonesia, subjects children 6- 10 years old. They were screened by The Children's Sleep Habits Questionnaire- Abbreviated (CSHQ-A) developed by Owen et al., to assess sleep deprivation. The same number children without sleep deprivation was taken as a control group. They were collecting 24 hours urine, then measured urine serotonin level (ELISA method). Data were analyzed with Chi- square test, and Spearman Correlation Test, significant p value<0.05.

**Results:** One hundred sixty four children were screened by CSHQ-A, 15% categorized as sleep deprivation. Fourteen children (90%) with sleep deprivation came from low socioeconomic family. There was no significant differences in urine serotonin level between children with and without sleep deprivation (p 0.933). There was weak correlation between sleep deprivation and urine serotonin level in subjects with low socioeconomic status (r 0.089).

**Conclusion:** No differences about urine serotonin in children with and without sleep deprivation. Children with poor socioeconomic family tend to have more sleep problems.

**Keywords:** *Urine serotonin, sleep deprivation, CSHQ-A, healthy children, low sosioeconomic.*

## Introduction

Sleep deprivation can cause difficulties in social interaction, emosional control, irritability, behavioral problems, learning difficulties, motor vehicle crashes in teenagers, and poor academic performance, so it should be prevented.<sup>1</sup> Many ways to evaluate sleep problems,

one of it is questionnaire. Although objective measures of children's sleep behavior produce highly reliable and valid data, the cost, time, and effort associated with these measures can also make them difficult to administer on a wide scale. Clinicians prefer to use questionnaires rather than polysomnography or actigraphy as tools for diagnosing sleep deprivation because of the effective time and cost, as well as the easy administration. One of the most commonly used sleep screening questionnaires for school-aged children is the Children's Sleep Habits Questionnaire (CSHQ), developed by Owens et al.<sup>2</sup> Biological factors that influenced sleep deprivation was serotonin. Serotonin (5-hydroxytryptophan, 5-HT) was the metabolyte of essential amino acid tryptophan.<sup>3</sup> Based on electrophysiological, neurochemical, genetic and neuropharmacological approaches, it is currently accepted that serotonin functions predominantly to

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promote wakefulness and to inhibit REM (rapid eye movement) sleep.<sup>4,5</sup> The main metabolite of serotonin (5-hydroxyindolacetic acid dan 5-methoxyindoleacetic acid) was excreted in urine.<sup>6</sup> An increase in urinary 5-HIAA reflects an increase in serotonin metabolism throughout the body, the gut is the principal source of 5- HIAA. Both serotonin and 5- HIAA are influenced by dietary tryptophan<sup>7</sup> This study aimed to analyze correlation between urine serotonin and sleep deprivation.

**Material and Method**

A cross sectional study was conducted between May 2018 until February 2019 in Airlangga I Elementary School Surabaya, East Java, Indonesia. Population of 6- 10 years old children who were registered as pupils in that school were screened. The CSHQ-A (NICHD SECCYD-Wisconsin) was used in this study, modified by Owen, to assess sleep deprivation. There were 5 points response scale (1= always, 5= never) and 22 questions. Retrospective method from parents/caregivers recalling on sleep pattern, disturbances, or behaviours (e.g., bed time, sleep behaviour, waking during the night, morning wake up) was used in this questionnaire. Items of the CSHQ-A were rated on a five point scale ranging from “always” if the sleep behaviour occurred 7 time in the past week, “usually” if the behaviour occurred 5-6 times in the past week, “sometimes” for 2 to 4 times that week, “rarely” for 1 time that week, and “never” for 0 time that week. A total score of more than 41 on CSHQ-A was taken as abnormal and indicative of sleep problem.<sup>8,9</sup> Inclusion criteria were the population that categorized

as sleep deprivation due to CSHQ-A and parents fill informed consent for joining this study. The exclusion criteria were chronic disease that consumed long term medicine or hospitalized, include severe malnutrition, and uncomplete data of CSHQ-A. Drop out criteria was consuming medicine while urine collecting process. Characteristics were sex, age (6- 8 years old and 9- 10 years old). Nutritional status was categorized as normal or moderate malnutrition based on CDC growth chart, percentage ideal body weight between 70 and 90 categorized as moderate malnutrition, 90 and 110 categorized as normal. Family income based on regional income, divided into low and high income. Family education were assessed from the latest parents education, categorized as low education (elementary school), medium if the parents latest education was junior high school, and high education for senior high school or academic. Children as sample were educated to collect 24 hours urine, submit about 30 cc of homogenated urine sample to laboratory, then run for quantitative urine serotonin level using ST/5-HT (Serotonin/5-Hydroxytryptamine) ELISA Kit from Elabscience.

**Results**

Of 164 children were screened for CSHQ-A, 25 children categorized as sleep deprivation. Excluded 9 students (1 ADHD, 1 history of asthma, 7 not signed informed consent), drop out 1 children because of fever and consumed paracetamol during 24 hours urine collecting. 15 children succeed to submit the collecting urine. 15 children from normal CSHQ-A score group as the second population, also submit the collecting urine.

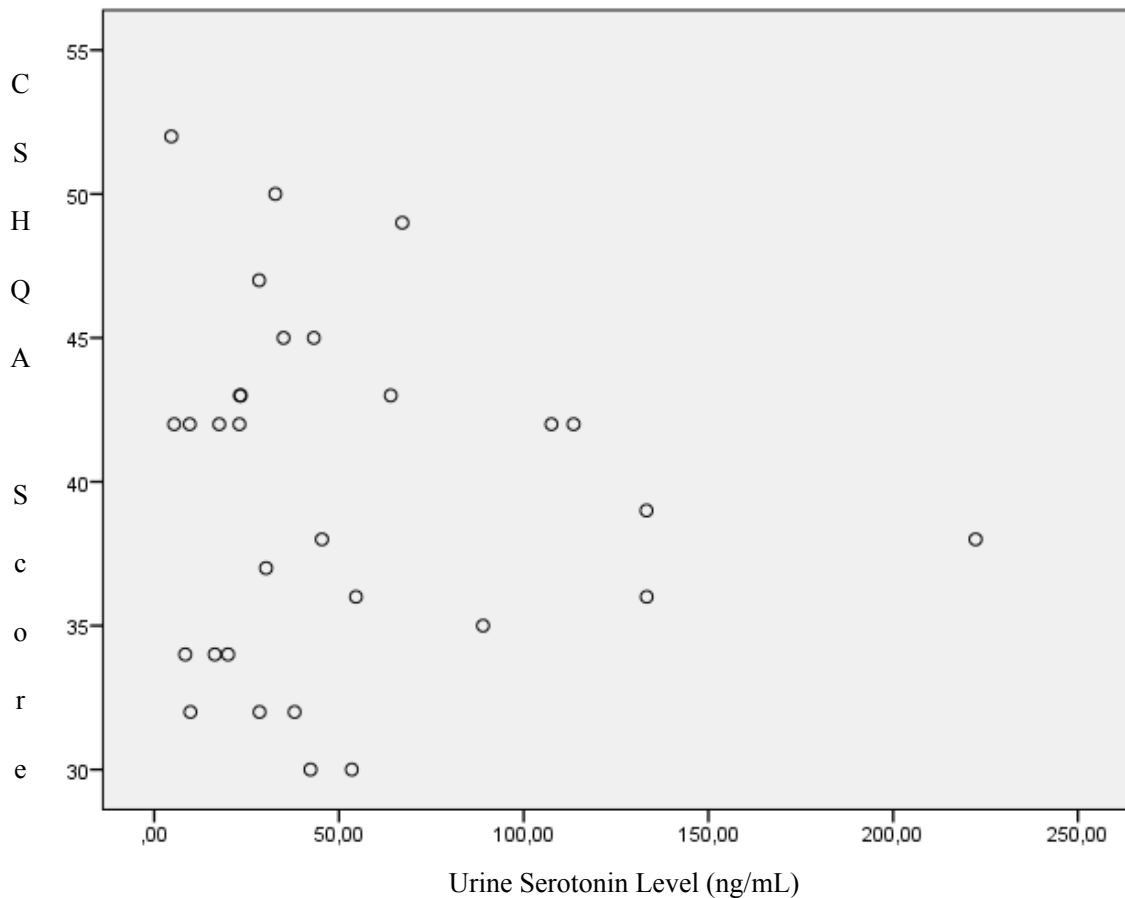
**Table 1: Characteristics of subjects**

Baseline Characteristics	Sleep Deprivation		%	p
	Yes	No		
<b>Sex</b>				
Male	7	10	56	0.461
Female	8	5	43	
<b>Age, median (min-maks)</b>	9.5 (6-10) years old			
<b>Age (Years)</b>				
6 - 8	3	10	43	1.448
9 -10	12	5	56	
<b>Nutritional Status</b>				
Normal	10	14	80	0.171
Moderate Malnutrition	5	1	20	

Baseline Characteristics	Sleep Deprivation		%	P
	Yes	No		
<b>Socioeconomic Status</b>				
<b>Family Income</b>				
High	1	11	40	0.273
Low	14	4	60	
<b>Parents Education</b>				
Low	2	0	6.6	0.057
Moderate	9	5	46	
High	4	10	46	

**Table 2. Urine serotonin characteristics in children with and without sleep deprivation**

Urine serotonin level (ng/mL)	Sleep deprivation (%)	No sleep deprivation (%)
<68	10 (33)	7 (23)
>68	5 (17)	8 (27)



**Picture 1. Urine serotonin level in 6- 10 years old children with and without sleep deprivation**

**Table 3. Urine serotonin and CSHQ-A score characteristics in low socioeconomic subjects**

CSHQ-A score	Urine serotonin level <68 (ng/mL)	Urine serotonin level >68 (ng/mL)
<41	3	1
>41	10	4

**Table 4. Urine serotonin analysis in 6- 10 years old children**

		Urine serotonin level (ng/mL)		P
		<68	>68	
Sleep Deprivation	Yes	10	5	*0,933
	No	7	8	
<b>Total</b>		<b>17</b>	<b>13</b>	

\*Chi- Square test

**Table 5. Correlation analysis for urine serotonin level to CSHQ-A score in low socioeconomic subjects**

		Urine serotonin level (ng/mL)		P
		<68	>68	
CSHQ-A Score	<41	3	1	*0,726 (r 0,089)
	>41	10	4	
<b>Total</b>		<b>13</b>	<b>5</b>	

\*Spearman correlation test

### Discussion

Serotonin (5-HT) is a crucial neuromodulator, yet its role in behavior remains poorly understood. There was no significant differences urine serotonin level in children with and without sleep deprivation ( $p>0.05$ ). Serotonin deficiency can cause sleep deprivation, but sleep deprivation itself can be caused by many reasons. Another study that developed an approach that reproducibly achieves near-complete elimination of 5-HT synthesis from the adult ascending 5-HT system, discovered that adult 5-HT deficiency led to a novel compound phenotype consisting of hyperactivity, disrupted circadian behavior patterns, and elimination of siestas, a period of increased sleep during the active phase.<sup>10</sup> Previous study reveal that the serotonergic raphe nuclei with their widespread cortical projections are part of the monoaminergic wake promoting system. Accordingly, cortical serotonin levels are high during wakefulness, reduced during Slow Wave Sleep (SWS), and virtually quiescent during rapid eye movement sleep. During sleep deprivation the serotonin release is even higher than during the previous wake period, as animal findings suggest. Elevated serotonin levels have been measured in the hippocampus of sleep deprived rats and even during the subsequent recovery period.<sup>11</sup> Serotonin does not cross the blood-brain barrier, so all central 5-HT must be synthesized locally in the neuron. Serotonin is synthesized from the neutral amino acid L-tryptophan (TRP), which is readily available from the diet. Tryptophan is highly protein-bound, leaving only

5% available for transport through the blood-brain barrier into the brain. The free TRP level depends on the balance of dietary intake and its depletion by liver for protein synthesis.<sup>12</sup> Previous studies have showed a correlation between central nervous system neurotransmitter activity and urinary transmitter output. The study using rats as the objects, analyzed the effects of oral ingestion of the serotonin precursor, 5-hydroxytryptophan (5-HTP), on specific brain regions. Serotonin levels were measured using brain tissue immunoreactivity and urinalysis. Maximum serotonin immunoreactivity in the serotonergic dorsal raphe nucleus reached within 2 hours of administration. Urinary analysis of serotonin, 5-HTP, and 5-hydroxyindolacetic acid (the major metabolite of serotonin) showed the changes observed in immunoreactivity, suggesting a positive correlation between CNS and urinary serotonin levels.<sup>13</sup> A study that measuring serotonin levels in platelets results in a very strong correlation with levels in CSF, so in most cases platelet measurements will be preferable since it is much less invasive to collect. Levels of serotonin in plasma and urine are significantly but less strongly correlated with levels in CSF.<sup>14</sup>

Sleep deprivation in this study was shown in 15% population of healthy children age 6- 10 year old. Almost half of the sleep deprivation population come from low socioeconomic family. Shown in this study there was weak correlation of urine serotonin level and sleep deprivation in children from family with low socioeconomic status ( $r 0.089$ ). A related study

found that the socioeconomically disadvantaged have higher likelihood of sleep complaints. They also found differing effects of employment on sleep complaints by gender. Poor sleep quality is strongly associated with poverty and race. Socioeconomic variables are related to sleep complaints in general (greater socioeconomic status is associated with less sleep complaints) but the specifics of this relationship are complex.<sup>15,16</sup> From previous study indicated that adolescents living in lower socioeconomic conditions experienced significantly poorer sleep outcomes in terms of the timing, duration, and regularity across the week. Although we controlled for the number of medical and psychiatric conditions; however, it is possible that living in lower socioeconomic status conditions is associated with the development of medical conditions that affect sleep and/or sleep disorders. The chaos of poverty might lead to emotional and physical health problems that in turn negatively affect sleep.<sup>17</sup>

The limitation of this study was few sample so the results could not be generalized to population. Other factors that influenced serotonin level could not be controlled in this study. But application of urine as a sample that less invasive to collect can be a superiority for this study.

### Conclusion

There was weak correlation between urine serotonin level and sleep deprivation in healthy children. Children with low socioeconomic status tend to be sleep deprivation.

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**Ethical Clearance:** This study was approved by medical researched ethical committee Dr. Soetomo General Hospital Surabaya No. 67/Panke. KKE/IV/2018.

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# Assessing Demographic Distribution of Dengue Infections in Seremban District, Malaysia

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## Abstract

This study aims to assess the trends of dengue incidence and socio-demographic characteristics of reported dengue cases in Seremban district, Malaysia during the last decade. Secondary data on reported dengue cases during 2003-2011 were collected from the District Health Office, Seremban. Trend analysis was conducted to assess the status of dengue incidence and demographic distribution of the disease in the district. Annual incidence rates of the disease were also calculated and compared. The district experienced a total of 11,936 dengue infections during 2003-2011. It was found that majority of the reported cases were among the Malays (62%), followed by Chinese (17%) and Indians (15%). The age-specific incidence rate was highest in young adult and adult group (15-44 years), followed by middle-age group (45-59 years). The analysis also revealed that majority of the reported cases (on average, 79% per year) came from urban areas of the district which highlights the fact that dengue is still an urban public health problem in Seremban. The study findings provide the critical data and information on trends of dengue incidence and socio-demographic characteristics of reported dengue cases which might assist the public health authorities to achieve dengue mortality and morbidity reduction goals in the district.

**Keywords:** *Dengue incidence, demographic distribution, Seremban, Malaysia.*

## Introduction

Dengue is a mosquito-borne viral infection which can be caused by one of the four antigenically distinct dengue viruses namely, DENV-1, DENV-2, DENV-3, and DENV-4<sup>(1-3)</sup>. From the clinical perspective, a dengue infection is usually classified as dengue fever (DF), dengue hemorrhagic fever (DHF) or dengue shock

syndrome (DSS) according to severity of the disease<sup>(4)</sup>. The dengue infection usually begins with a sudden onset of high fever, a severe frontal headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, and rash<sup>(5,6)</sup>. The infection can manifest as DHF or DSS with plasma leakage, severe abdominal pain, respiratory distress, spontaneous bleeding, rapid breathing, fatigue, hypotension and organ impairment<sup>(7)</sup>. Currently, there is no specific medication for DF/DHF<sup>(8,9)</sup>. The patients are treated with paracetamol, oral rehydration and IV fluids in order to maintain the volume of the patient's body fluid<sup>(10)</sup>. Moreover, the patient suffered from DHF or DSS is considered a medical emergency and requires hospitalization in intensive care unit.<sup>(10,11)</sup>

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Dengue is found in tropical and sub-tropical regions

around the world, mostly in urban and semi-urban areas<sup>(12,13)</sup>. In recent years, dengue has become a major international public health concern in terms of morbidity and economic impact<sup>(14)</sup>. The disease is now endemic in 124 countries of the world and all four dengue viruses are circulating in poor and developing countries in Asia, Africa and the Americas<sup>(15- 18)</sup>. WHO currently estimates that there is 50-100 million dengue infections worldwide each year, 500,000 cases of DHF, and about 2.5% of whom die<sup>(19)</sup>. Southeast Asia and the Western Pacific regions are particularly vulnerable to dengue due to rapid urbanization and high densities of dengue vector<sup>(20)</sup>. Recently, DHF has become a leading cause of hospitalization and death among children in most of the Asian countries<sup>(12)</sup>. Approximately, 200,000 dengue cases have been reported annually during the last decade in Asia Pacific region<sup>(21)</sup>.

Currently, DF is one of the major public health problems in Malaysia<sup>(22,23)</sup>. The incidence of DF and DHF in Malaysia has increased steadily during the last decade<sup>(24)</sup>. The disease is predominant in urban areas where majority of the country's total population resides<sup>(25)</sup>. Seremban is one of the highly affected districts by dengue infections in Malaysia. However, the ongoing burden of the disease in the district is not well studied. This study aims to assess the trends of dengue incidence in Seremban during the last decade. It also analyses the socio-demographic characteristics of the reported dengue cases in the district. To our knowledge, this study is an important academic attempt to examine the burden of dengue from socio-demographic perspectives that might be helpful in policy and decision making for sustainable public health in Malaysia.

## Material and Method

Seremban is one of the seven districts of the Malaysian state of Negeri Sembilan. It is the capital of the state and one of the most affected districts by dengue infections in Malaysia. The hot and humid climate of Seremban is favourable for *Aedes* mosquitoes to breed and survive. Moreover, rapid urbanization, infrastructure development, very active construction sector for housing and commercial buildings in the district play important role in transmission and outbreaks of dengue. We conducted a retrospective secondary-data based study

and collected annual data on reported cases of DF and DHF and patients' socio-demographic information in Seremban during 2003- 2011. Reported cases included all the clinically diagnosed and laboratory-confirmed cases notified to public health authority in the district. Data were extracted from record of the District Health Office, Seremban. Trend analysis was conducted to assess the status of dengue incidence from 2003 to 2011. Annual incidence rates were also calculated and compared for the nine-year period. Summary descriptive statistics (viz. summation, mean, frequency, ratio and percentage) were applied to analyze socio-demographic characteristics of reported dengue cases.

## Results and Discussions

**Annual Incidence of Dengue:** Figure 1 shows the annual number of dengue (including DHF) cases in Seremban between 2003 and 2011. The findings suggest that dengue incidence has followed a cyclical pattern (i.e. down-up-down-up) during the last decade. However, a total of 11,946 dengue cases were reported in the district over a 9-year period. Incidence rate of dengue in Seremban is also shown in figure 1. The findings showed a great variation in yearly incidence rate of the disease during the last decade. The highest incidence rate (443.60 cases per 100,000 populations) was observed in the year 2003 while the lowest incidence rate was 97.07 cases per 100,000 populations in 2011.

**Distribution of Cases by DF and DHF:** Table 1 shows the distribution of dengue cases by DF and DHF and incidence rate per 100,000 populations in Seremban between 2003 and 2011. It was found that out of the total 11,946 reported cases, 11,288 (95%) were DF with the remaining 648 (5%) being DHF. It was also found that the number of DF cases was substantially higher than that of DHF in each year during the last decade. The findings indicate that annual incidence rate of DF in every 100,000 populations was substantially greater (the range of 91.45-421.31) than that of DHF (the range of 5.62- 22.61) between 2003 and 2011. The DF/DHF ratios also reveal that DF was the predominant type of dengue illness in the district over the last 9 years. The predominance of DF over DHF in the district was observed to be the greatest (45.5: 1) in the year 2004 and the smallest (8.9: 1) in 2009.



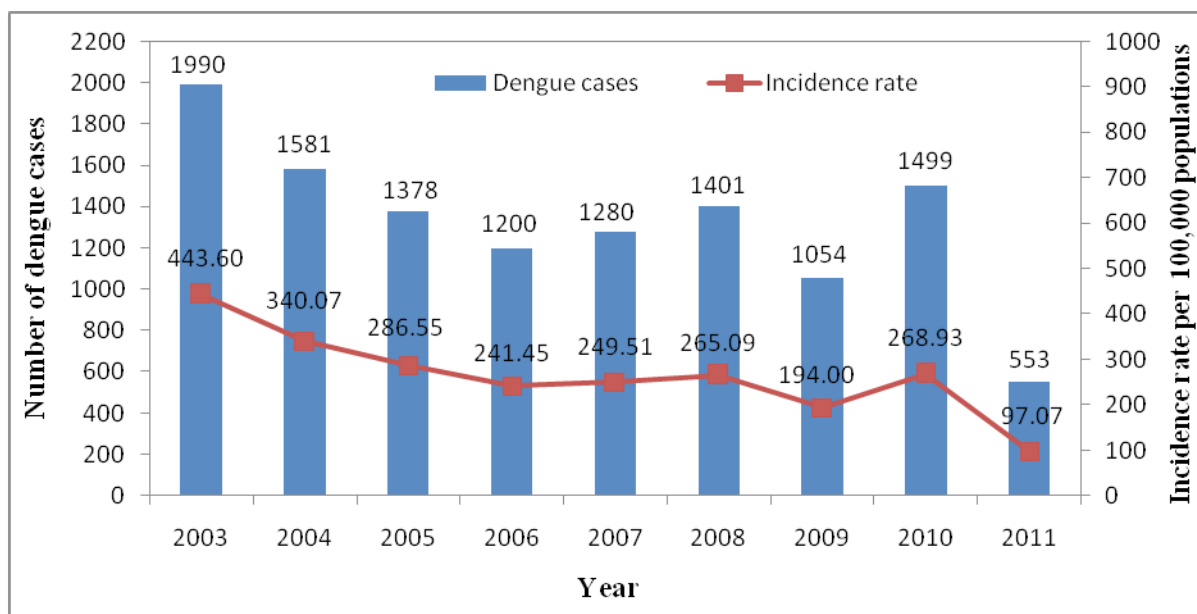


Figure 1: Number of dengue cases and incidence rate in Seremban

Table 1: Distribution of cases and incidence rate by DF and DHF in Seremban

Year	Number of dengue cases		Incidence rate per 100,000 populations		Ratio (DF/DHF)
	DF	DHF	DF	DHF	
2003	1890	100	421.31	22.29	18.9: 1
2004	1547	34	332.76	7.31	45.5: 1
2005	1335	43	277.61	8.94	31.1: 1
2006	1123	77	225.96	15.49	14.6: 1
2007	1201	79	234.11	15.40	15.2: 1
2008	1350	51	255.44	9.65	26.5: 1
2009	948	106	174.49	19.51	8.9: 1
2010	1373	126	246.32	22.61	10.9: 1
2011	521	32	91.45	5.62	16.3: 1

**Distribution of Dengue Cases According to Sex:**

Table 2 presents the distribution of dengue cases and incidence rate per 100,000 populations based on sex in Seremban for the period of 2003-2011. Of the total cases reported in the district over the nine years period, 7305 (61%) were males and 4631 (39%) were females. It can be also seen that majority of the reported cases per year were consistently male in the district between 2003 and 2011. Moreover, the findings indicate that the annual number of male cases in every 100,000 populations was greater than that of female cases in the district during the last decade. However, there was a great variation in yearly incidence rate of dengue in both male and female population. The ratio of male cases to female cases (i.e. male: female) ranged from 1.4: 1 to 2.1: 1 (table 2). The

male/female ratios also reveal that there was a consistent trend of males having a higher incidence of dengue as compared to females.

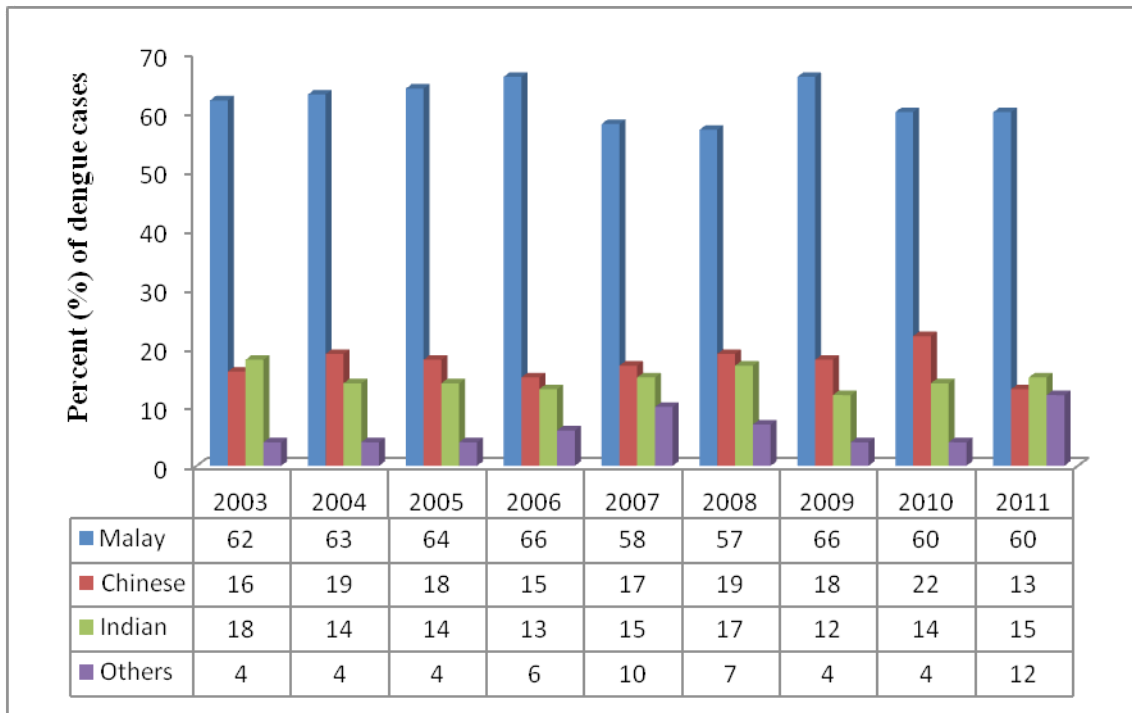
**Distribution of Dengue Cases Based on Ethnicity:** The distribution of dengue cases by ethnic group in Seremban between 2003 and 2011 is shown in figure 2. The findings revealed that while all ethnic groups were infected by the disease, the majority of the reported DF/DHF cases were among the Malays. It can be seen that the Malays constituted, on average, 62% of notified cases per year in the district during the last decade. The data show that the Chinese had the second highest proportion of dengue incidence in the district. This ethnic group shared, on average, 17% of the yearly

reported cases for the period of 2003-2011. The Indians constituted an average of 15% of the annual reported cases of dengue during the last decade. The other groups shared the smallest portion (on average, 6%) of annual

dengue incidence in the district. Majority of the dengue cases under the other groups were foreign workers mainly from Indonesia, Bangladesh and Nepal.

**Table 2: Distribution of dengue cases and incidence rate according to sex in Seremban**

Year	Number of dengue cases		Incidence rate per 100,000 populations		Ratio (Male/Female)
	Male	Female	Male	Female	
2003	1144	846	494.81	389.32	1.4: 1
2004	936	645	390.65	286.16	1.5: 1
2005	833	545	336.02	233.91	1.5: 1
2006	770	430	300.43	178.65	1.8: 1
2007	868	412	327.92	165.93	2.1: 1
2008	934	467	342.50	182.49	2.0: 1
2009	625	429	222.97	163.12	1.5: 1
2010	874	625	304.11	231.48	1.4: 1
2011	321	232	109.52	83.88	1.4: 1

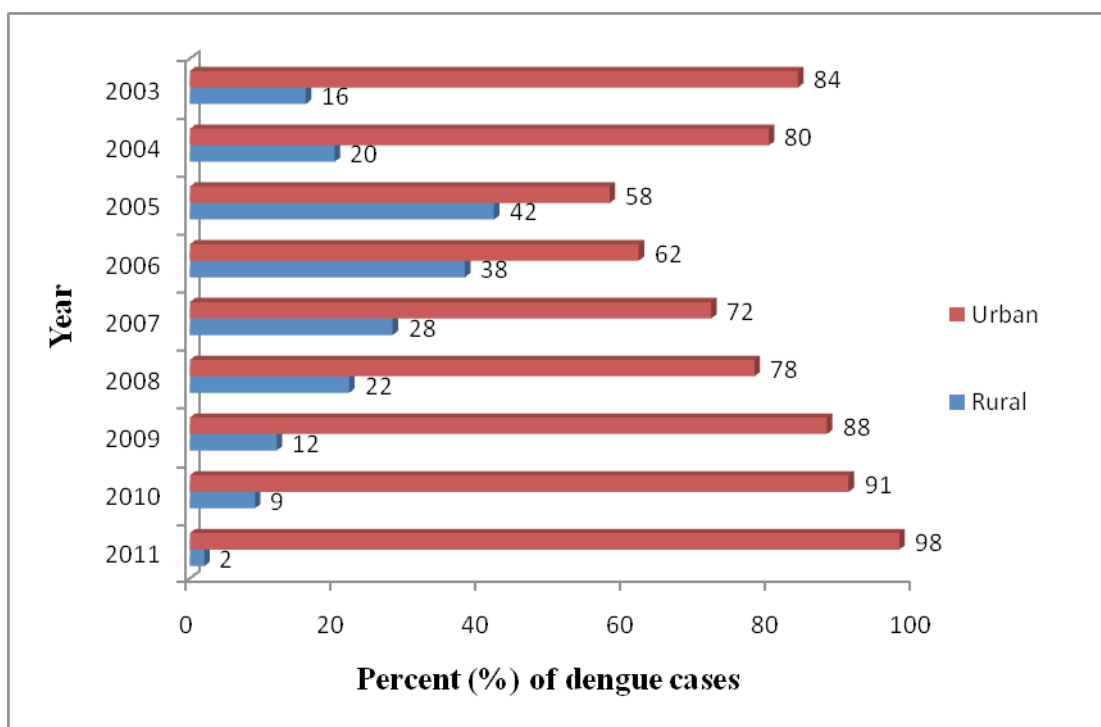


**Figure 2. Distribution (%) of dengue cases based on ethnicity in Seremban**

**Distribution of Dengue Cases Based on Locality:**

The distribution of dengue cases according to locality in Seremban for the period of 2003-2011 is presented in figure 3. The findings reveal that dengue cases were more prominent in urban areas of the district during the last decade. The percentage of cases reported from

the urban areas ranged from 62% to 98% highlighting the predominance of the disease in urban localities of the district. The highest predominance (98%) of urban incidence of dengue in the district was observed in the year 2011.



**Figure 3. Distribution (%) of dengue cases based on locality in Seremban**

**Distribution of Dengue Cases According to Age:**

Table 3 depicts the distribution of dengue infections according to age of the reported cases in Seremban between 2003-2011. It can be seen that the children (0-14 years) contributed 15% (1,759 cases) of total reported cases in the district during the last decade. The analysis shows that the adult (15-44 years) had the highest portion

(64%) of dengue incidence in the district. However, the middle-age group (45-59 years) constituted 16% of total reported dengue cases in the district. On the other hand, the proportion of dengue infections among older people (60 years and above) was significantly low (5% of total reported cases).

**Table 3: Distribution of dengue cases based on age in Seremban**

Year	Age Group								Total
	0-14 years		15-44 years		45-59 years		60 & above		
	Dengue cases	(%)	Dengue cases	(%)	Dengue cases	(%)	Dengue cases	(%)	
2003	390	20%	1,280	64%	243	12%	77	4%	1,990
2004	283	18%	1,025	65%	206	13%	67	4%	1,581
2005	215	15%	852	62%	245	18%	66	5%	1,378
2006	175	14%	754	63%	229	19%	52	4%	1,210
2007	169	13%	846	67%	201	15%	64	5%	1,280
2008	173	12%	877	63%	260	19%	91	6%	1,401
2009	114	11%	685	65%	184	17%	71	7%	1,054
2010	165	11%	984	66%	269	18%	81	5%	1,499
2011	75	14%	384	69%	71	13%	23	4%	553
Grand Total	1,759	15%	7,687	64%	1,908	16%	592	5%	11,946

## Conclusion

The present study investigates the trends of dengue incidence and socio-demographic distribution of the disease in Seremban, Malaysia between 2003 and 2011. The study found that among the three major ethnic groups in the district, the Malays were the most commonly affected, followed by Chinese and Indians. While dengue affects all age group, incidence rate of dengue was highest in the young adult and the adult group (15-44 years), followed by the middle-age group (45-59 years). It was also found that dengue cases were more prominent in urban areas of the district during the last decade (on average, 79% per year). It highlights the fact that dengue is still an urban public health problem in Seremban. The findings of this study provide critical data and information on the trends of dengue incidence and socio-demographic characteristics of the reported dengue cases which might assist the public health authorities to achieve dengue mortality and morbidity reduction goals in the district. The public health authorities in the district should enhance integrated surveillance activities in this regard.

**Conflicts of Interest:** The authors declare that there is no conflict of interest among them.

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**Ethical Clearance:** The study was approved by the Medical Research Ethics Committee (MREC), Ministry of Health, Malaysia (MREC Code No. NMRR-11-730-9099).

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# The Contribution of Learned Helplessness to the Results of Some Evaluation Tests for the Athletes of the Talent Care Centers

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## Abstract

The study aimed to identify the level of the learning Helplessness and the numerical values of the results of some evaluation tests for football talent care centers players, and to identify the extent to which the learning deficit contributed to the results of some of their evaluation tests. Talent care centers at the Ministry of Youth and Sports and the Amo Baba School for the season (2018-2019), aged (15-17) years, numbering (84) players were randomly selected by (45.405%) of their community. Evaluating tests from the two centers, and conducting the study over (9) consecutive weeks, for the period from Friday, 11/1/2019, until Friday, 8/3/2019, Scale data and evaluation tests were then collected for each gifted player from the sample application and processed quantitative data using SPSS (V25). The researchers concluded that football talent players do not have a high level of learning disability, and that the level of gifted players Convergent in each of the four assessment tests (transitional speed, eye-to-man compatibility, scoring from stability to divided goal, accuracy of scoring towards the goal), and correlates, contributes and influences the learning deficit of all four assessment tests (transition speed, Compatibility between the eye and the man, scoring stability towards the goal divided, the accuracy of the scoring towards the target), it is possible to predict the tests evaluation of the four (transition speed, compatibility between the eye and the man, scoring stability towards the goal divided, the accuracy of scoring towards the target) in terms of the learner deficit.

**Keywords:** *Evaluation Tests, Care Centers, Transition speed.*

## Introduction

**The research problem and its importance:** The National Football Talent Care Center aims to develop the talents abilities to prepare a strong base of players to provide the elite of them to the various Premier League clubs and the national team to enhance their leadership in the local and international competitions. Performing tests by the players of these centers at different levels requires physical and psychological preparation, their environment in these centers is characterized by multiple attitudes or many duties lies on the talented player and exaggeration with him to complete the best and when he fails to increase the state of attribution to the conditions that earns learned helplessness.

Cemaicilar & Others mentioned that “according to the original model of the learned helplessness theory of

Seligman and Miller, Learner helplessness appear when the individual have an the inability to control experiences firstly, and learns that the experience results impede the control, then generalize this belief to new situations that generation many of difficulties. In the initial research on the learning helplessness of the human showed that he learns to avoid loud voice, and avoid the tasks of solving various problems, and intelligence tests, the learned helplessness model used to give meaning of a variety of adaptive failing behaviors as disorder (motivation, cognitive, emotional, behavioral)<sup>[13]</sup>.

The formation of groups of these talented people and their atlantesand their different social environments pushes them to some self-proof behaviors among themselves, which is clear in the bullying of each other, and that the bullying behavior acquired by the talent

person for many reasons leads to some practices that harm his peers psychologically and physically during their presence in the center. This can also be reflected on the groups leadership, which calls to caring of these phenomena in terms of their contribution and their impact on the results of evaluation tests approved by the trainer periodically, it cannot be ignored the importance of psychological phenomena when conducting the evaluation tests, especially their application is an ongoing process, one of the most important principles that avoid random trainers and improvisation when judging the planning of their training in the center, as the evaluation process which based on measurement, and it is a complementary process through the researchers' repeated visits to the National Center for football talent care players is one of the leading projects in the Iraqi Ministry of Youth and Sports, notice that the effects of the surrounding environment of this group of talented people show many psychological phenomena that need to be described accusation and objectively to address or develop the solutions to them, including the learning helplessness, which is characterized by most players as a preliminary observation by the researcher which came after deliberation with their coaches without measuring of this phenomenon which are caused by several reasons, including exaggerating with the tasks and duties that may lead them to sense of weakness in the ability to implement some or fail to complete and which may affect the results of evaluation tests, Learned Helplessness is defined as a "motivation problem" because a person may fail in one or more tasks in the past, which may result a belief that he is unable to do anything to improve his performance in these tasks. This feel may accompany it at all stages of his life stages if not treated properly, and will generation a sense of weakness in his ability to control his environment, which will impedes his learning in other situations of his life, and therefore this misconception about self it leads to the conviction that no matter how he tries to change the failures situations he faced in previous stages, he will not succeed because he is unable to make any improvement and change, and that these erroneous cognitive accumulations which created by the individual about himself will lead to the formation of a cognitive emotional state, termed as an learned helplessness case<sup>[1]</sup>. In order to adapt the learned state as well as indifference of the duties, and the researcher review to some of the specialized studies in different fields, and

concerned with their study noted the need first to develop instruments measuring psychometric and codified take into account their specificity of direct measurement which derives data from this same sample, Which is one of the determinants of preparation or construction is that it must be appropriate to their perceptions and the extent of their response to its paragraphs, and is characterized by easy application and correction, to support the observation of this problem academically and then addressed by the adoption of scientific method later, so the study aims to:

1. Identify the level of the players of talent care of football centers with the learned helplessness.
2. Identify the numerical values of the results of some evaluation tests for the players of talent care of football centers.
3. To identify the extent of the contribution of the learned helplessness results of some evaluation tests for the players talent care football centers.

### **Research Methodology**

The researchers adopted the correlation research method from the descriptive method, which is defined as

"The kinds of researches that can detect whether there is a relationship between two or more variables, and then know the strength and direction of this relationship."<sup>[12]</sup>

**The Research population and its sample:** The boundaries of the research population are represented by talented football players in the talent care centers at the Ministry of Youth and Sports and Amo Baba School for the season (2018-2019), with ages (15-17) years, of (185) players, the researcher review their study and being the problem population of the study themselves, and they achieve their purposes in sequential methodological steps, the sample selected by random method of (84) players representing (45.405%) of the research population. The procedures concerned its players to applying the two measurements for the purposes of standardization and evaluation tests.

Measurement tools and procedures: - The researchers adopted the measure of learned helplessness, which was based on (Ali Hamad Samir 2019)<sup>[2]</sup> on (91) members of the same research population as shown in Table (1):

**Table (1) shows the details of the structure of the learned helplessness measurement**

Fields	Paragraphs number	Alternatives of answer paragraphs	correction Key	Total Degree Limits	Hypothetical mean
Payer deficit	8			24-8	16
Cognitive deficits	8			24-8	16
Emotional deficit	8			24-8	16
Behavioral deficit	6			18-6	12
Failure to control failure	7			21-7	14
Total measure	37			111-37	74

In addition, four tests were identified by the specialists, which are among the accredited trainers in talent care centers, which were as follows:

Transitional speed test (running for a distance of (20 m) and measuring time in seconds):<sup>[1]</sup>

Leg and eye compatibility test (jump on the numbered eight circles and measure time in seconds):<sup>[2]</sup>

Test the accuracy of scoring towards the goal of running mode (calculated the scores of each ball of the six balls of (24) degrees).<sup>[3]</sup>

Test the accuracy of scoring towards the goal of the stability (the scores of each of the five balls is calculated from (25) degrees).<sup>[4]</sup>

The researchers adapt the main survey by applying it on identified application sample in this study of (84)

talented players in the talent care centers in the Ministry of Youth and Sports and Amo Baba School Center, where the researchers applied the measurement before conducting the evaluation tests for each laboratory (5) Players per day for each of Friday and Saturday, i.e. (10) players per week according to the conditions and instructions these evaluations tests were applied to them taking into account the comfort between test and another that need to completely rest to restore energy sources, as the survey of individuals in this sample continued on the measurement or else Four evaluations tests of (9) consecutive weeksthe period from Friday 11/1/2019 to Friday 8/3/2019, with the assistance of the assistant team, the data of measurement and evaluation tests were collected for each talented player of the sample of the application and talented players in preparation of statistical treatment to achieve the objectives of the study, and processing Quantitative data processing by using Social Statistical Portfolio System SPSS (V25).

### Results and Discussion

**Table (2) shows the statistical parameters of the learned helplessness measurement compared with the hypothesis mean of the measurement**

Measurement Name	Paragraphs number	measurement total score	Hypothetical mean	Arithmetic mean	Mediator	Standard deviation	Torsion coefficient	T Calculated	Degree (Sig)
Learned helplessness	37	111	74	58.5	56.5	12.131	0.351	11.783	0.000

**Table (3) shows descriptive statistical features of the evaluation tests results**

Evaluation tests	Measurement unit	Arithmetic mean	Mediator	standard deviation	Torsion coefficient
Transitional speed	Second	3.753	3.75	3.093	0.23
Compatibility between the eye and leg	Second	4.107	4.1	0.054	0.433
Scoring from steadiness towards the divided goal	Degree	4.107	13	2.222	1.322



**Table (4) Simple correlation coefficient, linear regression.**

Measurement	Evaluation tests	Simple correlation coefficient (R)	Multiple regression coefficient 2 (R) (The determination coefficient)	Contribution ratio	Standard error of estimate
	Transitional speed	0.928	0.861	0.859	0.035
Learned helplessness	Compatibility between the eye and leg	0.883	0.779	0.777	0.025
Learned helplessness	Scoring from steadiness towards the divided goal	0.627	0.393	0.386	1.742

**Table (5) (F) test of the linear regression model of the results of the learned helplessness measurement of some evaluation tests results**

Variables	Beta P	Standard error	Calculated (t)value	(Sig) degree	Moral
Fixed limit	4.166	0.019	222.282	0.000	Moral
Learned helplessness	-0.007	0.000	22.519	0.000	Moral
Fixed limit	3.879	0.014	283.618	0.000	Moral
Learned helplessness	0.004	0.000	17.017	0.000	Moral
Fixed limit	20.755	0.94	22.083	0.000	Moral
Learned helplessness	-0.115	0.016	7.287	0.000	Moral
Fixed limit	28.43	0.76	37.384	0.000	Moral
Learned helplessness	-0.183	0.013	14.356	0.000	Moral

\* Significance Level (0.05) n = 84 (F value) function if the value of the degree (Sig) ≤ (0.05)

Table (6) shows the estimates values of the fixed limit and inclination (impact) of the results of the measure of the learned helplessness of some evaluation tests results and their standard errors and the significance level of real and moral.

Significance level (0.05) n = 84 significant value (t) if the degree (Sig) ≤ (0.05)

Prediction of the transition speed test in terms of the learned helplessness = slope constant + ((slope (impact) × x)) = 4.166 + (-0.007x58.4)

Prediction of eye-to-man compatibility test in terms of learner deficit = slope constant + ((slope (effect) × x)) = 3.879 + (0.004 × 58.4)

Prediction of scoring test from stability to divided goal in terms of learner deficit = slope constant + ((slope (effect) × x)) = 20.755 + (-0.115x58.4)

Prediction of target scoring accuracy test in terms of learner deficit = slope constant + ((slope (effect) × x)) = 28.43 + (-0.183 × 58.4)

The results of the simple correlation coefficient, linear regression, contribution ratio and the standard

error for estimating the learned helplessness measure results of some evaluation tests results show that the learned helplessness, despite its low level, but it is a factor link with different contribution ratio with the results of all the four evaluation tests, as shown by the effect in that correlation, whenever higher the disability level of the talented players, the scores lowed to the two skill tests and the higher the time of the physical and motor tests, which depend on the less time, the better level of talented football player. This requires that the training staff to reduce of this phenomenon to assess their players according to their abilities when they are in a normal psychological state together, because the training burdens push them to increase the boredom and routine factor of repeated failures or improper handling in reprimand and face them to the failure positions with peers in some situations force them to attribute the failure to complete duties to external sources. This result is not limited on the correlation significance or predictability to the extent that the aggravation of this phenomenon may lead to the loss of efforts in the training process, which is judged by periodic tests, and if the tests are inaccurate in their results, it will cause a lot of confusion in the judgment at the level of talented players. This requires the need to adopt psychometric measurement before the application

of assessment tests to detect phenomena that harm the players results, including the learned helplessness which showed the study results that it is possible to infer the talented player level in each through the contribution of the learned helplessness and what it negatively effects on these evaluation tests results.

Adnan Yusuf mentioned that the individual's ability to interact is usually influenced of physical factors such as location and Stress stimuli in the natural environment, such as noise and pollution, while the degree of this effect depends on the social affiliations variation and the awareness degree of the reflect from this behavior and on how the individual perception himself as well as the adopted attribution method to resorting attribute his failure in the results of internal reasons of self-origin or attributed to external reasons of an environment beyond the scope of control.<sup>[1]</sup>

Mahmoud AL Said refer to "Some individuals who have been had shocking exceptional circumstances have been negatively which have a role in the learned helplessness, when forced to change their living way, They lived a life filled with helplessness feelings, frustration, anger and boredom, and their sense of helplessness and their belief that they followed the state of helplessness experienced to the individual from internal and external sources."<sup>[2]</sup>

Reham Al-Smadi refer to that "positive emotions and thoughts perform a therapeutic preventive function, to reduce the stressful situations effects, providing the extension services for abused children is a helpful factor in providing them with the skills necessary to deal with the situations they face in their lives, such as social skills and problem-solving skills, autonomy and sense of purpose, which help them in psychosocial adaptation."<sup>[3]</sup>

Dickhauser & Reinhard argues, "Learned helplessness is one of the most influential effects on frustrating motivation."<sup>[4]</sup>

#### **Abstracts and Applications:**

Football Players of talent care centers do not have a high level of learned helplessness.

The levels of talented players are similar in each of the four assessment tests (transition speed, compatibility between the eye and leg, scoring from stability to the goal divided, accuracy of scoring to the goal).

The learned helplessness is associated with,

contributes and influences all four assessment tests (transitional speed, compatibility between the eye and leg, scoring from stability to divided goal, scoring accuracy to the goal).

It is possible to predict the four assessment tests (transitional speed, compatibility between the eye and leg, scoring from stability to divided goal, scoring accuracy towards the goal) in terms of the learned helplessness.

It is necessary to pay attention the Ministry of Youth and Sports with the specialist necessity or psychological counselor in Talent care centers of football.

It is necessary to pay attention to similar studies dealing with the players of the talent care centers of sports in other games and events.

**Source of Funding:** Self

**Ethical Clearance:** Not required

**Conflict of Interest:** None

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# Peer Support Education Reducing Pain Perception and Improving Blood Glucose Control of Diabetes Mellitus

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## Abstract

**Background:** Diabetes mellitus (DM) is a chronic disease that requires long-term or lifelong care of DM patients. DM disease management in the Perkeni consensus (2013) is education, nutrition therapy, physical exercise, and pharmacological therapy.

**Material and Method:** This research uses Quasi-Experimental Design with Non-Random Pretest-Posttest Design. The purpose of this study was to analyze changes in disease perception and blood glucose control in patients with type 2 diabetes mellitus after being given peer support education. This research method is an experimental research with Quasi - Experimental Pretest-Posttest Design. The sample consisted of 60 respondents. Sampling is done by purposive sampling.

**Result:** Our study showed the average age of respondents was 56.44 years, most women, basic education, received OHO therapy, with an average length of illness was 8.93 years and suffered from complications of heart disease and neuropathy, before being given peer support education, control blood glucose: the average fasting blood glucose is 152.81 mg/dl, an average weight of 59.97 kg, an average blood pressure of 158.56/84.25 mmHg and an average pain perception of 69.75. After peer support education, blood glucose control: mean fasting blood glucose is 137.75 mg/dl, average weight 59.56 kg, average blood pressure 147.19/76.25 mmHg and average pain perception in the treatment group increased the average perception to 64.44.

**Conclusions:** Further analysis showed that peer support education was 0.001 in reducing pain perception. This study concludes that peer education support is effective in reducing pain perception and improving blood glucose control. The recommendation of this research is to do more respondents and more time.

**Keywords:** *Peer Support Education, the pain perception, blood glucose control.*

## Introduction

Diabetes mellitus (DM) is a metabolic disease in which the body's ability to use it, fat and protein are disrupted, related to insulin or insulin resistance <sup>1</sup>. DM is a chronic disease characterized by a lack of insulin or a decrease in the body's ability to use insulin. There are various types of DM, namely: type 1 DM, which arises due to damage to pancreatic beta cells that have not been recognized or due to auto immune processes, type-2 DM caused by cell resistance to insulin which causes beta cell damage, DM in pregnancy) and DM other types <sup>2</sup>. Type 2 DM is the largest group of all types of DM that

reaches 95% of total DM cases <sup>3</sup>. The results of the 2013 RISKESDAS also showed East Java following the order of East Kalimantan for the prevalence of diabetes. The results of a preliminary study in one of Malang district hospitals in 2014, the average visit of DM patients was 452 patients. Based on these data, the prevalence of diabetes is very high.

From this background, the authors were interested in examining the influence of peer support education on the pain perception and blood glucose control in patients with diabetes mellitus in Hospital.

### Material and Method

The sample of this study was 60 people and was taken by purposive sampling. The respondent inclusion criteria were: (1) Stable condition, not experiencing acute hyperglycemia. (2) Willing to be a research respondent.

The variable in this study was the peer support education independent variable and the dependent variable was the pain perception and blood glucose control. Measurement of pain perceptions used a questionnaire by DM Pain Perception consisted of 25 questions measured by a Likert scale. Blood glucose control is measured through: fasting blood glucose, blood pressure and weight.

Analysis of this research data was to identify differences in blood glucose control before and after peer group education conducted t-test 2 paired samples and to identify differences in perceptions before and after peer group education performed Wilcoxon Signed Rank Test.

### Result

**Table 1. Distribution of Respondents by Age, duration of illness and blood glucose in Hospital in November 2015**

Variable	Mean	SD	Min-Maks	95% CI
Age	56.44	11.105	30 - 70	50.52–62.36
Duration of illness	8.93	6.4	0.5 - 20	5.53–12.35

The average age of DM patients was 56.44 years (95% CI: 50.52 - 62.36), with standard deviation 11.105. The youngest age of the respondents was 30 years and the oldest was 70 years. The results of the analysis showed that the average duration of illness of patients with DM was 8.93 years (95% CI: 5.53 - 12.35), with a standard deviation 6.4. The respondents had the fastest DM 5 years and the longest 20 years.

**Table 2. Distribution of Respondents by Gender, Education, Therapy, Other Suffered Diseases at Hospital in November 2015**

Variable	Amount	Percentage (%)
<b>Gender:</b>		
- Female	43	71
- Male	17	29
<b>Education:</b>		
- Not Graduating from Elementary School	13	22
- Graduated from Elementary School	25	42
- Junior High School	14	23
- Senior High School	3	5
- University/College	5	8
<b>Therapy:</b>		
- Oral Pill/DM Drugs	39	65
- Insulin	21	35
<b>Other suffered illness:</b>		
- None	11	18
- Retinopathy	21	35
- Neuropathy	19	32
- Heart Disease	9	15

Distribution of respondents by their gender showed that most of them were female, they were 43 people (81%). Distribution of respondents based on education level showed that elementary and junior high school education was almost the same, namely 13 people (31%) for those with elementary education and 14 people (25%) for those with junior high school education. The

distribution of respondents based on the obtained therapy showed that most of them received oral DM/pill therapy which was 39 people (65%). While the distribution of respondents based on other suffered diseases showed that respondents who experienced neuropathy and heart disease were the same, namely 19 people (44%).

**Table 3. Changes in blood glucose control before and after Peer Support Education was given in Hospital in November 2015**

Variable		Average	SD	SE	p-value
Fasting blood glucose	Before	152.81	31.94	7.98	0.006
	After	137.75	26.64	6.66	
Systolic Blood Pressure	Before	158.56	24.69	6.17	0.000
	After	147.19	28.00	7.00	
Diastolic Blood Pressure	Before	86.25	11.69	2.92	0.002
	After	76.25	13.48	3.37	
Weight	Before	59.97	11.46	2.86	0.005
	After	59.56	11.62	2.90	

\* Meaning at  $\alpha < 0.05$

Based on table 3, the statistical test results obtained a value of 0.006, it could be concluded that there were significant differences in fasting blood glucose before and after Peer Support Education. The statistical test results obtained a value of 0.000, it could be concluded that there were significant differences in systolic blood pressure before and after Peer Support Education, the

statistical test results obtained a value of 0.002 so it could be concluded that there were significant differences in diastolic blood pressure before and after Peer Support Education and the statistical test results obtained a value of 0.005, it could be concluded that there were significant differences in body weight before and after Peer Support Education.

**Table 4. Changes in pain perceptions before and after Peer Support Education was given in Hospital in November 2015**

Variable		Average	SD	p-value
Pain Perception	Before	69.75	7.11	0.001
	After	64.44	6.47	

\* Meaning at  $\alpha < 0.05$

The average pain perception in measurements before Peer Support Education was 69.75 with standard deviation 7.11. The measurement after Peer Support Education was 64.44 with standard deviation 6.47. The results of statistical tests obtained a value of 0.001, it could be concluded that there were significant differences in the pain perception before and after Peer Support Education.

### Discussion

**Changes in pain perception before and after peer support education:** In this study the perception of pain before Peer Support Education was carried out an average of 69.75. Pain perception is important for knowing one's perception of the disease and the meaning

of the disease in life<sup>4</sup>. According to Coelho, Amorim, & Prata the results of measuring quality of life are evaluations of experience of illness<sup>5</sup>. Pain experiences include perceptions of pain regarding symptoms that are felt, experience cannot perform normal bodily functions and attempts to deal with and control disease<sup>6</sup>.

In this study the results of the analysis showed that there were significant differences in the decrease in pain perception after respondents were given peer support education. with  $p = 0.001$  ( $p$  value  $< 0.05$ ). This shows that peer support education is an effective technique in reducing the perception of DM patients. Pain perception is important for knowing one's perception of the disease and the meaning of the disease in life<sup>7</sup>.

In this study respondents as someone who interacted with other individuals in the group during the peer support education process.

**Changes in blood glucose control before and after peer support education:** The results showed that the results of fasting blood glucose before peer support education carried out an average of 152.81 mg/dl with a range between 110 mg/dl to 240 mg/dl. While blood glucose after peer support education was carried out an average of 137.75 mg/dl with a range between 100 mg/dl to 210 mg/dl. Judging from the average blood glucose of respondents before and after peer support education showed a decline<sup>8</sup>. Similarly, the range of blood glucose levels after peer support education was carried out. The high level of blood glucose in a long time will cause some complicating diseases until complications occur<sup>9</sup>. The appearance of complications and complications in patients with DM can cause physical or psychological discomfort.

**Changes in perception of pain before and after peer support education:** In this study the results of the analysis showed that there were significant differences in the decrease in perception of pain after respondents were given peer support education, with  $p = 0.001$  ( $p$  value  $< 0.05$ ). This shows that peer support education is an effective technique in reducing the perception of DM patients. Pain perception is important for knowing one's perception of the disease and the meaning of the disease in life<sup>10</sup>. Pain experiences include pain perceptions regarding symptoms that are felt, experience cannot perform normal bodily functions and attempts to deal with and control disease. Significant results on changes in perceptions of pain after being given peer support education because during the education process there was a strong sharing of experiences between respondents to manage their illness. In accordance with the results of research by Heisler which states peer support can reduce health behavior problems<sup>11</sup>. Health behavior in DM patients is that patients can accept changes that occur after suffering from DM or adapt positively. Roy's adaptation model consists of 4 important aspects, including: person, Environment, Health, and Nursing<sup>1</sup>.

In this study, respondents as someone interacts with other individuals in the group during the peer support education process. The commencement of interaction between individuals in the group increases enthusiasm for always joint discussions regarding the management of the disease<sup>12</sup>. So that there were seen some respondents

who at first seemed more silent, at the meeting and both began to dare to express questions and express opinions<sup>13</sup>. With the existence of positive experiences from other respondents it will make respondents who feel it as a problem motivated that he is not alone and he can overcome the problems experienced because of his illness with the help of friends in the group<sup>14</sup>.

When a DM sufferer is confused, irritability and even depression, according to Roy & Andrew in his theory can arise because of the stimulus both inside and outside<sup>15</sup>. There were several respondents who said they were offended because their wives and children were prohibited from eating. One of them is number 13, but after the respondent told me during the discussion the respondent number 15 said that he felt happy to be reminded and that the family supported it with his wife preparing special food for her husband, the same type of food as other family members<sup>16</sup>. At the third meeting showed a decrease in the perception of pain in respondent number 13. The presence of external stimulus, peer support made changes in perceptions of pain that would bring behavior changes in the management of the disease by showing a positive response to adversity<sup>17</sup>.

## Conclusions

The average perception of pain before peer support education was 69.75. The average perception of pain after peer support education was 64.44. There were significant differences with  $p$  value = 0.001. There were significant differences in changes of blood glucose control before and after peer support education: fasting blood glucose with  $p$  value = 0.028, systolic blood pressure with  $p$  value = 0.000, diastolic blood pressure with  $p$  value = 0.001 and body weight with  $p$  value = 0.005.

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**Ethical Clearance:** Not required

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# Sexist Language: Gender-Linked Expressions in Official Communications in the Academic Workplace

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## Abstract

This study investigated the occurrence of sexism in official communications in the academic workplace. Specifically, it attempted to determine whether or not words or expressions considered as gender-biased were used in memorandums written by officials of the respondent university and to identify in which examples of English usage classified as sexist do they belong. The study revealed that the most frequently used sexist words are the gender-linked masculine terms *freshmen* (used to refer to all first year students that include female students) and *chairman* (used to address even females serving as heads of departments). The examples of English usage considered as sexist which were found in the memorandums are as follows: using masculine nouns as generic, the non-parallel treatment of men and women, male being habitually placed before female, and gender-linked titles and work positions.

**Keywords:** *sexist language, academic discourse, gender-inclusive language.*

## Introduction

Communicative competence, a linguistic term coined by Dell Hymes, can be considered as an articulation of what it takes to communicate successfully. It describes the essential components of effective communication. These are the competences into which communicative competence itself is subdivided, namely linguistic, strategic, discourse, and socio-linguistic.

Of the aforementioned competences, the ones where much of the emphasis was placed on are linguistic, strategic, and discourse. Socio-linguistic competence is often disregarded. When people have ideas to express, they are often too concerned about what words to use,

how to put those words together, and what strategies to apply to deliver their message effectively. They tend to neglect one essential component of the communication process – the receiver of that message.

Socio-linguistic competence refers to the ability to use the language appropriate to the current social contexts<sup>[1]</sup>. It has been an integral part of communicative competence in that it includes learning pragmatic and sociolinguistic knowledge about how to appropriately use the language linguistically and socially<sup>[2]</sup>. It is taking into consideration the personal and cultural background of the participants in the communication process. While the linguistic, strategic, and discourse competences allow people to communicate correctly, the socio-linguistic competence makes them communicate appropriately. Sometimes, breakdowns in communication happen not for lack of clarity of the message but by what could be perceived as impropriety in the language used by the transmitter of the message.

Socio-linguistic competence enables a person to refrain from using language in any way that may be perceived as discriminatory.

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Discriminatory language includes any comments that indicate bias against other people based on factors such as race, gender, marital status, age, national origin or disability<sup>[3]</sup>.

Sexist language is a form of discriminatory language, a gender-linked language that carelessly excludes female gender and presumes that male gender is the standard or the norm. It also contains words and expressions that unfairly label women on the grounds of their gender alone. There are 3 forms of sexism – blatant sexism, covert sexism and subtle sexism. Sexist language is considered an example of subtle sexism.

Notwithstanding the steady growth of feminism and awareness on human rights, sexism continues to flourish in places where men and women coexist. There are volumes of literature and studies describing how women have become victims of both conscious and unconscious sexism. Even in language, women, regardless of their actual power or social status, are seemingly treated as subordinates to men. This unequal treatment of women in language are evident in the following examples of English usage that can be considered sexist: use of masculine nouns (e.g., *man*, *mankind*) and pronouns (e.g., *he*, *himself*) as generics; non-parallel treatment of men and women (e.g., *Mrs.* indicating a woman's marital status but *Mr.* does not); habitually putting males before females in word pairs (e.g., *husband and wife*, *he or she*); gender-linked titles and positions (e.g., *chairman*, *ombudsman*); *gender markers* (e.g., *female professor*, *lady dentist*); feminine nouns with attached suffixes (e.g., *authoress*, *comedienne*); gender-based labels (e.g., *sharp-tongued*, *gossipy*); and semantically positive male-gendered forms and their negative female-counterparts (e.g., *governor-governess*; *wizard-witch*).

In social institutions and organizations where men and women intermingle, sexist attitudes persist. Women continue to struggle for gender parity. This struggle is at its strongest in the workplace – both in the corporate world and in the academia.

In the workplace gender stereotypes are alive, well, and busy producing gender discrimination<sup>[4]</sup>. The existence of multiple forms of gender inequalities in the workplace make it sometimes an inhospitable place for women<sup>[5]</sup>.

It may not be surprising to hear women in the corporate world struggle for recognition and equal opportunities to get better salaries and occupy higher

positions. But this happening in the academic workplace is a different story. Feminism and human rights are taught in universities and as such gender discrimination are presumed less likely to occur in those institutions. It is in the light of this assumption that this study was conceived. This study was conducted to investigate the occurrence of sexism in the academic workplace.

Language is considered as one of the most powerful means which sexism and gender discrimination are perpetuated and reproduced<sup>[6]</sup>. Thus, it was through the use of language that occurrence of sexism in the respondent university was investigated. Specifically, the study attempted to determine whether or not gender-biased words or expressions were used in official memorandums written by university officials and to identify in which of the above-named examples of English usage classified as sexist do they belong.

## Materials and Method

To determine whether or not sexist language were used in formal communications in the respondent university, 14 memorandums were analyzed. 10 of the said memorandums were written by male and 4 by female officials belonging to the administrative and management councils of the respondent university.

Each memorandum was carefully read and examined. Examples of gender-biased words or expressions used in the memorandums were identified and then evaluated against examples of English usage that are considered sexist.

The occurrence of each gender-biased words or expression in the memorandums was counted manually for frequency. Each of the examples of sexist language found was contextually analyzed to correctly identify in which examples of English usage classified as sexist do they belong. The exact places where the said words and expressions appeared in the memorandums were shown in the tables where they are presented for analysis.

## Results and Discussion

The 14 memorandums analyzed for this study were written by members of the administrative and management councils of the respondent university, 10 of the said writers were males and 4 females.

The disparity in the number of male members and that of their female counterparts in the administrative and management councils represent another gender-

related problem – unequal opportunities to occupy higher positions in the academe. There are multiple studies [7, 8] that specifically focused on what factors prevent women leaders from occupying higher academic and senior management positions in the academic workplace.

Table 1 reveals that out of the 10 memorandums written by male members of the councils, 7 contain varieties of sexist language. None of the memorandums written by their female counterparts contain sexist language.

**Table 1. Frequency of Sexist Language Occurrence Found in the Memorandums in Terms of Gender**

Gender	Gender-biased Terms
Female	0
Male	9

The male writers in the respondent universities are seemingly oblivious with their use of sexist language. Conversely, the absence of words that discriminate their male counterparts in the memorandums written by female writers indicates their sensitivity towards the use of gender-inclusive language.

What is difficult to determine is whether or not the male writers used sexist language on purpose or the words they used are the ones they just got accustomed to using. One semantic rule which we can see in operation in the English language is that of the male-as-norm [9]. The male officials may have used the words considered as sexist not because they intend to devalue their female counterparts but because their language training created in them the tendency to always use the masculine form by default.

**Table 2. Masculine Generic Used in the Memorandums**

Gender-biased Terms	Memorandums Where They Are Used
For the incoming college <b>freshmen</b> , the report is to be submitted on...	Memorandum No. 93, s.2017 Date: December 19, 2017
..... accounting of students with priorities given to the seniors down to <b>freshmen</b> to expedite application for graduation...	Memorandum No. 6, s.2013 Date: July 11, 2013
Listed below are the schedules of interview for incoming <b>freshmen</b> students...	Memorandum No. 5 s.2015 Date: March 10, 2015

Presented in Table 2 is the masculine generic used by the male writers in the memorandums they wrote.

The word with sexist connotations that was used in 3 memorandums is *freshmen*. In each of the said memorandums the word *freshmen* appeared once. The word is a generic masculine term used to refer to students of mixed genders.

The male writers may claim that discriminating their female counterparts was furthest from their minds when they used generic masculine nouns in the memorandums they wrote. But Moulton [10] argued that regardless of the author’s intention the generic *man* is not interpreted

neutrally. There are studies [11,12] that concluded that when the word *man* is used generically, people tend to think male, and tend not to think female.

The generic *he* has the tendency to evoke images of males relative to *he/she* and the plural *they*. Gastil [13] investigated the aforementioned phenomenon. The results have provided strong support for the hypothesis that the generic *he* evokes a disproportionate number of males images. In addition, it was revealed that while the plural *they* functions as a generic pronoun for both males and females, males may comprehend *he/she* in a manner similar to *he*.

**Table 3. Non-parallel Treatment of Men and Women**

Gender-biased Terms	Memorandum/s Where They Are Used
To: Mr. Florentino G. Pineda, Dept. Chair-MCPAD <b>Mrs.</b> Crisanta T. De Leon Department Chair, ELD <b>Gng.</b> Josephine C. Arceta Puno, DWF	Memorandum No. 33 s.2014 Date: Dec. 4, 2014

\* Gng. is the equivalent of Mrs. in the Filipino language

Table 3 shows that in one of the memorandums written by a male writer the female recipients of the written communication were addressed as *Mrs.* and its equivalent in the Filipino language – *Gng.*

The use of the courtesy titles *Mr.* before the full name or surname of a male and *Mrs.* for female is an example of the non-parallel treatment of men and women. It is considered gender-biased for using *Mr.* would indicate only the gender of the person being addressed while *Mrs.* indicates both gender and marital status.

The naming practices for women and men are often asymmetrical which create the impression that women merit less respect or less serious consideration than men do [14].

Gender inclusiveness would require that women be addressed with the specific professional titles they possess, (E.g., *Prof., Dr., Arch., Engr.*). In addition, women should also be asked in which way they prefer to be addressed – *Miss, Mrs.* or *Ms.* If a woman’s marital status or preference is unknown, *Ms.* should be used.

To maintain the gender inclusiveness of correspondence, in case the reader’s gender is unknown, the use of a non-sexist salutation like *Dear Professor, Dear Policyholder,* and the like, is strongly recommended.

**Table 4. Forms That Habitually Place Male Before Female**

Gender-biased Terms	Memorandum/s Where They Are Used
... to discuss the results of <b>his/her</b> evaluation and the comments made by the students. This is a way of assisting the faculty to assert <b>himself/herself</b> to achieve a better performance.	Memorandum No. 94 s.2017 Date: Dec. 19, 2017

Table 4 reveals that in one of the memorandums the form *his/her* was used twice for non-gendered antecedents. The writer may have thought that it is one way of avoiding the usage of the default masculine form.. But even the form *his/her* is considered a gender-biased expression. Habitually putting male (*he/his/himself*) before female (*she/her/herself*) is an example of English usage considered as sexist.

The lack of *epicene* (gender-neutral) equivalent of *he* and *she* is single biggest problem of the English language. The prescribed alternative to clumsy constructions like *he or she* or *his/her* is *their*. [15].

Berry[16] argues that all that is needed are four letters– *THEY* – to take a stand against the prejudice embedded in the English language. The usage of the singular *they* has now become acceptable.

**Table 5. Gender-linked Titles and Work Positions**

Gender-biased Terms	Memorandum/s Where They Are Used
Dr. Alodia Zapata BTTE <b>Chairman</b> Mr. Rafael Dayao BEED Chairman	Memorandum No. 38 s.2014 Date: October 31, 2014
Estrella Fajardo <b>Chairman</b> , Department of English Francelaida F. Baluyot Puno, Departamento ng Araling Pilipino	Memorandum No. 09 s. 2017 Date: October 09, 2017

As shown in Table 5, two female department heads in the respondent university are addressed as *chairman* in two separate memorandums. Whether the writers of those separate memorandums used *chairman*

deliberately or it was an honest mistake is difficult to determine. But the said word is the most ubiquitous among job titles in universities. It is the most talked gender-biased expressions when it comes to academic

positions in universities. The following alternative forms are available – *chair* and *chairperson*.

Bovin [17] found out that there has been an increase of the gender-neutral forms since their introduction to English, and that they are primarily used when there is no explicit gender-referencing. Several of the previously gender-biased titles (that often end with *-man*) were said to have been supplemented by new, gender-neutral titles.

But notwithstanding the availability of the gender-neutral forms, the usage of gender-biased titles continue, most especially in the academe.

**Table 6. The Gender-biased expressions used in the Memorandums**

Gender-biased Expressions	Number of Occurrence
Freshmen	3
Chairman	2
Mrs./Gng	2
His/Her	1
Himself/Herself	1

Table 6 summarizes the gender-biased words and expressions used in official communications in the respondent university. A total of 5 namely *freshmen*, *chairman*, *Mrs.*, *his/her*, and *himself/herself* were found in 7 out of the 14 memorandums analyzed in this study.

The gender-linked terms *freshmen* and *chairman* appeared three times each and the title *Mrs./Gng*. 2 times. Each of the forms *his/her* and *himself/herself* was used once. These gender-biased words and expressions can be classified as examples of English usage considered as sexist, namely using masculine nouns as generic (*freshmen*), habitually putting male before female (*him/her* & *himself/herself*), using gender linked title/work position (*chairman*), and non-parallel treatment of men and women (*Mrs.*).

**Conclusion**

The study has found that official communications in the respondent university contain elements of sexism. Gender-biased words or expressions were used in 7 out of the 14 memorandums that were written by male members of the administrative and management councils.

There are 5 sexist terms that were used, namely *freshmen*, *Mrs.*, *his/her*, *himself/herself*, and *chairman*.

The examples of English usage considered as sexist where the said gender-biased words and expressions belong are using masculine nouns as generic, habitually putting male before female, habitually putting male before female, and using gender-linked titles or work positions.

**Ethical Clearance:** Bulacan State University

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# Improving Body Balance and Reducing Risk of Falling in Elderly People by Providing Family Health Related Tasks

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## Abstract

**Background:** The loss of functional capacity and body balance in elderly people are problems that can increase the risk of falling. Family health related task can reduce the risk of falling in elderly people. The aim of this research is to find out the effect of family health task by promoting tandem walking exercise to elderly people to reduce the risk of falling.

**Method:** This research involved a quantitative cross sectional study. This study used a sample of 46 elderly people from Isimu Raya Village, Tibawa District, Gorontalo Regency. The sampling technique used was simple random sampling involving elderly people between the age of 60-74 years staying with their families. The data was collected using questionnaires. The researchers used univariate and bivariate analysis of Chi-Square Test with significant value  $\alpha$ , 5% or 0.05 and multivariate analysis with multiple linear regressions.

**Result:** The result of the research showed that there was a significant effect of family health task on the body balance by providing tandem walking exercises to elderly people in reducing the risk of falling with p value 0.000. Thus, families can reduce the risk of falling amongst elderly family members by maximizing tandem walking exercises.

**Conclusion:** To improve the body balance of and reduce the risk of falling among elderly people, require an enhancement of family health task.

**Keywords:** Family Health Task, Body Balance, Elderly People, Risk of Falling.

## Introduction

Elderly people are mostly subject to deteriorating physical health. The loss of functional capacity and body balance are common physical disorders in elderly people, which can increase risk and incidences of falling.

In some cases, incidences of falling have led to death in elderly people and not necessarily caused by chronic diseases they may suffer. These incidences may seem uncomplicated, but they can cause death to the elderly.

The United States National Health and Nutrition Examination Survey data on balance stated that 69% of elderly people between 70-79 years old and 85% of 80 years and older has the body balance of and reduce the risk of falling<sup>1</sup>. The occurrence varies in term of incidences of falling among elderly people with 49.4% for people between 55 to 64 years old, 67.1% for people between 65 to 74 years old and 78.2% for people over 75 years old<sup>2</sup>.

The main factors that influence the body balance of elderly people are age, sex, drugs, alcohol,

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psychological disorder and physical activities. A person will lose their organs' functions when they get older<sup>3</sup>. Women experience more body balance disorder than men do because they tend to do less physical activities. Elderly people who experienced falls tend to be afraid of walking; hence, they will reduce their physical activities. This can increase muscle deficiency, which causes body balance disorder.

The family is primarily responsible to render care currently being provided by health care professionals. Family members can provide nursing services and take care of other family members to prevent mental illness or physical disorder. Five family health tasks can be indicators of family autonomy. First is the ability to recognize the problems faced by family members, then the ability to determine the appropriate treatment to solve the problem, the ability to provide simple health care services, the ability to modify the environment both physiologically and psychologically.

Families play an important role in taking care of other family members, especially in preventing the elderly from falls. Families need to know the causes of falls amongst the elderly, so they can provide preventive services, such as assisting them in doing physical exercises. Previous studies have recommended various physical exercises to fix balance disorder in older adults such as Swiss Ball exercise, regular exercise, Otago home exercise and tandem walking exercise. This exercise managed to increase peoples' walking speed by 33.17% and 15.64% compared to those who did the Swiss Ball exercise.

Tandem walking is a physical exercise done by walking in a straight line for 3 – 6 meters with one foot in front of the other (heel to toe). This exercise can improve body balance and reduce the risk of falling. Tandem walking has been proven to be better than Swiss Ball exercise in reducing the risk of falling<sup>4</sup>.

Health care providers must provide information to families and society on the risk of injuries from falls and how to prevent it from occurring. Tandem walking is an easy physical exercise to practice. Family members can assist their elderly family members in practicing tandem walking at home. Preliminary studies showed that families do not assess and assist in family health matters, such as assist their elderly family members to prevent the risk of falling. Researchers need to study the effect of tandem walking on the elderly at home, as part of family health to improve body balance and reduce the risk and injuries associated with falling.

**Method**

The researchers used a cross-sectional study design with a sample of 46 participants between the age of 60–75 years, staying with their families and at risk of falls. The research used a random sampling technique. The researchers used questionnaires to collect the data, as a tool to measure the variable effect of family health task by providing tandem walking exercise to improve the body balance and reduce the risk of falls in elderly people at home. The reliability and validity were tested by Pearson Product Moment Correlation with  $r = 0,957$ .

**Result**

**Table 1: Frequency Distribution of Respondents by Age, Sex, Occupation, Family Health Task, Body Balance and Incidences of Falling 2019 (n = 46)**

	Variable	Frequency	Percentage (%)
Age	60 – 61 years	6	13
	62 – 63 years	4	8.7
	64 – 65 years	6	13
	66 – 67 years	11	23.9
	68 – 69 years	6	13
	70 – 71 years	4	8.7
	72 – 73 years	7	15.2
	74 - 75 years	2	4.3
Sex	Male	18	39.1
	Female	28	60.9



	Variable	Frequency	Percentage (%)
Occupation	Farmer	11	23.9
	Housewives	27	58.7
	Retired	8	17.4
Able to provide Tandem Walking service		40	87.0
Unable to provide Tandem Walking service		6	13.0
At risk of falling		15	32.6
Not at risk of falling		31	67.4
The incidences of falling		3	6.5
No incidence of falling		43	93.5

**Table 2: The Effect of Family Health Task in Providing Tandem Walking Exercise towards the Improvement of Body Balance in Reducing The Risk of Falls in Elderly People at Home 2019 (n = 46)**

Family Health Task	Body Balance				Total		P Value	OR
	At Risk of Falling		Not at Risk of Falling		N	%		
	n	%	n	%				
Able to provide Tandem Walking	9	19.6	31	67.4	40	87	0.001	0.600
Unable to provide Tandem Walking	6	13.0	0	0	6	13.0		
	15	32.6	31	67.4	46	100.0		

\*Significance level ( $\alpha$ : 0.05)

**Table 3: The Result of Multivariate Analysis of the Effect of Family Health Task in Providing Tandem Walking towards the Improvement of Body Balance in Reducing the Risk of Falls in Elderly People at Home 2019 (n = 46)**

Variable	B	Std. Error	Beta	T	Sig	Anova Test
Constant	2.168	0.298		7.269	0.000	0.000
Sex	0.246	0.107	0.256	2.299	0.027	
Affective and Psychological Disorder	-0.911	0.098	-0.829	-9.327	0.000	
Physical Activity	0.178	0.112	0.181	1.583	0.121	

$R^2 = 0.689$  Rad=0.667

### Discussion

The result of the research showed that 40 respondents from families with elderly people were able to provide tandem walking service and 6 respondents from families with elderly people were unable to provide the service. The families were trained by the researchers to practice tandem walking and they were able to train their elderly families members.

The researchers observed that some families were too busy to participate in the tandem walking exercises. They were either too busy with work, taking care of other family members such as children and toddlers, and doing too many domestic chores. These factors significantly affected their responsibilities towards the

elderly. They could not effectively assist the elderly in the tandem walking exercises as per their responses in the questionnaires.

**Family relationships can be characterized into<sup>5</sup> the following:** (1) Well organized, a family is a reflection of an organization where each member has their own role and task to achieve the goals of a family. A well-organized family is exemplified by strong relationships among members in achieving the goals; (2) Limitation, each member of a family has their own roles and responsibilities in achieving the goals. Therefore, members of a family cannot be high-handed or unfair to others because of their limited responsibilities; (3) Dissimilarity and Specificity, each member of a family has

their own specific role, for instance, a father works to earn a living and a mother takes care of children.

Based on the observations, most of their family members showed their interdependent relationship and influence on each other. The health problems of members can affect other members and there exist an internal motivation to take care of others. Friedman, Bowden, & Jones's structural-functional perspective defined family as an open social system and other researchers believed that a family is an early form of system and a unit of care. A family has its own social structure in terms of health, religion, governance, education and economy. The main issue remains the extent to which families members carry out these roles. Family, as an open social system, are affected by the external environment. Meanwhile, family members are also preoccupied with their own roles. Illness in a family can affect a family's structure and function<sup>6</sup>.

The researchers assumed that family members have to fulfill their responsibilities to other family members with health problems due their interdependent relationships. An independent family is able to perform simple family health task to assist sick family members.

The researchers assessed the balance using the TUGT (Time Up Go and Test) and most of the participants had normal scores, on balance lesser than < 14 second. In TUGT, if a person spent 14 second or longer, then he/she is classified as having high risk of falling<sup>7</sup>.

There are two types of balance, dynamic and static. A static balance is the ability to stand in a firm position, while dynamic balance is the ability to control the body movement. Most respondents with high risk of falling were people had impaired dynamic balance rather than impaired static balance. When they carried out physical activities, such as walking, they tended to lose their balance.

The impairment of body balance in elderly people is commonly caused by factors, such as age, sex and physical activities. As people get older, they begin to lose their balance because of the disruption in their organs' functions. Women tend to suffer body balance impairment more than men because they usually have lesser work load. If elderly people actively carry out physical activities, they can reduce the risk of falling<sup>8</sup>. Writers stated that a good body balance could influence the speed and gait of walking in older adults. The researcher assumed that the faster elderly people could

walk, the better their balance. This can significantly reduce the risk of falling<sup>9</sup>.

Table 1 shows that only 3 respondents experienced falls. These were mainly caused by their age and sex. They were mostly women with limited physical activities and aged between 73-74 year sold. Guerra and Maciel stated that there was a correlation between the elderly over 75 years old with impairment in body balance. They conducted a research on 310 elderly people over 60 years old<sup>10</sup>. Tinetti also stated that one third of adults over 65 years old have experienced falls, and half of them suffered recurrent falling<sup>10</sup>.

It can be inferred that most of the respondents did not experience any fall after having undergone tandem walking exercises with regular supervision from family members. The families who managed to provide comprehensive tandem walking exercises helped their elderly family members in reducing the risk of falling. During the 4 weeks, the body balance of the older adults in the families improved due to family supervised tandem walking exercises at home. The elderly were able to control their movements when doing physical activities.

The researchers analyzed four factors that influenced the body balance of older adults with multivariate analysis. The factors were affective disorders, psychological conditions, physical activities and the environment. The researchers used multiple linear regression test and discovered that sex played the most influence that affected body balance. Women were at higher risk of falling than men. The balance scores for men were mostly lesser than 14 seconds and classified as having lower risk of falling. The difference between the body balance between man and woman was caused by the difference in anthropometry<sup>11</sup>. Psychological factors, muscle strength and hormonal factors also affected the body balance<sup>11</sup>. Physical activities had less influence on women' body balance<sup>12</sup>

This research have several limitations. The respondents were mostly women and it was really hard to find men respondents. The respondents in this research were imbalanced. There were also some families that needed to be reminded to provide the exercise, so the researchers needed to visit these families repeatedly.

## Conclusion

There was significant effect of tandem walking

exercises in reducing the risk of falling and improving the body balance of elderly people assisted by their family members. The most influential factor that affect body balance was sex. Women tend to suffer from falls more than men.

**Recommendation:** Family members should provide simple nursing care to elderly family members. Tandem walking exercises should be included as part of this nursing care program at home.

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**Ethical Clearance:** Received from Institutional Ethical Committee.

**Conflict of Interest:** Nil.

**Source of Findings:** Self.

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# Effectiveness of Gail Model in Assessing the Risk of Developing Breast Cancer in Baghdad, Iraq

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## Abstract

**Background:** The Gail Model is a statistical breast cancer risk assessment algorithm that was developed in 1989 by Dr. Mitchell Gail and colleagues with the Biostatistics Branch of the National Cancer Institute's Division of Cancer Epidemiology and Genetics. The Gail Model looked at a woman's personal medical history, familial history, and reproductive history. The Gail model has been widely used and validated with conflicting results.

**Method:** A Gail model were assessed for 200 convenient patients, 100 patients with history of breast cancer diagnosed during the last year (case) and other 100 patients with benign breast disease (control) and who attended the oncology hospital in medical city and Imamin Al-kadhimin medical city during 2019. The relative risk was measure for each patients and calculated 5 year risk >1.7% was regard as high risk, chi-square and student T test was used to find association between two groups.

**Results:** Calculated 5 year risk >1.7% found in 21% of case and in 11% of control and no association was found between two groups in the relative risk of breast cancer ( $\chi^2 = 3.7$ ,  $df = 1$ ,  $p = 0.054$ ).

**Conclusions:** The Gail model is not useful in identifying risk of breast cancer in women and should not be used for that purpose.

**Keywords:** *Gail model, breast cancer, relative risk, Baghdad, Iraq.*

## Introduction

Breast cancer is the most frequent cancer among women, impacting 2.1 million women each year, and also causes the greatest number of cancer-related deaths among women. In 2018, it is estimated that 627,000 women died from breast cancer – that is approximately 15% of all cancer deaths among women<sup>(1)</sup>. And in Iraq it regard as second cause of cancer-related deaths<sup>(2)</sup>.

Thus the increasing in breast cancer rate has enhanced global breast health initiatives, and attention towards breast cancer risk assessment and awareness<sup>(3,4)</sup>. Breast cancer causes serious concerns even in healthy women, both because of its incidence and mortality. The steps that should be taken in order to decrease this threat can be arranged as following: assessment of breast cancer risk of women, determination of risk groups, careful monitoring of such high-risk groups, informing individuals with risk factors, and extending screening and reachable treatment programs in every society<sup>(5,6)</sup>. Breast cancer risk factors have been defined by previous studies. Age and female sex are important risk factors for breast cancer. Other factors can be increase breast cancer risk including personal and family history of breast, ovarian, and endometrium cancer; history of lobular carcinoma in situ-matched biopsy of atypical

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hyperplasia; positive BRCA 1 and BRCA 2 genes; early menarche (<12 yr), late labor (>30 yr); induced abortion; late menopause (>55 yr); hormonal replacement treatment (HRT); alcohol over-consumption; smoking; lack of physical activity; diet rich in fat; body mass index (BMI); and high socio-economic level (7-9).

Over the past two decades, a number of statistical models that predict the risk of breast cancer have been designed to select high risk women for risk reduction strategies based on some risk factors that are associated with increased risk. There are two main types of models. The first type assesses the probability of BRCA mutations such as Claus model in which all predictions are only based on family history (10). The second type used risk factors of breast cancer includes Gail model (GM) and its modified one (GM2) which calculates 5-year and lifetime invasive breast cancer risk (11). The GM is the most commonly used risk prediction model and has been well studied, validated and applied in various studies worldwide(12)

**Objective:** To evaluate the performance of model in estimating the risk of breast cancer in the clinical setting.

**Material and Method**

A total of 200 patients equal or above 40 years, 100 patients with history of breast cancer diagnosed during the last year (case) and other 100 patients with benign breast disease (control) and who attended the oncology hospital in medical city and Imamin Al kadhimin

medical city between June and December 2019. The required information was age, age at menarche, age at first live birth, first degree relative numbers with breast cancer, previous breast biopsies with or without atypical hyperplasia, BRCA mutations and woman race. Unknown BRCA mutations and the white race/ethnicity variables were used for all the women in this study in estimating their risks(14). The relative risk was measure for each patient which available at (<http://www.cancer.gov/bcrisktool/>) and calculated 5 year risk >1.7% was regard as high risk (15), chi-square and student T test was used to find association between two groups. p≤0.05 was considered significant.

**Results**

The mean age of breast cancer patients was 51.3±9 years which was higher than the mean age of control benign patients (49±6.5 years) and it was statistically significant (p=0.02). Distribution of participants in different categories of age at menarche, age at first lived baby and family history was almost similar in both groups and no association were observed between the two groups(P= 0.62, 0.717, 0.27 respectively). Higher frequencies of previous breast biopsy were recorded in control patients compared to breast cancer patients (P<0.001), Gail model scores, that predict 5-year risk of invasive breast cancer, in breast cancer patients and control patients were 1.25±0.7 and 1.26±0.7, respectively and no statistically difference existed between them (P = 0.9) table 1.

**Table 1: Difference in Risk factor used in Gail model among studied groups.**

Variable	Participants (No)		P value
	Breast cancer patients	Control patients	
Age	40-49 years	53	0.02*s
	50-59 years	25	
	≥60 years	22	
	mean±SD	51.3±9	
Age at menarche	≤11 years	10	0.62*
	12-13 years	73	
	≥14 years	17	
Age at first live birth	Nil parity	17	0.717*
	<20 years	20	
	20-24 years	26	
	25-29 years	21	
	≥ 30 years	16	

Variable			Participants (No)		P value
			Breast cancer patients	Control patients	
Family history of breast cancer	Negative		78	84	0.27*
	Positive	One	21	14	
		≥ Two	1	2	
Previous <u>breast biopsies</u>	Negative		94	77	0.001* <sup>s</sup>
	Positive		6	23	
Gail score			1.25±0.7	1.26±0.7	0.9**

\*Chi-square test, \*\* Student T test, <sup>s</sup> significant ≤0.05.

Using the cut-off value of 1.7 in Gail score, patients were categorized into high and low risk groups. The model was able to correctly characterize 21 patients in the breast cancer group as having high risk of breast cancer (sensitivity = 21%) and the model was correctly characterize 89 patients in control group as having low risk of breast cancer (Specificity =89%) and no association was found between two groups in the relative risk of breast cancer ( $\chi^2=3.7$ ,  $df=1$ ,  $p= 0.054$ ).

### Discussion

As the incidence of breast cancer is rising in Iraq, it is important to detect women with a high risk for early detection, timely treatment and prevention. Mitchell Gail, a biostatistician, developed a mathematical model in 1989 to assess the risk of breast cancer risk based on the results from the BCDDP—a large screening study that included 284,780 women who had been undergoing annual mammographic examination <sup>(16)</sup>. Later, it was modified by involving atypical hyperplasia in breast biopsy, race, and ethnicity <sup>(17)</sup>. Most Western countries use the Gail model to assess the risk of breast cancer. The drawbacks of the Gail model were that it does not consider lobular neoplasia, family history of breast cancer in second-degree relatives and family history of ovarian cancer. This led to the development of various other models considering the factors that were neglected in the GM such as history of breast cancer in second-degree relatives, which was included in the Tyrer–Cuzick model. To many countries and cities around the world validated the GM apart from the United States like Canada <sup>(18)</sup>, Italy <sup>(19)</sup> and England <sup>(20)</sup>. Several reports focused on the performance of the Gail model in Asian population and the results of these reports were in agreement with the finding of the current study, there are no studies in Iraq to date assessed predictive breast cancer risk models. In this study, Gail model was assessed

by case control study to validated in risk prediction for breast cancer and different components of the Gail model were compared between patients with confirmed breast cancer and control patient, In this study, the two groups differed significantly in terms of age, number of previous breast biopsies, sensitivity of model was 21%, specificity was 89% and it failed to differentiated between breast cancer patient and control patients, this resembled to A study of Gail model in Turkish women compared 650 breast cancer patients with 640 healthy women as control group. In this study, age and first live birth ( $\geq 30$ ) were statistically significant between case and control groups but other risk factors used in Gail model were not different between two groups, sensitivity of model 13.3% and specificity was 92%. They concluded that Gail model is not appropriate for risk estimation in Turkish population <sup>(21)</sup>, Iranian study on 560 women that showed a significant association of patients age, age at first baby and history of previous biopsy, no association was found between age at menarche, first degree family history and Gail model also showed very low sensitivity(13.9%) and high specificity (91.4%) of the Gail model in Iranian population and Indian study <sup>(22)</sup> that showed Gail model is not useful in identifying the risk of breast cancer in Indian women. Several points noted regarding the limitations of the current study. Most importantly, that a sample of patients selected from a referral center in Bagdad might not be representative of Iraqi female population. Larger studies including women from different parts of country should be conducted in order to obtain an accurate assessment of the Gail model performance in Iraqi women, the relatively small number of patients that were included in current study, may hinder detection of significant association between the variables and risk of breast cancer and limit proper interpretation of results, Case-control nature of the study and lack of patients follow-up, do not allow researchers

to assess absolute risk of cancer development among study population. Based on the results of the current study, it could be suggested that current version of Gail model should be modified to make it applicable for breast cancer risk estimation in Iraqi women.

### Conclusions

The Gail model underestimate risk of breast cancer in Iraqi women and should not be used for that purpose.

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# Cues to Action to Utilization of Cervical Cancer Screening Services among Women of Reproductive age in Kediri, East Java, Indonesia

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## Abstract

Cervical cancer is currently ranked among the top among the various types of cancer that causes death in women in the world. The majority of women diagnosed with cervical cancer do not perform screening tests or do not follow up after being found abnormal results. The purpose of this study was to determine the correlation between cues to action or trigger and the implementation of early detection of cervical cancer using Visual Inspection with Acetic Acid (VIA) method in Kediri, Indonesia. This study used a case-control design. The sampling technique was a multi-stage random sampling method. The sample was 410 respondents. The data were analyzed using logistic regression. The results showed that the trigger affects the implementation of early detection of cervical cancer using the VIA method. Based on the results, the Odds Ratio (OR) cues to action or trigger values were: 1) Information from high television was obtained OR value: 2.7; 2) Recommendation from high physician was obtained OR: 2,3; 3) Recommendation from midwife was obtained OR: 2.6; 4) The recommendation from a friend was obtained OR: 2.5; 5) Having ever seen high cervical cancer patients was obtained OR: 1.6; 6) Having ever read a book or a high leaflet was obtained OR: 1.8. It showed that the higher cues to action or trigger were given to the women, the higher the probability of women to perform the early detection of cervical cancer using the VIA method. Based on the results, the appropriate cues to action or trigger need to be selected to improve the behavior of early detection of cervical cancer VIA method in women.

**Keywords:** *Cervical Cancer, Early Detection, Cues to Action.*

## Introduction

Currently, cervical cancer ranks second among the various cancers that cause deaths in women in the world

and 85% occur in women in developing countries<sup>(1,2)</sup>. Cervical cancer was a preventable and treatable disease if cervical cancer was detected early<sup>(3)</sup>. In Indonesia, an estimated 13,762 women every year were diagnosed with cervical cancer and 7,493 had died. Cervical cancer in Indonesia was also ranked second in terms of a number of cancer patients in women after breast cancer<sup>(2)</sup>. Cervical cancer was actually a preventable disease if cervical cancer was detected at the stage of precancerous lesions and treated with the correct procedure<sup>(4)</sup>.

VIA method was particularly a suitable method in developing countries such as Indonesia because of the

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easy or simple technique, low cost and high sensitivity, fast and accurate enough to find abnormalities at the stage of cell abnormality or dysplasia or before precancer<sup>(5)</sup>. Implementation of early detection of cervical cancer VIA method in Kediri was still very low, less than one percent of the target Health Department of Kediri which set 10%<sup>(6)</sup>.

The efforts had been made to increase women’s participation in early detection of cervical cancer such as dissemination of information or counseling about early detection of cervical cancer through printed, electronic and health workers, but women visit rates associated with early detection of cervical cancers were still low<sup>(7)</sup>. Based on the theory of the Health Belief Model and Fog Behavior Model, the existence of cues to action or trigger was needed to improve the behavior of early detection of cervical cancer in women. The cues to action or trigger were effective. Thus, the trigger could increase the motivation and the ability of women to perform early detection of cervical cancer. The Fog Behavior model also asserted that a person would like to perform target behavior if she had: 1) sufficient motivation, 2) sufficient ability to perform the behavior, and 3) effective or triggered triggers for behavior<sup>(8)</sup>. In addition, research data on the effective trigger to improve the behavior of early detection of cervical cancer VIA method was very low. Thus, the purpose of this study was to determine the effect of a trigger on the implementation of early detection of cervical cancer VIA method in women in Kediri, Indonesia.

### Material and Method

This study used a case-control design that tried to explain the effect of a trigger on the implementation of early detection of cervical cancer VIA method. The populations of the study were all woman who was married and not pregnant at the Health Center Working Area of Health Office of Kediri City 2017. The Sample in this study was some woman who is married and not pregnant in Kediri city year 2017. In this study, the respondents were 410 respondents who were divided into 205 cases and 205 control. The sample was selected using a multi-stage random sampling method with multilevel sampling.

The data were collected by giving questionnaires that had been tested for validity and reliability. The activity of questionnaires begins with determining the respondents who become case groups. After meeting the respondents who became the next case, then looking for the respondents who became the control. After meeting prospective respondents, the researcher explained the purpose of this study, how to fill out the questionnaire, the benefits of research for research subjects, and the confidentiality of the results of questionnaires that had been filled by respondents. Having understood the explanations given, the respondents were required to fill out the approval format to be the respondent, in which the woman was entitled to choose to be a respondent or unwilling, after determining the choice of participation, and then requesting to sign the approval format. In the case and control, respondents were given a questionnaire with the same questionnaire.

### Findings:

**Table 1. Cues to Action or Trigger Influence to the Implementation of Early Detection of Cervical Cancer VIA Method at Health Center Working Area of Health Office of Kediri City 2017**

No	The Characteristics	Categories	VIA checking up				Total		OR value	CI 95%
			Yes		No		N	Percentage		
			N	Percentage	N	Percentage				
1	Physic	Heavy	203	49.8	205	50.2	408	100	-	-
		Very heavy	2	100	0	0.0	2	100	-	-
2	Information from televisions	High	105	64.8	57	35.2	162	100	2.7	1.8–4.1
		Low	100	40.3	148	59.7	248	100	ref	
		P value = 0.000**								
3	Recommendation from the doctor		93	62.8	55	37.2	148	100	2.3	1.5–3.4
		Low	112	42.7	150	57.3	262	100	ref	
		P value = 0.000**								

No	The Characteristics	Categories	VIA checking up				Total		OR value	CI 95%
			Yes		No		N	Percentage		
			N	Percentage	N	Percentage				
4	Recommendation from the midwife	High	92	65.2	49	34.8	141	100	2.6	1.7–3.9
		Low	113	42.0	156	58.0	269	100	ref	
		P value = 0.000**								
5	Friend suggestion	High	106	63.5	61	36.5	167	100	2.5	1.7–3.8
		Low	99	40.7	144	59.3	243	100	ref	
		P value = 0.000**								
6	Having seen to the women who have cervical cancer	High	79	57.7	58	42.3	137	100	1.6	1.1–2.4
		Low	126	46.2	147	53.8	273	100	ref	
		P value = 0.028*								
7	Having seen friends who have cervical cancer	High	66	57.4	49	42.6	115	100	1.5	0.9–2.3
		Low	139	47.1	156	52.9	295	100	ref	
		P value = 0.06								
8	Reading book or leaflet	High	74	59.7	50	40.3	124	100	1.8	1.2–2.7
		Low	131	45.8	155	54.2	286	100	ref	
		P value = 0.01*								

Table 1 describes the results of two variables analysis between various triggers in the behavior of early detection of cervical cancer with the implementation of VIA checking up. The result of bivariable analysis between information from television with VIA implementation showed that the information from television had a statistically significant relationship with VIA implementation. The analysis results were obtained OR: 2.7 (95% CI 1.8 - 4.1) on information from high television. Based on the results, women who received information from high television about early detection of cervical cancer had a 2.7 times higher possibility to perform VIA examination compared with women received information from low television.

The result of bivariable analysis between a recommendation from a physician and VIA implementation showed that recommendation from a doctor was statistically had a significant relationship with VIA implementation. The analysis results were obtained OR: 2.3 (95% CI 1.5 - 3.4) on the recommendation of a high doctor. Based on the results, women who received recommendations from high doctors had a 2.3 times higher possibility to perform VIA examination compared with women who received recommendations from low physicians.

The result of bivariable analysis between a recommendation from a midwife and VIA

implementation showed that recommendation from a midwife had a statistically significant relationship with VIA implementation. The analysis results were obtained OR: 2.6 (95% CI 1.7 - 3.9) on the recommendation of a high midwife. Based on the results, women who received recommendations from midwives have a 2.6 times higher possibility to perform VIA examinations compared with women who received recommendations from low midwives.

The result of bivariable analysis between friend suggestion and VIA implementation showed that friend suggestion had a statistically significant correlation with VIA implementation. The analysis results were obtained OR: 2.5 (95% CI 1.7 - 3.8) at the advice of a friend. Based on the results, women who received advice from high friends had 2.5 times higher possibility to perform VIA examination compared with women who received low friend suggestions.

The results of bivariable analysis between having seen women with cervical cancer with the implementation of VIA showed that having seen women with cervical cancer statistically had a significant relationship with the implementation of VIA. The analysis results were obtained OR: 1.6 (95% CI 1.1 - 2.4) in ever saw women suffering from high cervical cancer. Based on the results, women who had seen women with high cervical cancer had 1.6 times higher possibilities to perform

VIA examination compared with women who had seen women with low cervical cancer.

The results of bivariable analysis between having seen a friend who had cancer with VIA implementation showed that having seen a friend who had cancer had not statistically had a significant relationship with VIA implementation (p-value  $0.06 > \alpha = 0.05$ ).

The result of bivariable analysis between the reading book or leaflet with VIA implementation showed that reading books or leaflets statistically had a significant relationship with VIA implementation. The analysis results were obtained OR: 1.8 (95% CI 1.2 - 2.7) on high reading books or higher possibilities to VIA checking up compared with women who low read books or leaflets.

## Discussion

Trigger or cues to action was a stimulus that motivates individuals to perform actions appropriate to health behavior<sup>(9)</sup>. The trigger was one of the triggering factors for deciding to accept or to reject alternate precautions. Triggers were needed to encourage individual involvement in health behaviors. These cues could be internal; the internal cues within the individual such as perceived and external symptoms derived from interpersonal interactions such as mass media, messages, advice, advice or consultation with health workers. In this study, the results showed that women who received the appropriate trigger would perform early detection of cervical cancer by using the VIA method.

Trigger or cues to action was a factor that leads to a change in one's behavior<sup>(10)</sup>. According to the results of this study, in terms of triggers, most respondents performed early detection of cervical cancer VIA method because of the advice of midwives, doctors and reading leaflets.

Based on the result of this research, the trigger variable consists of six indicators including information from television, the recommendation from a doctor, the recommendation from a midwife, suggestion of a friend, having seen cervical cancer patient, and reading book or leaflet. The physical condition indicator did not qualify as the compiler of the trigger variable, this is not in accordance with the trigger theory in<sup>(11)</sup>, but in accordance with the results of the study<sup>(12)</sup> where the most dominant trigger was recommended by health personnel including the main midwife next recommendation from the doctor. The physical condition in this research did not become

a trigger. The possible cause was the respondents in this study were all people who were still not affected by cervical cancer. Cervical cancer of stage one or stage of precancerous lesions did not show any complaints or signs and symptoms of any kind.

Based on the research<sup>(13)</sup> mentioned that the trigger in the form of recommendations from doctors and recommendations from the family proved to influence the use of influenza vaccine by parents in children. Triggers prove effective in reducing perceived obstacles or minimizing parental awareness about the negative effects of vaccine delivery and might increase perceived benefits about the effectiveness of influenza vaccine delivery in infants. thus increasing external motivation for using the influenza vaccine.

Research<sup>(14)</sup> suggested that cues to action or triggers were associated with adherence to taking antihypertensive drugs. Reading about disease information, knowing about services, and consulting with others about illness could trigger a person against compliance. Triggers were needed to encourage individual involvement in health behaviors. The trigger could come from internal or external. Internal triggers such as physiological cues such as pain. External triggers such as illness from family members, media reports<sup>(15)</sup>. The existence of clues, education, symptoms or information media could influence a person about the dangers of illness, thus, they felt the need to take action<sup>(16)</sup>.

According to<sup>(11)</sup> one of the triggering sources was the physiological condition of humans in the form of a sense of discomfort or tension. When the tension was strong enough, it would motivate humans to act to meet their needs. Previous human experience and current physical condition would greatly affect the behavior to be taken. Research conducted by<sup>(12)</sup>, mentions that medical triggers have greater or more effective power in losing weight than other triggers. Medical triggers could be advice from doctors or stories of patients who have been sick from being overweight. Medical triggers would cause health threats and increase motivation in patients to control weight.

## Conclusion

There was an existence of a trigger effect on the implementation of early detection of cervical cancer VIA method. The trigger in this study consisted of information from television, recommendations from doctors, recommendations from midwives, advice from

friends, have seen cervical cancer patients, have seen cancer patients and read books. Based on the Odds Ratio (OR) the highest influence was information from televisions.

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# Birth Length is a Dominant Risk Factor of Stunting among Children Aged 6-59 months in North Moyo Sub District, Sumbawa District West Nusa Tenggara, Indonesia

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## Abstract

**Background:** Malnutrition is still a problem of public health that occurs in the area of North Moyo Subdistrict, Sumbawa District.

**Objective:** This analysis aims to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District.

**Materials and Method:** This was an observational study with a cross-sectional design. Chi-square statistical test was conducted to identify the incidence of stunting in children aged 6-59 months and the major factors associated with stunting in children aged 6-59 months. Statistical test results were declared significant if the p-value was less than 0.100. There were 406 children aged 6-59 months as sample.

**Results:** The prevalence of stunting was 34.9%. Several significant variables related to stunting are age, birth length, integrated health care visits, smoke, and mother's education ( $p < 0.05$ ). Birth length is a dominant factor of stunting after being controlled by age, visit to integrated health care, smoke and mother's education.

**Conclusions:** Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

**Keywords:** *Stunting, children, birth length.*

## Introduction

Stunting is a condition of growth failure in under-five as a result of chronic malnutrition from the womb until early childhood, so that the child is considered too short for their age. Globally, stunting affects about 21.9 % or 149 million children under 5 years of age in 2018. Children who suffer from stunting will probably never reach their maximum height and the brain will

never develop to their maximum cognitive potential. These children start their lives at a disadvantage: they face learning difficulties in school, earn lower income as adults, and face obstacles to participate in their community.<sup>(1)</sup> Based on the 2018 National Basic Health Research data, it is known that the prevalence of stunted under-five in Indonesia is 30.6%; while, the prevalence of stunting in West Nusa Tenggara Province is 33.49%, and Sumbawa District is at 31.53%.<sup>(2)</sup> Although a decrease occurs compared to the 2013 National Basic Health Research data, the decrease is not significant and remains a public health problem because it is still above 20% according to WHO standards.

According to UNICEF, the stunting problem is a cumulative process and caused by inadequate nutrient

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intake or recurrent infectious diseases, or both. Stunting can also occur at fetal time, which is caused by poor nutritional intake during pregnancy, inadequate care and feeding practices, poor quality of food in line with the frequency of infection, so that it can inhibit growth.<sup>(3)</sup>

A meta-analysis study conducted in 37 developing countries found that 10.8 million stunting cases (out of 44.1 million) were caused by poor sanitation (7.2 million cases) and diarrhea (5.8 million cases).<sup>(4)</sup> A study by Cummin and Cairncross also stated that poor access to clean water, sanitation and hygiene has a significant detrimental effect on child growth and development.<sup>(5)</sup>

North Moyo Subdistrict in Sumbawa District is one of the areas for developing cattle farming for both meat and milk production in the Sumbawa District area and which will be sold to other regions, such as Java, Sumatra and other regions. With the localization of livestock-farming close to residential locations, it is likely to cause many health problems, especially for children under five. Nutritional Status Monitoring Results in 2017 shows that North Moyo Subdistrict is the subdistrict with the highest stunting prevalence, compared to 23 other Subdistricts in Sumbawa District, which is at 72.19%.

The high exposure of various risk factors above has a direct impact on the incidence of stunting for under-five. The aim of this study was to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District in 2019.

## Materials and Method

This study used a cross-sectional study design. All variables observed in this study were carried out at the same time, obtained through direct interviews using questionnaires and anthropometric measurements. The study was conducted in North Moyo Subdistrict, Sumbawa District, West Nusa Tenggara Province. This study was conducted in June-August 2019.

The data collected were primary data in which the study subjects were children aged 6-59 months as many as 406 children. The data were collected related to child characteristics (age, sex, birth length, birth weight, anthropometric measurements (length/height), breast feeding record, food intake, infectious diseases, parity and number of household members), parent's education level, level of knowledge and attitude about health and nutrition, income level, and smoking habits, hygienic

and healthy behavior, hand-washing habits, access to health care services, and food intake. Nutritional status data were obtained from length/height and age data, which was processed using WHO-ANTRO software. The analysis used was univariate and bivariate analysis.

## Results

**Characteristics of children and families:** The total sample in this study was 406 children under five. Highest proportions of under-five are female (51.2%), age 24-59 months (62.1%), family members < 4 people (75.4%), regular visits to integrated health care (71.4%), exclusive breastfeeding (35.9%), ever experiencing infections (83.7%), not implementing Hygienic and Healthy Behavior (87.4%), and having smoker family members (77.1%). Highest proportions for under five's mothers were those attaining secondary education, and as housewives. Most of the under-five had low nutritional intakes, namely in energy, fat, and carbohydrate.

**Characteristics of children with stunting:** The nutritional status measurement results showed the mean z-score + SD was  $-1.27 \pm 1.11$  (min max  $-4.73$   $-3.18$ ), with a stunting proportion of 34.5%. There is a significant relationship of the incidence of stunting in under-five with aged, birth length, mothers did not wash their hands with running water and soap, visits to integrated health care, and mother and father's education ( $p < 0.100$ ).

In multivariate analysis, six variables were included in modelling namely age, birth length, mother's education, visit to integrated health care, and family members smoke (Table 1). The analysis result showed that standardized coefficient beta value of birth length variable was the largest, which means birth length was the dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke.

**Table 1. Multivariate analysis results in stunting among children aged 6–59 months**

Variables	B	P-value	OR
Age	-1.034	0.0005	0.36
Birth length	0.974	0.003	2.65
Mother's education	0.461	0.017	1.59
Visit to integrated health	0.523	0.050	1.69
Family members smoke	0.699	0.027	2.012

## Discussion

Nutritional problem is a serious problem that occurs in Sumbawa District, especially stunting, making Sumbawa District determined as one of 100 districts/cities with locus stunting in an effort to reduce stunting in its region.<sup>(6)</sup> In this study, the magnitude of stunting in North Moyo Subdistrict was 34.5%, still above the standards set by WHO, so that North Moyo Subdistrict was still categorized as a health problem area specifically related to stunting.

In this study, the age of children under five was related to stunting, in which children over 2 years had a higher risk for stunting than children under 2 years. This could be related to changes in food intake received by children over 2 years at which most of them have begun to be weaned and there is an adaptation process related to changes in feeding which most likely majority of children over 2 years do not adapt well, added with mostly low education level of mothers, that contribute to the incidence of stunting in children over 2 years. Similar results from several studies that show significant relationship between age and stunting, in which the risk of stunting is higher in children over 2 years.<sup>(7),(8),(9)</sup>

In this study, mother's education was related to the incidence of stunting in children aged 6-59 months, in which children with low-educated mothers will be at risk of stunting by 2.06 times higher than children with high-educated mothers. In line with studies conducted in The Royal Kingdom of Bhutan 2015 showed the prevalence of stunting was significantly higher among children whose mothers without any formal education, and/or born to families where the household head did not have any formal education.<sup>(10)</sup> Maternal education that it may influence child growth and health through better feeding practices and home hygiene.<sup>(11)</sup>

Integrated health care, commonly known as *Posyandu* in Indonesia, is a form of community resource health efforts, which is managed and organized from, by, for and with the community where this activity had been carried out by community in early 1970s. Integrated health care is a means to facilitate community access to health care services, especially in monitoring the growth of children under five. In this study, children under five who were not routinely taken to the integrated health care significantly increased the risk of stunting incidence. Similar to other studies conducted in three districts in Indonesia, namely Sikka, Jayawijaya, and

Klaten Districts, the prevalence of stunting was also significantly lower among children of mothers who had good access to health care services.<sup>(9)</sup>

This study also showed that children under five coming from families with smoker family members had a higher risk for stunting. This is similar to studies conducted in rural and urban areas of Indonesia where smoker fathers have been proven to shift household income from food to tobacco, putting infants and children at greater risk for chronic malnutrition.<sup>(12)</sup>

Birth length was a dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke. A study in Melawi and Bogor Indonesia showed that newborn's length was related to the incidence of stunting in children aged 6-59 months.<sup>(8),(13)</sup> Length of birth is important indicator as the initial growth and development of the individual in the next life. Birth weight and length are positively associated with later height from infancy to adulthood. Children defined as SGA (Small for Gestational Age) show that birth length is somewhat more sensitive than birth weight in predicting shortness in adulthood. The difference, however, is overtaken by the persistence or not of shortness at 2 years of age. It can be concluded that children born SGA will show remain short, however, and in these children full catch-up never occurs.<sup>(14)</sup>

Although both genetic and individual specific environmental factors influence the association between birth size and later height, genetic factors are more importantly influenced birth length rather than birth weight.<sup>(15)</sup> Various factors that increase the risk of children with low birth length. The Lancet 2013 nutrition series has identified maternal undernutrition during pregnancy as a major determinant of poor fetal growth and child stunting.<sup>(16)</sup>

## Conclusion

This study showed the prevalence of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District was still high at 34.9% and included in the category of health problem.

Significant variables related to stunting are age, birth length, mother's education, integrated health care visits, and smoke. Birth length is a dominant factor of stunting in children aged 6-59 months in North Moyo



District after being controlled by age, visit to integrated health care, mother's education, and smoking.

Therefore, it is very important to ensure that women enter pregnancy in good health and with adequate nutritional status. Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

**Conflict of Interest Statement:** The authors declare that there is no conflict of interest.

**Ethical Clearance:** The study was approved by the Commission of Research Expert and Research Ethics of Faculty of Public Health, Universitas Indonesia (Letter of Approval No. 308/UN2.F10/PPM.00.02/2019 dated 15 May 2019).

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# Extra-Levator Abdomino-Perineal Excision Versus Standard Abdomino-Perineal Excision: A Prospective Study in the Egyptian National Cancer Institute

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## Abstract

**Background:** The standard abdomino-perineal excision (SAPE) is associated with a high incidence of Intraoperative Bowel Perforation (IOBP) and positive circumferential resection margin (CRM), both are major determinants of local recurrence. This led to the introduction of the more radical surgery; extra levator abdomino-perineal excision (ELAPE).

**Method:** This prospective pilot study included 40 patients with low rectal cancer. They were randomized to either ELAPE Group or SAPE Group. The study was carried out over 54 months, from January 2014 to June 2018. All patients were evaluated regarding operative factors, early postoperative complications, and oncological outcomes (CRM and local recurrence).

**Results:** IOBP Occurred in one *patient* in ELAPE Group (5%) vs. seven in SAPE Group (35%) ( $p=0.044$ ). CRM was positive in seven patients of the SAPE group (35%) vs. one (5%) in the ELAPE group ( $p=0.004$ ). Local recurrence occurred in six patients (30%) of the SAPE group vs. one (5%) in the ELAPE group ( $p=0.091$ ). There was no significant difference between the two groups regarding perineal wound complications, urinary complications, Operative factors, and Length of Hospital Stay (LHS).

**Conclusion:** ELAPE is an oncologically superior and equally safe procedure to replace SAPE without compromising patients' QOL.

**Keywords:** *Abdomino-perineal; positive margin; extra-levator; local recurrence.*

## Introduction

Important goals during rectal cancer treatment are to minimize the risk of local recurrence and to preserve the quality of bowel, bladder, and sexual function. For tumors lying less than 2 cm above the anorectal

ring, abdomino-perineal resection (APR) is usually unavoidable<sup>1</sup>.

It is well-established that CRM involvement and specimen perforation are documented determinants of local recurrence of low rectal cancer<sup>2</sup>. Therefore, the perineal dissection part of SAPE has been in focus as it is considered a vulnerable phase for specimen perforation and positive CRM<sup>3,4</sup>[8,9]. This led to the introduction of a more extensive and detailed type of perineal dissection aiming to improve the oncological outcomes; extra-levator abdomino-perineal excision (ELAPE)<sup>5,6</sup>.

This study aims to provide a thorough description of ELAPE as a new technique introduced in the National Cancer Institute (NCI), Cairo University, and to

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compare it with SAPE regarding oncological outcomes and postoperative complications.

## Patients and Method

This prospective pilot study involved 40 patients with low rectal cancer who were candidates for APR. The study compared ELAPE versus SAPE regarding oncological outcomes and early postoperative complications. All patients were followed for a minimum period of 24 months. The study protocol was approved by the institutional review board of the NCI. Informed consent was obtained from all patients after a comprehensive explanation of the techniques and outcomes.

Randomization was done using a computer-generated random table. Consecutive numbers were included in opaque sealed envelopes. Patients were randomized into two equal groups according to the type of surgery; ELAPE group and SAPE group. The patient, pathology, and radiology specialists were blinded to the nature of the procedure.

**Surgical Technique (Figure 1-4):** The abdomino-pelvic phase was the same for the two techniques. In the ELAPE group, the lower limit of rectal dissection stopped earlier than in the SAPE group so that the distal tapering end of the mesorectum was not dissected off the levators and was left undisturbed to be addressed only through the perineal part.

The perineal phase for ELAPE was done while the patient in the prone Jack-Knife position for better exposure. Maximizing the CRM didn't mean to include a large amount of the ischio-anal fat unless grossly involved. We continued dissection till the inferior surface of the levators was exposed entirely bilaterally. The pelvis was entered posteriorly by disarticulating the coccyx. The levators were clasped between 2 fingers, and their lateral-most attachment was divided. In the SAPE group, the perineal dissection was done in the Lithotomy position and was carried in a plane parallel to the wall of the anal canal and continued through and not outside the levator complex. For both groups, the perineal defect was reconstructed by using a pedicled omental flap. A composite mesh was used in 5 patients only.

In the two groups, intraoperative and early postoperative complications were evaluated. Then, the oncological outcomes, including CRM and local recurrence, were recorded within 24 months.

Pathological examination of the surgical specimens was done by expert pathologists at NCI blinded about the procedure. We followed the grading system of Nagetegaal et al.<sup>7</sup> for grading of APR specimens. Grade 3 specimens were those with an extralevator plain. Grade 2 specimens were those with sphincter plain. Grade 1 specimens were those with intra-sphincteric plain and/or mucosal exposure and perforation.

The primary outcome measures were intraoperative bowel perforation (IOBP) CRM positivity and local recurrence. IOBP was defined as "inadvertent" perforation only during pelvic or perineal dissection located in relation to the radial margin of the tumor. Positive CRM was defined as any tumor located within less than 1 mm from the inked circumferential margin. Local recurrence was defined as true pelvic recurrence and/or perineal recurrence within the 24 months' follow-up period that was detected radiologically by MRI or PET-CT and/or histologically proven.

Secondary outcome measures were intraoperative blood loss, operative time, perineal wound complications, urinary retention, and length of hospital stay. Perineal wound complications included wound infection or dehiscence. Urinary retention was defined as delayed urinary catheter removal beyond postoperative day 6.

**Statistical Method:** Statistical analysis was done using IBM® SPSS® Statistics version 22 (IBM® Corp., Armonk, NY, USA). Numerical data were expressed as mean and standard deviation or median and range as appropriate. Qualitative data were expressed as frequency and percentage. Chi-square test or Fisher's exact test was used to examine the relation between qualitative variables. For not normally distributed quantitative data, a comparison between the two groups was made using the Mann-Whitney test (non-parametric t-test). All tests were two-tailed. A p-value < 0.05 was considered significant.

## Results

There was no significant difference between the ELAPE group and the SAPE group regarding demographic, clinical, and operative characteristics. All clinically and/or radiologically T3 and T4 patients received neoadjuvant treatment, the percentage of which was equally 85% in both groups. Blood loss and operative time were comparable between the two groups. Pathological factors, including pT, pN, grade, and margins, were comparable between the two groups (Table I).

Table II shows that IOBP occurred in one patient with a locally advanced tumor in ELAPE Group A (5%) compared to 7 patients in SAPE Group ( $p = 0.044$ ). All perforations were located at the point of maximum wasting in the specimen.

Severn patients (35%) of SAPE Group had positive CRM compared to only one in the ELAPE group ( $p=0.044$ ). Within the follow-up period of 24 months,

six patients (30%) of the SAPE group developed local recurrence compared to only one in the ELAPE group ( $p=0.091$ ). All patients with positive CRM had local recurrence except only one patient in the SAPE group. All recurrences were documented by imaging and only two were histologically proven. Secondary outcome measures, including perineal wound complications, urinary retention, and hospital stay, were all comparable between the two groups (Table II).

**Table I: Disease characteristics of the two studied group**

	ELAPE Group A n=20	SAPE Group n=20	p-value
<b>Pathological T-Stage</b>			<b>0.621</b>
pT2	6 (30%)	5 (25%)	
pT3	7 (35%)	10 (50%)	
pT4	7 (35%)	5 (25%)	
Nodal stage			0.433
pN0	11 (55%)	10 (50%)	
pN1	6 (30%)	9 (45%)	
pN2	3 (15%)	1 (5%)	
Histological Grade			0.592
G1	4 (20%)	4 (20%)	
G2	12 (60%)	9 (45%)	
G3	4 (20%)	7 (35%)	
Proximal Margin (cm)*	30 (16-90)	30 (18-40)	0.882
Distal Margin (cm)*	2 (0.1-4.0)	3.0 (1.0-4.0)	0.211

Data were expressed as number (%), or median (range)

**Table II: Outcome of surgery and postoperative complications of the two studied group**

	ELAPE Group n=20	SAPE Group n=20	p-value
Intraoperative bowel perforation	1 (5%)	7 (35%)	0.044
Positive CRM	1 (5%)	7 (35%)	0.044
Local Recurrence	1 (5%)	6 (30%)	0.091
Perineal Wound Infection	10 (50%)	9 (45%)	0.752
Perineal Wound Dehiscence	5 (25%)	2 (10%)	0.407
Perineal Abscess	0	2 (10%)	0.487
Urinary Retention	8 (40%)	4 (20%)	0.168
Length of hospital stay (days)	8.5 (5.0-15.0)	6.0 (4.0-20.0)	0.383

Data were expressed as number (%), or median (range), CRM: circumferential resection margin



**Figure 1: IOB perforation**



**Figure 2: typical waist of the specimen in SAPE**



**Figure 3: extra levator APR showing complete excision of the levator muscle**



**Figure 4: Reconstruction of the pelvic floor with mesh**

### Discussion

ELAPE, through a more radical perineal approach, has addressed the problems associated with SAPE, i.e., threatened CRM and IOBP that have been considered independent risk factors for local recurrence<sup>5</sup>. The principles involve avoiding dissecting the mesorectum off the levator-ani muscle and dividing the levators at their lateral-most point<sup>8</sup>.

Several studies have compared ELAPE and SAPE regarding oncological outcomes, but most of these studies were systematic reviews and multi-center trials<sup>3,6,9</sup>. Our study is a prospective single-institution pilot study that details the new perineal approach by ELAPE and compares ELAPE and SAPE.

In the current study, blood loss was comparable between the two groups. Operative time was not prolonged as it was assumed for a new technique requiring changing the patient's position. In agreement with the current results, pooled data from three studies reported no significant difference in operating time between ELAPE and SAPE. Pooled data from two studies reported slightly less, but comparable blood loss in ELAPE than APE<sup>10-12</sup>.

In our study, we tried to stick to the original technique that was first published by Holm et al.<sup>5</sup>. By defining the lower limit of pelvic dissection and attacking the pelvic floor at their origin, we managed to achieve what we call "a site-specific CRM," i.e., maximum CRM at the point where specimen integrity is threatened the most. This led to much fewer IOBP

and wider CRM in the ELAPE group with a statistically significant difference. A systematic review pooled data from 1,097 patients who underwent ELAPE and 4,147 patients who underwent SAPE. The authors reported IOBP of 4.1% vs. 10.4%, respectively<sup>9</sup>. These findings confirmed the findings of another retrospective study that reported lower perforations in ELAPE compared to SAPE (3.7% vs. 22.8%, respectively)<sup>13</sup>.

In the current study, the new technique didn't have an impact on the rate of wound complications and length of hospital stay. Though the overall incidence of perineal wound infection was relatively high (45% and 50%), the two groups were comparable. These results are comparable to that of two meta-analyses that showed no significant difference in the rate of postoperative complications between ELAPE and SAPE<sup>6,14</sup>. However, other studies reported a higher incidence of perineal wound complications in ELAPE patients<sup>13,15</sup>.

The extent of tissue removal in ELAPE can result in autonomic nerve damage, especially at the posterolateral aspect of the prostate/vagina. This might explain the relatively higher incidence of urinary retention in the ELAPE group, with no significant difference between the two groups ( $p=0.168$ ). Our results regarding urinary complications were comparable to the works of Ramsay et al., West et al., and Palmer et al., who showed a relatively high incidence of urinary complications in the ELAPE group, but the results were statistically comparable<sup>13,16,17</sup>.

In our study, CRM was positive in 7 patients of the SAPE group compared to only one in the ELAPE group ( $p=0.004$ ). Though the number of local recurrences was higher in the SAPE group, it was near but not statistically significant ( $p=0.091$ ). Keeping with our results, the retrospective study by West et al. showed Less CRM positivity in the ELAPE group (14.8% vs. 40.6%;  $p=0.013$ ), but this study didn't investigate Local recurrence rates<sup>18</sup>. A previous prospective study comparing ELAPE (16 patients) and SAPE(20 patients) reported comparable results to the current study regarding CRM and local recurrence<sup>12</sup>. Stelzner et al.<sup>9</sup> reported a significant relative risk reduction of local recurrence of 44.5% in extended vs. standard APE.

A systematic review showed a 37.7% relative risk reduction of CRM involvement in extended vs. standard APE<sup>9</sup>. A retrospective analysis from 2000 to 2010 also showed a reduction in CRM positivity/R1 resections

and the local recurrence rate after the introduction of ELAPE<sup>19</sup>. It has also been demonstrated that ELAPE can reduce the incidence of positive CRM in the advanced stages of low rectal cancer. These results suggest that ELAPE can be selected for specific T-stages clarifying the indication of this technique<sup>19,20</sup>. In the current study, all local recurrences were observed in patients who had pT3-4 and received preoperative treatment except one patient in the SAPE group who didn't receive a preoperative treatment.

In contrast to our study, a previous retrospective study did not find a significant difference between ELAPE and SAPE in the rate of positive CRM or local recurrence<sup>3</sup>. Similar results were observed in the meta-analysis done by Yang et al.<sup>14</sup>.

## Conclusion

ELAPE offers a more standardized perineal approach. Oncological superiority comes from maximizing the volume of tissues resected around the tumor at the lower end of the mesorectum. Our study showed that it was associated with much less IOBP and positive CRM, which predict the local recurrence. It was a more efficient oncologically and equally safe procedure to replace SAPE without compromising the postoperative course.

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# A Comparable Study of Ovarian Response to Controlled Ovarian Stimulation between Overweight/Obese and Normal Weight Women with Polycystic Ovary Syndrome Whom Undergone Intracytoplasmic Sperm Injection

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## Abstract

The prevalence of obesity is increasing world-wide. Obesity is considered to have a vital role in the pathogenesis of polycystic ovary syndrome (PCOS). An assisted reproduction technique, Intra cytoplasmic sperm injection (ICSI), has been used increasingly for the infertility management in those patients. However, data regarding the effects of obesity on the outcome of this technique in PCOS patients is limited.

**Aim:** This study compared the response to controlled ovarian stimulation (COS) between overweight/obese and normal weight women with PCOS whom undergone ICSI.

**Materials and Method:** 53 PCOS infertile females were included. They were divided according to their body mass index (BMI) into two groups: (Group I normal weight and group II overweight and obese). Both were included in COS/ICSI program. Assessment of total dose of gonadotropins, duration of stimulated cycles, total number of retrieved oocytes, their quality and development of OHSS was undertaken.

**Results:** The study showed that despite being insignificant, the total dose of gonadotropin used for stimulation of group II women was higher than that used for women in group I: 1729.06 iu vs 1380.00, p-value=0.1 with a longer duration cycle 10.0 days vs 9.4, p-value=0.5, the mean total number of retrieved oocytes from the group II was more than that from group I women, while the mean total number of immature oocytes retrieved from group II women was significantly less than that from group I (1.7% vs 3.7%, p-value=0.04). The rate of developing OHSS in group II was more than that in group I.

**Conclusion:** Overweight and obese PCOS women need higher doses of gonadotropin to be stimulated with longer duration of the treatment cycle; however, they produce a higher number of oocytes with a higher maturity during COS. Also, they are more likely to develop OHSS when stimulated in comparison to normal weight PCOS women.

**Keywords:** PCOS, Overweight and Obesity, Oocyte quality and OHSS.

## Introduction

Polycystic ovarian syndrome (PCOS) is a common

endocrine disorder affects the reproductive age women and is responsible for up to 80% of causes of anovulatory infertility making a large number of those women seeking assisted reproductive techniques<sup>1</sup>. Weight and body mass index are important parameters of normal reproductive functions. Approximately, thirty five percent of PCOS women are overweight and obese<sup>2</sup>. A close correlation between obesity and symptom severity of the syndrome is present<sup>3</sup>. Controlled ovarian stimulation and assisted

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reproduction outcomes are negatively affected with a higher miscarriage rate<sup>4</sup> which may be partially attributed to elevated LH, intra-follicular and serum androgen levels excess and follicular degeneration<sup>5</sup>. Although, different studies tried to discuss the effect of obesity on COS/ICSI outcomes in PCOS patients but their results were varied and inconclusive<sup>6-8</sup>.

So, this study tries to investigate the effect of obesity in PCOS women on ovarian response by a comparison with an aged-matched ( $\leq 35$  ys.) normal weight PCOS women whom subjected to the same induction protocol (GnRH antagonist + r-FSH).

**Study Design:** It is a prospective cohort study that was conducted at the Fertility Center, Al- Sadr Medical City, Al- Najaf AL-Ashraf, in Iraq.

### Materials and Method

Our study recruited fifty three sub-fertile females with PCOS whom had been diagnosed according to Rotterdam criteria<sup>9</sup>. The age was less than 35 years old and participants' male partners had either normal or mild-moderate impairment in semen parameters (according to World Health Organization criteria in 1999<sup>10</sup>). All females and their partners were evaluated by history, physical examination, BMI and fertility investigations (cycle day 2 hormones E2, LH, FSH, prolactin, endometrial thickness by transvaginal

ultrasound (TVUS) and male seminal fluid analysis). The participants then divided in to two groups according to their BMI (weight in kilograms / square height in meters): group I included women of normal body weight (BMI from 19 to 24.9) and group II included overweight and obese women (BMI  $\geq 25$ ). Non-PCOS women (normal ovulatory) and PCOS women with a BMI less than 19 were excluded. All were subjected to COS by gonadotropin releasing hormone (GnRH) antagonist and gonadotropins. Assessment of the dose and duration of treatment cycle and monitoring of the development of OHSS by TVUS and serial E2 assay was done. Once they produce sufficient number of oocytes, a trigger by human chorionic gonadotropin (HCG) was done followed by oocyte retrieval 34-36 hours later, under TVUS and general anesthesia. An evaluation of oocyte quality was done under inverted microscope. Only those oocytes which extruded the first polar body to the perivitelline space will be considered as mature (MII) oocyte<sup>11</sup>.

### Results

Table (1) shows the means of age, cycle day 2 hormones and endometrial thickness (ET) of both groups with no significant difference except for LH level which was significantly less in overweight and obese group , p-value= 0.05.

**Table (1): A comparison between both groups regarding age, hormonal profile and ET.**

Parameter	G-I (N=10) Mean $\pm$ SD	G-II (n=43) Mean $\pm$ SD	P-value
Age (Years)	26.3 $\pm$ 3.1	28.3 $\pm$ 3.9	0.12
E2(pg/ml)	33.3 $\pm$ 12.00	43.19 $\pm$ 23.6	0.20
LH(iu/l)	6.6 $\pm$ 5.6	4.2 $\pm$ 2.6	0.05
FSH(iu/l)	5.1 $\pm$ 1.8	4.8 $\pm$ 1.3	0.48
Prolactin(ng/dl)	26.4 $\pm$ 16.2	25.3 $\pm$ 10.5	0.79
ET (mm)	3.9 $\pm$ 0.8	3.7 $\pm$ 1.01	0.70

Table (2) demonstrates the total dose and duration of gonadotropin stimulation and E2 & ET at the day of HCG trigger. Overweight and obese women were stimulated with higher doses and for longer duration,

had a higher E2 level and a lower ET thickness than normal weight women but with no significant difference, p-value= 0.10, 0.50, 0.71 and 0.53 respectively.

**Table (2): A comparison between both groups regarding total dose, duration of gonadotropins, E2 and ET at day of trigger.**

Parameter	G-I Mean $\pm$ SD	G-II Mean $\pm$ SD	P-value
Total dose (iu)	1380.0 $\pm$ 372.8	1729.0 $\pm$ 644.4	0.10
Duration( days)	9.4 $\pm$ 1.2	10.0 $\pm$ 1.7	0.50
E2( pg/ml)	2250.0 $\pm$ 1191.0	3729.6 $\pm$ 11537.0	0.71
ET(mm)	10.2 $\pm$ 2.5	9.6 $\pm$ 2.5	0.53

Table (3) shows the response to COS. Overweight and obese women insignificantly produced more mature oocytes and the mean total number of immature oocytes was significantly less 1.7  $\pm$ 2.0 vs 3.7  $\pm$ 4.2, p-value=0.04.

**Table (3): Controlled ovarian stimulation response between both studied groups.**

Parameter	G-I Mean $\pm$ SD	G-II Mean $\pm$ SD	P-value
To. No. of oocytes	10.8 $\pm$ 3.3	13.0 $\pm$ 8.3	0.40
Mature (MII)	7.8 $\pm$ 2.6	11.1 $\pm$ 7.7	0.22
Immature(GV+MI)	3.7 $\pm$ 4.2	1.7 $\pm$ 2.0	0.04

Table (4) illustrates the rate of OHSS development in both groups. None of normal weight women developed OHSS, while 10 out of 43 overweight and obese women developed OHSS. The rate of OHSS development in overweight and obese was 23.2% vs 00.00% in normal weight women, p-value=0.09.

**Table (4): A comparison between both groups regarding OHSS development.**

Parameter	G-I (Total no.)	G-II (Total no.)	Total	P-value
OHSS	0(00.0%)	10(23.2%)	10	0.09
No-OHSS	10	33	43	
Total	10	43	53	

## Discussion

The detrimental effect of obesity on ovarian stimulation response may be explained via the effects of certain mediators e.g. leptin and ghrelin<sup>12</sup>. The increased leptin level within follicles leads to inhibition of ovarian steroidogenesis through its antagonizing effect to stimulatory factors (IGF-1, TGF- $\beta$ , insulin and LH)<sup>12</sup>.

The study showed that, although being insignificant, higher doses of gonadotropin and longer durations of stimulation cycles were needed to stimulate overweight/obese PCOS women than normal weight women. Some other studies agreed with us that showed significant higher doses and longer duration of gonadotropin stimulation were required in the overweight PCOS women<sup>1,2,12</sup>.

This study showed that there was no significant variation between both the overweight/obese and normal weight women regarding the number of retrieved mature

oocytes despite being higher in the overweight group. While the mean total number of immature oocytes was significantly less in the overweight/obese group. Similar results were obtained by other studies<sup>13</sup>.

On the other hand, many studies disagreed with our findings and showed the women of both groups produced a comparable number of mature oocytes without significance difference<sup>1,2</sup> or overweight/obese women produced less mature oocytes<sup>9,14</sup>.

Regarding the development of OHSS, the present study revealed that the overweight/obese women are at a higher risk of developing OHSS by a 23.2% than that of normal weight women. This could be confirmed by a higher level of serum E2 at the day of HCG trigger which was showed in the overweight/obese women. This result were inconsistent with many studies which concluded that overweight/obese women at a lower risk of developing OHSS due to low ovarian reserve<sup>15</sup> and

that high body weight had no significant effects on the rate of developing OHSS<sup>1, 2,9,14</sup>.

Depending on these results, we can conclude that the exact effects of high body weight on the response to COS and the risk of OHSS in such group of women is a matter of controversy and need further researches.

**Conflict of Interest:** The authors declare that there was no any conflict of interest.

**Source of Funding:** There was for funding source for this study.

**Ethical Clearance:** A verbal consent was taken from all the included couples.

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# Evaluation of Locoregional Control and Survival after Total Mesorectal Excision for Middle and Lower Rectal Cancer

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## Abstract

**Background:** The cornerstone in rectal cancer management is resection, negative margin and resection of all draining lymph nodes. Neo-adjuvant chemo-radiation may increase the ability to preserve continence by down-staging the cancer and shrinking the size of the tumor to permit the achievement of a cancer-free margin.

**Objectives:** To evaluate locoregional control and survival after total mesorectal excision for middle and lower rectal cancer.

**Patients and Method:** A retrospective study of 119 patients of middle and lower rectal cancer patients who underwent total mesorectal excision at National Cancer Institute, Cairo University in the period from 1st January, 2006 to 31st December, 2010, certain factors related to the primary tumor were recorded including: (age, sex, site, initial stage, histopathology, tumor size, grade of the tumor, number of Lymph nodes, lympho-vascular invasion, neo-adjuvant chemotherapy and radiotherapy and surgical procedures either sphincter preserving surgery or abdominoperineal resection).

**Results:** Overall survival was worsened by T stage (p value 0.036), positive lymph nodes (p value 0.071), positive margin (p value 0.031) and lack of adjuvant treatment (p value 0.001).

**Conclusion:** The overall survival at 3 years was 58.1% which was worsened by advanced stage, positive margin, and lack of adjuvant treatment. The 3-year disease-free survival was 55%, which was worsened by older age, lymph node positivity, positive surgical margin and lack of adjuvant therapy. The local recurrence rate after three years was 12.6%. Postoperative chemo-radiotherapy was associated with better overall survival when compared to chemotherapy alone or no adjuvant treatment.

**Keywords:** Rectal cancer, Neo-adjuvant chemoradiotherapy, Total mesorectal excision, overall survival, Disease free survival.

## Introduction

Colorectal cancer is the second most common cancer in women and third-most common cancer in men.

In 2012, 614,000 women (9.2% of all new cancer cases) and 746,000 men (10.0% of new cancer cases) were diagnosed with colorectal cancer worldwide. <sup>(1)</sup>

The main goals in the treatment of rectal cancer are: (1) Ensuring local control; (2) Maintaining long-term survival; (3) preservation of anal sphincter, bladder, and sexual function; and (4) maintaining patient's quality of life. <sup>(2)</sup>

Total mesorectal excision (TME) and the addition of neo-adjuvant chemo-radiotherapy (CRT) show

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significant improvements in local control and survival.<sup>(3)</sup>

TME has markedly reduced local recurrences even in lymph node-positive rectal cancers and is supposed to prevent all locally recurrent disease after optimal curative surgery.<sup>(4)</sup>

**Aim of the Work:** To evaluate locoregional control after TME in patients with middle and lower rectal cancer & its impact on survival at National Cancer Institute, Cairo University.

**Patients and Method**

This is a retrospective study of 119 patients with middle and lower rectal cancer patients who underwent TME at National Cancer Institute, Cairo University in the period from 1st January, 2006 to 31th December, 2010. Included patients had pathologically proven middle or lower rectal cancer that underwent TME at National Cancer Institute whether they received neo-adjuvant chemotherapy and radiotherapy or not. The hospital records of the patients were reviewed for clinical, pathological and management data. Clinical data included age, sex, site, initial stage and the presence of complications like bleeding or obstruction. Pathological data included histopathology, tumor size and grade, lymph node number, lympho-vascular invasion and stage. And the management data included if patients received neo-adjuvant chemotherapy and radiotherapy, the surgical procedure performed wither sphincter preserving surgery or abdominoperineal resection and if adjuvant treatment was given to the patients or not.

The overall survival was calculated from diagnosis

date to the date of death or lost follow up. Disease free survival was calculated from date of (TME) till date of local recurrence, distant metastasis or death.

**Results**

The mean age for the studied group was 44.6±13.8 years, ranging from 17 to 73 years with male predominance. A large proportion of the patients presented with complications mainly in the form of bleeding per rectum (40.3% of the studied group). Adenocarcinoma was the main pathological type (74.8%) followed by mucinous adenocarcinoma (20.2%). About 62% of the patients had their lesions 5 cm or above from the anal verge. Grade 2 disease was more common than grade 3. T-stage at diagnosis was T3 in more than half of cases.

Lymph nodes were positive in 52% of cases and the median number of excised lymph nodes was 10 nodes (range: 1-30 nodes).The median number of positive lymph nodes was 1 node (range: 0-18 nodes). Neo-adjuvant therapy was administered to 66 patients (55.5%); mainly as a combination of chemo- and radiotherapy (CTH+RTH) in 63 patients, near 90% of the patients received post-surgery adjuvant treatment. Abdominoperineal resection (APR) was used for treating 62 patients (52.1%), while sphincter preservation was done in 57 patients (47.9%).

The median follow up time was 32.8 months (range: 1-111 months). The overall survival of the whole group was 58.1%; and was worsened by advanced stage, positive margin, and lack of adjuvant treatment (**Table 1**).

**Table (1): relation between overall survival & various prognostic factors.**

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Whole group			58.1	--	
T-stage					0.036
I, II	42	13	76.1	--	
III, IV	77	39	48.4	10.4 (14.4-55.2)	
LN positivity					0.071
Negative	57	20	69.2	--	
Positive	62	32	48.4	13.5 (8.9-61.7)	
Margin					0.031
Free	112	47	60.1	--	
Positive	7	5	28.6	6.4 (0.0-23.7)	

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Adjuvant therapy					0.001
No	26	18	31.0	8.8 (9.2-43.5)	
CTH	55	23	59.7	--	
CTH +RTH	38	11	74.8	--	

On multivariate analysis, the independent factors affecting survival were, age, adjuvant therapy, T-stage, and surgical margin status. Age above 50 years worsened survival with a hazard ratio (HR) of 2.41, the 95% confidence interval (CI) was 1.34-4.38. Adjuvant CTH+RTH had better survival compared to no therapy

(HR: 5.3, 95%CI: 2.37-11.88) and CTH alone (HR: 2.18, 95%CI: 1.01-4.71). Advanced stage worsened survival with HR of 2.05 (95%CI: 1.07-3.96). Positive surgical margin worsened survival with HR of 4.46 (95%CI: 1.58-12.56). (Table 2).

**Table (2): Multivariate analysis of overall survival of the whole studied group using Cox-proportional hazard model.**

	B	p value	HR	95.0% CI for HR	
				Lower	Upper
Age, > 50 years	0.826	0.004	2.41	1.34	4.38
Adjuvant		< 0.001			
Adjuvant (CTH+RTH vs. No)	1.668	< 0.001	5.30	2.37	11.88
Adjuvant (CTH+RTH vs. CTH)	0.781	0.047	2.18	1.01	4.71
T-stage, III, VI	0.720	0.031	2.05	1.07	3.96
Margin, Positive	1.494	0.005	4.46	1.58	12.56

The whole group disease-free survival (DFS) was 55% (Table 3). And it was obviously worse in patients who did not receive adjuvant treatment ( $p = 0.002$ ).

**Table (3): Disease-free survival in relation to various prognostic factors.**

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Whole group	119	67	55.0	27.1 (17.2-36.9)	
Age (years)					0.062
≤ 50	76	41	61.2	34.6 (17.6-51.5)	
> 50	43	26	42.8	11.6 (0.0-23.9)	
Sex					0.087
Female	50	32	46.7	20.9 (3.9-37.9)	
Male	69	35	60.7	42.5 (22.4-62.6)	
LN positivity					0.070
Negative	57	26	59.6	44.2 (4.9-83.5)	
Positive	62	41	51.1	24.8 (14.0-35.6)	
Margin					0.053
Free	112	61	56.8	32.1 (17.7-46.5)	
Positive	7	6	28.6	6.1 (0.0-13.2)	
Adjuvant treatment					0.002
No	26	19	31.2	8.3 (3.2-13.8)	
CTH	55	31	56.7	34.0 (8.9-59.2)	
CTH +RTH	38	17	71.0	44.0 (2.1-86.0)	

Multivariate analysis was done involving factors with near significant effect on DFS (p values up to 0.1). The independent factors affecting DFS were lymph node positivity, adjuvant therapy, age, and surgical margin status as illustrated in (Table 4).

Age above 50 years worsened survival with a

hazard ratio (HR) of 2.54 (95%CI: 1.47-4.38). Adjuvant CTH+RTH had better survival compared to no therapy (HR: 5.20, 95%CI: 2.47-10.95) and CTH alone (HR: 1.93, 95%CI: 1.01-3.71). Positive surgical margin worsened survival with HR of 3.95 (95%CI: 1.46-10.69). Lymph node positivity worsened survival with HR of 1.72 (95%CI: 1.03-2.88).

**Table (4): Multivariate analysis of disease-free survival using Cox-proportional hazard model.**

	B	p value	HR	95.0% CI for HR	
				Lower	Upper
Lymph node positivity	0.545	0.037	1.72	1.03	2.88
Adjuvant		<0.001			
Adjuvant (CTH+RTH vs. No)	1.648	< 0.001	5.20	2.47	10.95
Adjuvant (CTH+RTH vs. CTH)	0.659	0.048	1.93	1.01	3.71
Margin, Positive	1.374	0.007	3.95	1.46	10.69
Age > 50	0.932	0.001	2.54	1.47	4.38

By the end of 3 years follow up, the loco regional recurrence was reported in 15 patients & therefore, the loco regional recurrence rate was 12.6%.

**Discussion**

The mean age of the studied group was 44.6±13.8 years, ranging from 17 to 73 years with male predominance. An important remark in the current series is that, patients 40 years or younger constituted 42% of the studied group. The increase in rectal cancer in younger patients has been previously reported. O’Connell et al. demonstrated an increase in rectal cancers in patients’ aged 20 to 40 years using the SEER database data from 1973 through 1999. (5)

Although a previous study on 837 patients suggested that age, tumor size, histological grade, preoperative obstruction, pathological type, status of resection and lympho-vascular invasion are all considered positive prognostic factors; the multivariate analysis results identified the depth of invasion, histological grade and number of positive lymph nodes to be the most important prognostic factors. (6)

In the present study, there was a male to female predominance with a ratio (1.4:1); which agrees with facts

that men are more risky and have higher incidence and worse prognosis for colorectal cancer than women. (7,8) Men are exposed to risk factors more than women so they develop more colorectal cancers (CRC) at all ages and also four to eight years younger than women. (9)

In this study, there was no significant survival difference between males and females. Although men have higher risk to develop CRC than women; the findings regarding differences in prognosis based only on sex have been inconsistent with several studies reported higher survival in females (10, 11, 12) , while different studies did not report the same difference. (13)

The survival advantage of women was confirmed in a multivariate analysis performed by Majek et al. on 164996 patients diagnosed with CRC from (1997 to 2006) after adjusting stage and sub-site in patients under 65 years of age, but not in older subjects. This advantage was most pronounced for localized disease and explained by the effect of sex hormones. (14)

In the current study, adenocarcinoma was the main pathological type about (74.8%) of CRC followed by mucinous adenocarcinoma (20.2%). This agrees with older study which stated that Adenocarcinomas are the most common type of colorectal cancers and among



these mucinous subtype constitute approximately 10% and signet ring adenocarcinoma constitute 1%-2.4%.<sup>(15)</sup>

The gold standard surgical technique for rectal tumors staged T1, T2, and favorable T3 (T3N0M0) (T3 with negative nodal status) is TME, which is recommended after neo-adjuvant therapy in low-seated rectal cancers, T3c and T3d disease to reduce the risk of local recurrences.<sup>(16)</sup>

In the current series, the overall survival of the whole group was 58.1% at 3 years. Overall survival was worsened by advanced stage, positive margin, and lack of adjuvant treatment. The 3-year disease-free survival (DFS) of the whole group was 55%. Disease-free survival was worsened by older age, lymph node positivity, positive surgical margin status, and lack of adjuvant therapy. The local recurrence rate after two years was 12.6%.

The local recurrence rate ranges from less than 6% to more than 50% and survival from 45% to 80% at 5 years in surgically treated cases with markedly better outcomes with neo-adjuvant radiotherapy (with or without chemotherapy) and better surgical techniques.<sup>(16)</sup>

Neo-adjuvant therapy was used in 66 patients (55.5%) of the current series mainly in the form of chemoradiotherapy (CRT), older studies stated that Neo-adjuvant radiotherapy alone or with sensitizing chemotherapy has been increasingly used before surgical resection in the primary management of patients with rectal cancer and especially T3 and T4 rectal cancers benefit with approximately 50% reduction in local recurrence by preoperative CRT in comparison with cases receiving only postoperative CRT, but this is not translated into a significant difference in overall survival that agreed with our study.<sup>(17,18)</sup>

In the current series, postoperative chemoradiotherapy was associated with better overall survival when compared to chemotherapy alone or no adjuvant treatment. However, neo-adjuvant chemoradiotherapy did not improve overall or disease-free survival of the studied group. These results are inconsistent with previous reports.

On studying a large population-wide cohort of 869 patients it was found that overall survival was worse with age was 65 year or more, high grade of pathological differentiation, perineural nerve invasion, and multiple regional lymph node metastases.<sup>(19)</sup>

In the current study, the local recurrence rate after two years was 12.6%. This figure is relatively higher than previous studies which reported that recurrence rates by different groups vary widely from 4% to 12% at 5 years despite following TME guidelines.<sup>(20)</sup> This can be explained by the high proportion of patients with advanced stage (T-stage III and IV) in our series.

It was stated by Leong that mesorectal metastases could extend up to 5 cm below the lower margin of a rectal tumor. Their presence in pT3 and pT4 tumors indicates a poorer prognosis and his results also confirmed that TME improves outcomes in mid- and low-rectal cancers.<sup>(21)</sup>

The majority of the previously mentioned studies are in agreement with the current study that advanced stage is an independent component that worsens overall survival and disease-free survival.

## Conclusion

This study reported that overall survival at 3 years was 58.1% which was worsened by advanced stage, positive margin, and lack of adjuvant therapy. The 3-year disease-free survival was 55%, which was worsened by older age, lymph node positivity, positive margin, and lack of post-operative chemoradiotherapy. Local recurrence rate after three years was 12.6%. Postoperative chemoradiotherapy results in better overall survival when compared to chemotherapy only or no adjuvant treatment. Neoadjuvantchemoradiotherapy did not enhance the overall or the disease-free survival of the studied group.

**Ethical Clearance:** Taken from Egyptian National Cancer Institute Ethical Committee.

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**Conflict of Interest:** Nil

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