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# False Positive Widal Reactions in Patients with Malaria- the Diagnostic Challenges and Public Health Implications

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## ABSTRACT

**Background and objectives:** Malaria and typhoid fever are common endemic infectious diseases in many parts of Karnataka and they still remain major public health concern. False positive widal reactions have been reported in patients with non enteric salmonella infections, malaria, immunological disorders and chronic liver disorders. We undertook this study to find out false positive Widal reactions in malarial cases.

**Method:** A total of hundred cases admitted to McGann hospital were studied for malarial parasites. 50 healthy cases with age, sex, socio-economic and environmental background similar to the subject were selected as controls. Widal test was performed on 100 patients and 50 healthy controls.

**Results:** In 100 smear positive cases, 18(18%) cases were positive for widal reaction. Of 18 widal positive cases, 10(77%) cases were *P.falciparum* and 8(9%) cases were *P.vivax*. Among the control group, only non significant titre was noted in four cases. Out of 100 smear positive cases, *P.vivax* was noticed in 87(87%) & *P.falciparum* was noticed only in 13(13%) cases.

**Conclusion:** Widal test interpretation has to be done with caution in malaria and typhoid endemic region. If there is a suspicion of co infection of malaria and typhoid, only malaria should be treated, unless blood culture yields salmonella species.

**Keywords:** Malaria, Widal Reactions, Typhoid Fever

## INTRODUCTION

Malaria and typhoid fever are common infectious diseases in many parts of India. These diseases are endemic in many parts of the Karnataka and they present with fever, clinician has to pass through exercise of differential diagnosis of the two diseases.<sup>1</sup>

Widal test has been used very extensively in the serodiagnosis of typhoid fever in the developing countries; probably it remains only practical test available.<sup>2</sup> But interpretation of single antibody levels, rather than rising titres in paired sera, is difficult since base line antibody levels are influenced by such factors as age, prior exposure to salmonella antigen and cross reactivity with other coliforms and possibly malaria<sup>(3)</sup>.

Because of cross reaction between typhoidal salmonella antibodies and malarial antigens, the use of widal test as a diagnostic tool in patients with

malaria may lead to misleading results. This is because of false positive widal agglutination.<sup>4</sup>

## OBJECTIVES

1. To determine the incidence of positive widal reactions in malaria cases
2. To know whether positive widal reactions in malaria cases indicates co-infection or true single Infection
3. To re-evaluate the diagnostic value of Widal test in an endemic area.

## MATERIALS AND METHOD

The prospective study was carried out at MacGann hospital attached to Shimoga Institute of Medical Sciences, Shimoga. A total of hundred cases admitted to this hospital were studied.

**Inclusion criteria**

- 1) Patient with febrile illness
- 2) Presence of Malaria parasite in peripheral smear.

**Exclusion criteria**

- 1) Patient with previous history of typhoid fever
- 2) Patient with TAB vaccination within last 6 months
- 3) Patient with history or examination findings suggestive of any infectious disease other than malaria

**CONTROLS**

50 healthy cases with age, sex, socio-economic and environmental background similar to the subject were selected. Complete history was noted in each case in terms of duration and pattern of fever. The complete examination was done to rule out chronic liver disease and immunological disorder.

Thick and thin smear were examined for the malarial parasites after staining with J.S.B stain. Patients' blood collected for Widal test, blood culture

and complete hemogram. Sera from malarial smear positive patient were tested for somatic 'O', flagellar 'H' antigen of *S. typhi* and 'AH' antigen of *S. paratyphi A* after making doubling dilutions of the sera from 1:20 to 1:320. the highest dilution that demonstrated the agglutination was considered the titre.

Blood culture, stool culture and urine culture were performed for patients showing positive widal reaction. Other routine investigations like liver function tests, biochemical tests and urine analysis were performed.

**RESULTS**

Out of 100 cases smear positive for malaria 69(69%) were male & 31(31%) were female. Most cases were in age group of 20-42 years, but age range was 10-61 yers. Fever was intermittent in 72(72%) case and countinuous in 28 (28%) High degree feve i.e.> 103° F was noted only in 10(10%) cases moderate degree i.e.100-103°F was noted in 62(62%) cases and mild fever was noticed in 28(28%) cases. In most of the patients' common symptoms were fever, chills and rigors, vomiting, myalgia. Commons signs noticed were pallor, hepatomegally & splenomegaly.

**Table 1: Clinical features of malarial cases**

Signs / Symptom	Vivax n=87 No (%)	Falciparum n=13 No (%)	Total n=100 No (%)
<b>Duration of fever</b>			
1-8 days	32 (36.7)	3(23)	35 (35%)
8-15 days	42 (48.2)	9 (69.2)	51 (35%)
15-30 days	13 (14.9)	1 (7.6)	14 (14%)
Body ache	66 (75.8)	10 (76.9)	76 (76)
Pain abdomen	10 (11.4)	4 (30.7)	14 (14%)
Pallor	48 (55.1)	9 (69.2)	57 (57%)
Hepatomegally	25 (28.7)	8 (61.5)	33
Splenomegally	64 (73.5)	11 (84.6)	75 (75)
Headache	52 (59.7)	10 (76.9)	62 (62)

All cases were of uncomplicated malaria clinical features of all the cases were shown in table (1). Out of 100 smear positive cases, *P.vivax* was noticed in 87(87%) & *P.falciparum* was noticed only in 13(13%) cases. There were no mixed infections.

In 100 smear positive cases, 18(18%) cases were positive for widal reaction. The antibody titre was

considered significant when 'O' titre > 1:80 and 'H' titre > 1:160. Significant titre of 'O' & 'H' were observed in 17 (17%) and of 'O' & 'H' were in 1(1%) cases. Non significant titre was noticed in 22(22%) cases. Negative widal reactions was observed in 60 (60%) out of 18 widal positive cases, 10(77%) cases were of *p.falciparum* and 8(9%) cases were of *p.vivax*.

**Table 2: Widal test in malaria cases and control groups**

Widal titre	Falciparum n=13No (%)	Vivax n=87No (%)	Total n=100	Control n=50No (%)
Significant titreO	10 (77)	8(9)	18(18)	-
H	10 (77)	7(8)	17(17)	-
AH	-	1(1.14)	1(1%)	-
Non significant titreO	12(92.3)	10(11.5)	22(22)	4(8%)
H	12(92.3)	10(11.5)	22(22)	4(8%)
AH	-	-	-	-
Negative	8(61.5)	52(59.7)	60(60%)	42(84%)

(P&lt;0.05)

There were no significant typhoidal antibody titres in the control group. But, in 4(4%) cases there was no significant titre. Widal test was repeated to see for rise in antibody titres. But there was no rise in the titres in any of the 18 samples. In fact all cases showed decline in the antibody titres.

Blood cultures, stool culture and urine cultures were negative for salmonella species. Other hematological investigations, urine analysis stool examinations & live function tests were found normal. Patients were treated only with the antimalarial drugs and there was tremendous response.

## DISCUSSION

False positive widal reactions have been reported in patients with non enteric salmonella infections, malaria, typhus, cryptococcal infections, immunological disorders and chronic liver disorders<sup>5,6</sup>All these factors were ruled out by proper history, clinical examination and laboratory investigations in the present study.

In our study positive widal reactions was observed in 18(18%) of smear positive cases which is significantly higher compared to controls (p=0.05).

Co-infection of malaria and typhoid were observed by many author<sup>4,7,10</sup>But in our study co-infection was ruled out by negative blood and stool culture for salmonella. The tremendous response to antimalarial drugs in the present study itself will explain that, patients were suffering from malaria only but not by other infections.

The theory of polyclonal B cell activation as the cause of increased antibody and possible explanation for positive widal reactions in malaria patients has been hypothesized by auither.<sup>1</sup> In the present study this

hypothesis could explain the false positive widal reactions in malaria patients.

Malaria parasite may have some undefined antigenic determinants similar to s. typhi which can induce antibody production.<sup>4</sup>There should be fourfold rise in the antibody titres to diagnose a case of enteric fever.<sup>8</sup>But this is not possible in routine clinical practice and rarely performed.By the time patient comes for repeated test he might have received antibiotic which will blunt the assessment of rise in antibody titres

But routinely in some developing countries a single widal test is still being practiced. Single Widal test in endemic typhoid regions cannot provide a reliable diagnosis because;

- Repeated exposure to small inocula of S. typhi or other salmonella species that contain type 9 or 12 antigens.
- Previous typhoid immunizations.
- Other infectious agents such as malaria.

In developing countries where the use of single widal test appears to be norm, there has been increase in the rate of false positive results.<sup>6</sup> hence in situations where the diagnosis is based on a single test its modification with 2- mercapto ethanol treatment of the serum can de crease false positive reactions.

As the Widal test suffers from serious cross reactivity with other infectious agents, it may produce false positive results leading to an over diagnosis of typhoid fever. This leads to abuse of first line drug of choice (chloramphenicol) consequently selection of resistant mutants of s. typhi. Hence erroneous interpretation of the test result may lead to misdiagnosis and mismanagement of the patient, resulting in morbidity and mortality.

We conclude saying that; the Widal test interpretation has to be done with caution. If there is a suspicion of co infection of malaria and typhoid, only malaria should be treated unless blood culture yields salmonella species. Single Widal test has no diagnostic significance even in endemic regions. Hence modified Widal test can be performed in such cases.

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# A Study of Pattern of Biochemical Changes Occuring among Patients of Acute and Chronic Renal Failure in a Tertiary Hospital of Orissa

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## ABSTRACT

**Background:** Biochemical indicators are routinely monitored to enable timely assessment of strategies & management programmes in patient care to check the effectiveness of therapy as well as prevention of dangerous metabolic disturbances. An overview of biochemical pattern of the patients can assist the clinician in making adjustments to clinical management practices

**Objectives:** 1. To study the biochemical pattern of acute & chronic renal failure patients. 2. To compare the pattern of biochemical changes occurring in both the groups.

**Materials and Method:** Around 100 patients of acute renal failure & 100 patients of Chronic Renal Failure who were admitted in the hospital during September 2008 to September 2009 were examined, investigated & interviewed with the help of a pretested proforma. The pattern of biochemical changes occurring in both groups at that time was studied.

**Results:** The renal parameters, electrolytes & bicarbonates were more deranged in ARF whereas in CRF, anaemia, hyperparathormone, hyperphosphatemia, & hyperlipidemia were more seen.

**Conclusions:** It is important to check these parameters regularly in order to prevent the complications arising out of these in order to reduce the mortality.

**Keywords:** Acute & Chronic Renal Failure, Biochemical Changes, Hyperkalemia, Uraemia etc.

## INTRODUCTION

Renal failure is defined as reduction in renal function to a degree where the kidney is no longer able to maintain biochemical homeostasis. Renal disease remains one of the top ten leading causes of death since 1960. When renal failure occurs, waste products, such as nitrogen or salt & excess fluids are not removed by the kidneys & build up in the body, upsetting the body's normal chemical balance. Chemicals &

electrolytes such as sodium, potassium & calcium which are required for normal functioning become harmful or sometimes toxic to the body when they reach abnormally high or low levels.<sup>1</sup> There are several biochemical changes occurring in renal failure & more with Chronic Renal Failure (CRF). One such example is a steady increase in parathormone leading to elevated serum alkaline phosphatase concentrations due to isoenzymes from the osteoblasts.<sup>2,3</sup> In addition the failing kidney is also unable to produce vital hormones for red cell synthesis resulting in anaemia which is associated with cardiovascular risk requiring correction.<sup>4,5</sup>

Biochemical indicators are routinely monitored to enable timely assessment of treatment strategies & patient care. This is to check the effectiveness of therapy

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as well as prevention of metabolic disturbances which can have a fatal outcome. An overview of the biochemical pattern of the patients can also assist the clinician in making adjustments to clinical management practices.

Our study is an attempt to identify & study the biochemical parameters in Acute Renal Failure (ARF), which is preventable & eminently treatable problem as well as CRF patients so that the dangerous metabolic derangements can be corrected in time & also the effectiveness of dialysis can be known in order to prevent fatal complications like hyperkalemia, metabolic acidosis, uraemia etc.

## MATERIALS AND METHOD

**Study design:** Hospital based study

**Study area:** Medical wards & nephrology unit of M.K.C.G Medical College & Hospital, Berhampur, Orissa.

**Study subjects:** All cases of ARF & CRF admitted during the study period.

**Sample size:** 100 cases of ARF & 100 cases of CRF

**Study period:** September 2008 to September 2009.

**Sampling technique:** Simple random sampling technique

**Study variables:** Age, renal parameters, liver enzymes, lipid profile, Haemoglobin%, serum ferritin etc.

**Study instrument:** pre-tested questionnaire, equipments & materials required for examination.

**Statistical analysis:** percentages and proportions, mean & standard deviation, chi-square.

**Inclusion criteria for ARF:** Acute onset, oliguria (less than 400 ml/24 hrs), blood urea above 40mg%, serum creatinine more than 2mg%, 24 hours creatinine clearance less than 80 ml / min.

**Inclusion criteria for CRF:** progressive renal disease of gradual onset, urinary specific gravity lowed & fixed around 1010, blood urea above 40mg%, serum creatinine more than 2mg%, impaired creatinine clearance less than 80 ml / min.

**Exclusion criteria for both ARF & CRF:** those who did not fit the inclusion criteria & those who are not willing to participate in the study.

## METHODOLOGY

The study was carried out in the inpatients department of the medical wards & nephrology unit of M.K.C.G Medical College & Hospital, Berhampur, Orissa during the period of September 2008 to September 2009. All the diagnosed cases of ARF & CRF, through thorough clinical examination, detailed history & preliminary laboratory tests & admitted during that period were considered for study. According to the diagnostic criteria, the patients were divided into 2 groups i.e. cases of ARF & cases of CRF. Around 100 patients of ARF & 100 patients of CRF who fitted the inclusion criteria were admitted during that period which was also taken as sample size. The patients from both groups were interviewed with the help of a pretested, semi structured proforma which included the required details, after obtaining their consent. They were also subjected to laboratory investigations to know their biochemical status at that point of time. The data collected was analyzed.

## RESULTS

Out of the 100 ARF & 100 CRF cases, more no. of patients were in age group of 41 to 50 yrs. 28% of ARF patients were in the age group 41 to 50 yrs & 42% of CRF patients in the same age group, followed by 21 to 40 yrs (27% in both the groups). The female patients constituted 38% among ARF & 28% among CRF cases. It was observed that more derangement occurred in the age group of 41-50yrs in both acute & chronic renal failure. The aetiological factor responsible for ARF in most of the cases i.e. 50% was gastroenteritis followed by acute glomerulonephritis in 15%, whereas in CRF Diabetes mellitus was the most common cause (54%) followed by glomerulonephritis constituting 17%. About 40% of the patients were nonoliguric & 60% were oliguric among the ARF patients whereas about 90% of CRF patients were non oliguric. About 68% of pts of ARF & 72% of CRF patients had their Blood Urea Nitrogen above 40%. It was observed that the derangements of renal parameters were seen in the age group of 40 – 50 yrs in both acute & chronic renal failure. Table 1 shows that most of the ARF patients i.e. 36% of them had blood urea values between 50 to 60 mg/dl followed by 28% of them having values between 40 to 50 mg/dl whereas in CRF patients, maximum i.e. 48% had values between 40 to 50 mg/dl followed by 24% of them having values between 50 to 60 mg/dl. The blood urea value is more than 60mg/dl in 52% patients & less than that in 48% of ARF patients whereas it is more than 60mg/dl in 28 %

patients & less than that in 72% of CRF patients. (p= 0.0005) which is statistically significant. It is shown in table 2 that 72% of patients of ARF & 82% of CRF patients had serum creatinine value of less than 5 mg/dl & 28% of ARF patients & 18% of CRF patients had serum creatinine value of more than 5 mg/dl. However difference between the findings of ARF & CRF are not significant statistically. Almost 85% of the cases of ARF & 96% of CRF cases had serum sodium values of than 145meq/L & only 15% among ARF & 4% among CRF patients showed values more than 145 meq/L. The difference of findings between ARF & CRF was statistically significant.(p=0.0002). The bicarbonate value among ARF patients was less than 19.0mmol/L in 45% of patients & 30% in CRF patients.

The RBS values of more than 140 mg/dl were seen in 40% of ARF patients & 50% of CRF patients. 85% of ARF patients had normal calcium levels i.e.9-11mg/dL whereas 20% of CRF patients had hypocalcemia. The Phosphate levels were normal for 92% of ARF patients (3-4.5 mg/dL) whereas 68% of CRF patients had high phosphate concentration. The serum parathormone was normal in almost all the ARF patients but elevated in 72% of CRF patients. The liver enzymes were within normal limits in 96% of ARF patients but 15% of CRF showed elevated overall liver enzymes ( Normal range of Alkaline phosphatase is

30-120 U/L, Alanine Amino Transferase & Aspartate Amino Transferase is 0-35U/L) <sup>6</sup>.

Table 3 shows the haemoglobin concentration of less than 10gm/dL in 35% of ARF patients & 92% of CRF patients which is statistically highly significant.(p=0.000) It is more than 10gm/dL in 65% of ARF patients & only 8% of CRF patients. Serum ferritin was decreased in 90% of the CRF patients whereas Iron Binding Capacity (TIBC) was elevated in 80% of the anaemic CRF patients & decreased in 12% of them. Around 95% of the patients of CRF had haemoglobin below 12gm/dL.

The serum triglyceride levels were more than 200 mg/dL in 20% of ARF cases & 75% in CRF cases as per table 4. The difference was statistically highly significant. (p=0.000). Only 25% of CRF cases had serum triglyceride of less than 200 mg/dL which is the cut off point for normal. <sup>7</sup> The serum cholesterol levels were more than 240 mg/dL in 12% of ARF patients & 51% of CRF patients which is statistically highly significant. (p=0.000) It is less than 240 mg/dL in 88% of ARF patients & 49% of CRF patients. Around 90% of ARF patients & 60% of CRF patients had LDL value of less than 130 mg/dL. About 10% of ARF & 40% of CRF patients had HDL value of less than 35 mg/dL.

**Table 1: Pattern of blood urea between ARF & CRF patients.**

Blood Urea(In mg/dL)	ARF		CRF	
	No.	%	No.	%
40 – 50	22	22	48	48
50 – 60	26	26	24	24
60 – 70	28	28	16	16
70 – 80	14	14	8	8
>80	10	10	4	4
Total	100	100	100	100

**Table 2: Pattern of serum creatinine**

Serum Creatinine (In mg/dL)	ARF		CRF	
	No.	%	No.	%
2 – 3	30	30	46	46
3 – 4	22	22	24	24
4 – 5	20	20	12	12
5 – 6	10	10	6	6
6 – 7	7	7	7	7
7 – 8	8	8	3	7
>8	3	3	2	2
Total	100	100	100	100

**Table 3: Pattern of serum potassium**

Serum Potassium(In meq/L)	ARF		CRF	
	No.	%	No.	%
<2	0	0	2	2
2 – 3	4	4	13	13
3 – 4	16	15	15	15
4 – 5	30	30	45	45
>5	50	50	25	25
Total	100	100	100	100

**Table 4: Pattern of lipids**

Serum Triglycerides(In mg/dL)	ARF		CRF	
	No.	%	No.	%
150 – 200	80	80	15	15
200 – 250	10	10	20	20
250 – 300	10	10	40	40
>300	0	0	25	25
Total	100	100	100	100
Serum Cholesterol ( in mg/dL)				
160 – 200	18	18	25	25
200 -240	70	70	24	24
>240	12	12	51	51
Total	100	100	100	100

## DISCUSSION

In the present study, maximum belonged to the middle age group of 41-50 yrs in both acute & renal failure cases. It is also seen that females constituted around 38% among ARF cases which is similar to the study by Mehta et al<sup>8</sup> & 28% in CRF cases. The commonest etiological factor responsible for ARF was due to dehydration due to gastroenteritis. According to John P Cunha<sup>9</sup>, the commonest cause of pre renal failure is due to dehydration from vomiting & diarrhea which is similar to our study. According to Liano F<sup>10</sup> et al & Thadani R et al<sup>11</sup> & Dr. Rebecca<sup>12</sup>, at least half of all cases are non- oliguric which is similar to our study.

Acute glomerulonephritis is more seen in children which is rare in adults but it was seen as 2<sup>nd</sup> most common cause. The studies by Falk RJ<sup>13</sup> & Kobrin S<sup>14</sup> also support this fact. 72% of patients of ARF & 82% of CRF patients had serum creatinine value of less than 5 mg/dL A steady serum creatinine concentration is a good marker of glomerular filtration rate. Hence it is important to evaluate & maintain the creatinine levels.<sup>15</sup> Successful amelioration of the renal failure state depends on early identification & treatment of the cause of the disorder<sup>16, 17</sup>. Total serum calcium levels were normal in maximum patients of ARF which is

similar to the study by Wilson L et al.<sup>18</sup> It is seen that serum parathormone level occurs in CRF & more with advanced CRF & progressive hypocalcemia & hyperphosphatemia are the initiating factors for hyperparathyroidism which is concurrent with the study by MH Rehman et al<sup>19</sup>. Significant hyperphosphatemia was seen in chronic & advanced renal failure rather than acute & early renal failure which is similar to the studies by Rao SD<sup>20</sup> & Portale AA<sup>21</sup> Around 92% of the CRF patients had Haemoglobin% below 10 gm/dl which is similar to the study by Patel et al.<sup>22</sup> Patient with CRF are more at risk for cardiovascular disease & have higher prevalence of hyperlipidemia than general population<sup>23, 24</sup>. Our study shows most of the CRF patients having hyperlipidemia who have more cardiovascular risk. It has been also suggested that hyperlipidemia could cause renal injury & contribute to the progression of renal disease<sup>25</sup>. Hence it is necessary to keep a check in order to control & prevent cardiovascular morbidity as well as to arrest the progression of renal disease.

## CONCLUSION AND RECOMMENDATIONS

- The renal parameters, electrolytes & bicarbonates are more deranged in ARF which can lead to complications like hyperkalemia & metabolic



acidosis requiring correction in order to prevent mortality whereas in CRF, anaemia, hyperparathormone, hyperphosphatemia, & hyperlipidemia were more seen. It is important to check these parameters regularly in order to prevent the complications arising out of these in order to reduce the mortality.

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# Respiratory Morbidity in Spray Paint Workers in an Automobile Sector

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## ABSTRACT

**Background:** Occupational Asthma (OA) is a major cause of respiratory morbidity and the most common cause of non acute lung disease in the industrialized world. The incidence of OA in developed country is increasing, while in developing countries is still unknown. Automobile is a place where workers are exposed to harmful chemicals and toxic substances. In automobile industry work floor assembly lines chassis move continuously and pass by "Robot Painter" that spray them and workers assemble the chassis. The paint that is used contains isocyanate (Low molecular weight compound) which is most frequent agent responsible for OA.

**Objective:** The present study is under taken to assess respiratory morbidity of paint workers in terms of obstructive and restrictive lung pattern and to study relationship between duration of exposure and their respiratory morbid state.

**Method:** This cross sectional study included 70 car spray paint workers, who are working for 1-6 years in an automobile shop. A pre structured questionnaire was used to record the clinical, sociodemographic profile and clinical examination. Pulmonary function parameters were recorded by a computerized spirometer- Medspiror during their working hours. Chi square and independent t test were applied.

**Results:** Sixty workers had normal lung functions. The nine isocyanate exposed workers showed significant reduction in FEV1/FVC ( $p < 0.05$ ) suggestive of obstructive lung pattern and one subject had increase in FEV1/FVC ( $p < 0.05$ ) suggestive of restrictive lung pattern on long term exposure (>5yrs).

**Conclusion:** With irregular usage of preventive measures like face mask, goggle, coat and the low levels of long term exposure to isocyanate can cause respiratory morbidity as isocyanate induced occupational asthma.

**Keywords:** *Isocyanate (Spray Paint), Isocyanate Induced Asthma, Respiratory Morbidity Preventive Measures*

## INTRODUCTION

Pneumoconiosis constitutes the major proportion of the occupational disease and is one of the ancient occupational disease. Occupational Asthma is defined as asthma caused or made substantially worse by agents inhaled in the occupational environment<sup>[1]</sup>

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Since Fuchs and Valade were the first to recognize that isocyanate exposure can cause respiratory diseases, numerous studies have been carried out among paint works<sup>[2]</sup>.

Automobile industry involves spray painting, welding, grinding, hammering dents, removing damaged parts etc. Workers may be exposed to hazards including isocyanates, metals in paints, solvents, dusts and noise<sup>[3]</sup>. Risk of occupational exposure to isocyanates is increasing substantially because of the rapidly expanding use of coating materials (Paints), adhesives and binders<sup>[4]</sup>.

Recent years, many studies documented the effects of spray paint (containing isocyanate) on respiratory functions, which is of a major concern regarding Occupational Asthma<sup>[5,6]</sup>

Spray paint which is used in automobile car industry contains isocyanate along with other chemicals like, Chromium, Cadmium. Diisocyanates are monomers, low molecular weight compounds with two  $-N=C=O$  (isocyanate) functional groups attached to an aromatic or aliphatic parent compound.

Isocyanates are highly reactive compounds that have a variety of industrial applications such as, Paints, Polyurethane foam manufacturing, Elastomers, Adhesives, Surface coating, Varnishes, Binders and Resins.

Some Ex. for Diisocyanates are TDI (Toluene Diisocyanate), MDI (Methylene Diphenyl Diisocyanate), HDI (Hexamethylene Diisocyanate), IPDI (IsoPhorone Diisocyanate) and NDI (Naphthalene Diisocyanate).

Diisocyanates have been the most commonly identified cause for occupational asthma (OA) in industrialized areas. Asthma among diisocyanate workers may be due to a high level of irritant exposure at work or by sensitization to diisocyanates. Alternatively, asthma may be coincidental or may be aggravated by work exposure<sup>[7]</sup>.

Compared with OA caused by other agents, those with OA due to diisocyanates had a significantly earlier onset of asthma (mean 5 yr vs. 7 yr). Spray painting creates fine mist as droplets may stay suspended in the air for the short time increasing risk of exposure.

According to NIOSH isocyanate exposure should not exceed an 8 hour time weighted average (TWA) exposure of 5 ppb or a short time ceiling exposure of 20 ppb.

Effects of long term low levels of TDI exposure has been assessed by several group of investigators but there have been no acute toxic exposure to MDI resulting in acute respiratory diseases. Because of the vapor pressure of this material is so low, large airborne exposure occurs infrequently. Case of MDI induced asthma was first reported in 1973 and only

epidemiological study reporting this was by Zammit-Tabona et al.<sup>[6]</sup> HDI and NDI has been reported to cause a OA and a case of isophorone induced asthma was reported by Clarke<sup>[8]</sup>.

The early identification of Occupational Asthma in workers lead to reversal of the symptoms and prevent additional workers from being at risk of getting Occupational Asthma<sup>[9,10]</sup>.

Without early detection, workers will be needlessly put at risk of developing morbid lung diseases possibly preventing from enjoying leisure sports activities and continuing to work in the same profession<sup>[9]</sup>.

Despite possible adverse health effects there has been little epidemiologic investigations of the automobile repair industry<sup>[11]</sup>.

## METHOD

The present study was designed as a cross sectional study. It was carried out in an automobile shop in Bangalore city. A total of 70 male workers who were working in a car spray paint booth (exposed to diisocyanates) for 1-6 years and aged between 25 - 35 years were included. Using interview technique as a tool for data collection, clinical history, sociodemographic, occupational history and clinical examination of the subjects were recorded on predesigned proforma. Pulmonary function parameters were recorded by a computerized spirometer- Medspiror during their working hours. These are

- Forced Vital Capacity (FVC)
- Forced Expiratory Volume in First second ( $FEV_1$ )
- $FEV_1/FVC$  ( $FEV_1\%$ )
- Peak Expiratory Flow Rate (PEFR)
- Forced Expiratory Flow during 25-75% expiration ( $FEF_{25-75\%}$ )

Spirometry is required for the evaluation of workers for disability under the Social Security Administration (SSA) <sup>[12]</sup> Occupational Safety and Health Administration (OSHA) <sup>[13]</sup> and in Workers Compensation Settings<sup>[14]</sup>.

**Table no.1: Interpretation of Spirometry values<sup>[15]</sup> :**

Parameters	Restrictive	Obstructive
FVC	< 80% of predicted	Normal or < 80% of predicted
FEV <sub>1</sub>	Normal or < 80% of predicted	< 80% of predicted
FEV <sub>1</sub> /FVC	≥ predicted	< predicted

These values (FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC, PEFR, FEF<sub>25-75%</sub>) were compared with average predicted for a subject on the basis of age, sex, built and race<sup>[16]</sup>.

**Statistical Analysis**

Chi square test is applied to study the relationship between duration of working and their morbid state. p <0.05 is considered as statistically significant.

**RESULTS**

Table 2 depicts anthropometric characteristics of study group. Majority had a height between 165-170 cms. Mean height of the workers was 163.33cms and the mean weight was 65kgs, while majority were of 65-75 kgs. BMI was calculated and 38% workers were obese. Table 3 shows distribution of subjects according to demographic characteristics. 40% workers were between the age group of 30-35 yrs. Mean age was 28yrs. Their education history revealed that 5% were illiterate, 14% Primary, 21% Middle school and 51% were completed Secondary and Higher Secondary. 7% were Graduate and above. Mostly they include the supervisory staff. Socioeconomic status was known according to modified Kuppaswamy's classification<sup>[17]</sup>. 62 % belonged to lower middle class and 32% to lower class.

In table- 4 the Occupational Characteristics includes duration of exposure to isocyanate. 43% workers were working for 1-3 yrs and 28 % for 3-5 yrs, 17% more than 5yrs rest less than a year. There were 42% smokers with mean duration 1.91±0.31yrs of smoking, 2.45±0.98 being the number of cigarettes/day.

Table 5 depicts respiratory symptoms of workers 28% of workers had cough and wheezing, 4% had nocturnal awakening which are traditional symptoms of asthma. 12% had flu-like symptoms which indicates symptoms of Hypersensitivity Pneumonitis (HP) and 3% workers had Itching, redness & swelling of skin.

The scientific literature contains a limited amount of animal data suggesting that dermal exposure to diIsocyanate may produce respiratory sensitization.<sup>[18]</sup>

Table 6 shows Pulmonary function results in which all the parameters were statistically non significant as 86% workers are having normal lung function.

**Table-2 Anthropometric Characteristics of study group**

Features	No. of workers(%)
Height( cms) <150	2(3)
150-155	8(11)
155-160	14(20)
160-165	16(22)
165-170	22(31)
>170	8(11)
Weight(kgs) 45-55	5(7)
55-65	25(35)
65-75	30(42)
>75	10(14)
BMI: <25	48(68)
25-29.9	17(24)
30-39.9	2(3)
>40	3(4.2)

**Table 3: Distribution of subjects according to demographic characteristics**

Age: (yrs)	No. of workers(%)
20-25	30 (42)
25-30	12 (17)
30-35	28 (40)
Sex: Male (%)	100
Education: Illiterate	4( 5)
Primary	10 (14)
Middle	15 (21)
Secondary and Higher Secondary	36 (51)
Graduate and above	5 (7)
<b>Socioeconomic status</b>	
Upper	-
Upper middle	03 (4)
Lower middle	44 (62)
Lower	23 (32)

**Table 4: Occupational and Smoking Characteristics**

Duration of work	No. of workers (%)
<1yr	8 (11)
1-3yrs	30(43)
3-5yrs	20(28)
>5yrs	12(17)
Smoking History	
Smokers {n(%)}	30 (42)
Smoking duration	1.91±0.31
Number of cigarettes/day	2.45±0.98

**Table 5: Respiratory symptoms**

Symptoms	No.of workers (%)
Cough	19(27)
Chest tightness	5(7)
Breathlessness	15(21)
Nocturnal awakening	3(4)
Wheezing	20(28)
Flu-like symptoms	9(12)
Itching, redness & swelling of skin	2(3)

**Table 6: Pulmonary Function Test Parameters of spray paint workers**

Parameter	% predicted	p value*
FVC	90 .00 ± 10.48	>0.05
FEV <sub>1</sub>	89.00 ± 10.15	>0.05
FEV <sub>1</sub> /FVC	98.6 ± 7.307	>0.05
PEFR	82.00 ± 15.23	>0.05
FEF <sub>25-75%</sub>	71.05 ± 20.00	>0.05

\* p >0.05 statistically non significant.

**Table 7: Respiratory morbidity (Total n=70)**

Condition	Smokers (n=30)	Non smokers (n=40)
Obstructive	8	1
Restrictive	—	—
Combined	1	—
Normal	21	39

## DISCUSSION

This study was indoor based air pollution problem in an automobile. The study revealed that nine spray painters showed < 70% FEV<sub>1</sub>/FVC suggestive of obstructive lung disease (OA). Which could be attributed to long duration of exposure to isocyanate. PEFR and FEF<sub>25-75%</sub> were declined but not statistically significant. Among nine, seven were working for more than five years and two for 3-4 yrs and eight were smokers, one was non-smokers. In spite of proper paint shop design, less permissible dose of isocyanate, availability of face mask, goggle, coat etc. these

workers had negligence to use them probably due to lack of awareness towards ill effects of isocyanate. Compared to non-smokers the smokers had not statistically significant decline in PFT. So this suggest the effects of long term exposure to isocyanate were independent of smoking status. One worker had flu like symptoms with > FEV<sub>1</sub>/FVC suggestive of restrictive lung disease. Hypersensitivity Pneumonitis (HP) is a restrictive disease affecting the lung parenchyma. The initial symptoms associated with isocyanate induced HP are, flu like, including shortness of breath, non-productive cough, fever, chills, sweats, malaise and nausea.

Schwarz DA, Baker EL. in their a study concluded that, increased risk of airflow obstruction in painters was related to duration of exposure to isocyanate and was independent of the effects of cigarette smoking<sup>[19]</sup>. Akbar-Khanzadeh, et al., in 2.5yrs follow up study showed no daily or weekly reduction in PFTs but long term exposure to isocyanate even in very low concentration, contributing to impaired pulmonary functions<sup>[20]</sup>.

Many studies concluded in their study that, painters may be at risk for developing airflow obstruction and these changes appear to be related to the duration of exposure to paint products. Painters who smoke may be at risk of developing this obstructive process earlier than non-smoker

Chattopadhyay O, studied pulmonary function in automobile repair workers found that FEV<sub>1</sub> and FVC decrements were significantly associated with the length of exposure to isocyanate<sup>[21]</sup>.

A study by Morgan KC, done on FEV<sub>1</sub>, changes in paint workers which concluded that, none of the workers developed isocyanate-induced asthma suggesting the threshold limit and permissible exposure limit were not exceeded<sup>[22]</sup>.

Sparer J et al., reported that, despite of improvements in autobody shop materials, practices and control, there are still opportunities for substantial exposure to isocyanates due to personal negligence<sup>[23]</sup>.

In a longitudinal study of 5yrs, in the painters Diem JE, et al., concluded that, there is an association between higher exposure to TDI and larger annual decline in FEV<sub>1</sub> and FEF<sub>25-75%</sub>.

<sup>[24]</sup>In a study it was shown that negative pressure, air purifying, face mask respirators and paint

prefilters provides protection against isocyanates exposure in spray and priming operations if workers are properly trained and fitted<sup>74</sup>. The present study is consistent with previous studies.

Since chemicals with MW less than 1000 daltons are rarely antigenic, but may act as haptens. An immunologic mechanism causing TDI induced asthma has been suggested by Scheel et.al.<sup>[25]</sup>. More recently Karol<sup>[26]</sup> and co-workers have shown the presence of specific IgE antibodies for isocyanate molecule in the sera of the symptomatic workers.

Davies et.al have suggested that isocyanate act as pharmacologic inhibitors, reducing the ability of beta-adrenergic receptors to produce cAMP in sufficient amount to maintain bronchial tone<sup>[27]</sup>.

However, isocyanate asthma can occur in sensitized subjects even in the absence of airway hyperresponsiveness<sup>[28]</sup>. The mechanism of specific sensitization to isocyanates, still remains unclear, even though recent studies suggested that the isocyanate effect is linked to an acute inflammatory response in the airways<sup>[29]</sup>. The natural history of isocyanate induced asthma also to be defined.

### CONCLUSION

The important hazards of isocyanate are isocyanate induced asthma, Hypersensitive Pneumonitis leading to restrictive lung disease. Even with adequate preventive measures the personal negligence can lead to a major morbid state as above said. Based on above findings we recommend the following,

- The worker should wear mask during painting
- Pre employment medical examination and yearly medical check up
- Regular use of all preventive measures like face mask, Splash gloves, barrier cream etc.
- Avoidance of smoking, tobacco.
- PFTs and X-ray chest should be done once in a year after one year of exposure

It is well known that the cessation of occupational exposure to a sensitizing agent may modify airway caliber or bronchial reactivity. There is no pathognomic test for the diagnosis of occupational asthma. The

diagnosis depends primarily on history taking, clinical findings PFTs and response to treatment.

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# Factors Influencing Anaemia among Adolescent Girls from Urban Slums of Hyderabad - A Cross Sectional Cohort Study

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## ABSTRACT

**Background:** In India, Iron deficiency anemia affects an estimated 50% of the population. In Andhra Pradesh, overall 50% of women have some degree of anemia. Adolescent girls are highly susceptible to anemia which is responsible for unwanted happening following delivery. This study was undertaken with the objectives of (i) identifying factors responsible for anemia in adolescent girls (ii) To promote safe mother hood by reducing anemia in adolescent girls.

**Methodology:** This is cross sectional, cohort study. The survey was carried out in 2 urban slums (Jangayya Nagar and NTR Nagar) of Hyderabad, India. The study group was formed of 300 adolescent girls and was followed for a period of 6 months from June 2010 to November 2010. The tool was a proforma which attempted to capture both qualitative and quantitative data. The data was entered on MS Excel and was analyzed using SPSS version software.

**Results:** The prevalence of anemia among literate girls was 77.3% while in illiterate girls it was 90%, among premenarcheal girls 31.6% where as for post menarcheal girls it was 48.3%, among the girls with < 38 kg weight it was 46.6% while in girls with > 38 kg it was 39.33% and in girls with BMI > 18.5 kg/m<sup>2</sup> it was 21%. Out of 34 married adolescent girls 85.29 % were anaemic and 14.7% were non anaemic.

**Conclusion:** Improvement of literacy status is needed. All post Menarcheal girls should be supplemented with Iron and Folic acid tablets. Annual examination of blood for Hemoglobin percentage and stool for Helminthes infestation should be undertaken with periodic Deworming. Health education on the causation and prevention of anemia should be given to the community.

**Keywords:** Anaemia, Adolescent Girls, Literacy, Income, Age, Nutrition, Religion

## INTRODUCTION

Iron deficiency anemia is the most prevalent nutritional problem in the world to-day affecting more than 700 million persons<sup>1</sup>. In India, anemia affects an

estimated 50% of the population<sup>2</sup>. In Andhra Pradesh, overall 50% of women have some degree of anemia. Thirty three percent of women are mildly anaemic, 15% are moderately anaemic and 2% are severely anaemic<sup>3</sup>. Prevalence of anemia is slightly higher for younger women less than age 25 years than for older women<sup>3</sup>. Infants, pre-school children, adolescents and women of child bearing age particularly pregnant women are at greater risk of developing iron deficiency anemia<sup>4</sup>. It is slightly higher for rural women (51%) than for urban women (47%)<sup>3</sup> in India. It is observed that the prevalence of anemia was 27% and 22% in the rural and urban premenarcheal girls and 24.2% and 27.8%

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in the rural and urban postmenarcheal girls in the age group 11 – 16 years respectively in Hyderabad<sup>5</sup>.

The consequences of anemia in infants and children are impaired motor development and co-ordination, impaired language development and scholastic achievement, psychological and behavioral effects as well as decreased physical activity<sup>6</sup>. In adults it leads to decreased physical work and earning capacity and decreased resistance to fatigue<sup>7,8</sup>. In pregnant women it leads to increased maternal mortality and morbidity, increased fetal morbidity and mortality and increased risk of low birth weight<sup>9</sup>.

When the iron balance is precarious, repeated episodes of infection may result in the development of anemia, particularly in young children. This explains the high prevalence of anemia among infants and pre-school children. Adolescent girls are highly susceptible to anemia which is responsible for unwanted happening following delivery<sup>10</sup>. The treatment of iron deficiency anemia is technically simple requiring only the administration of medicinal iron. The only challenge is to tackle the complex reasons responsible for millions of untreated sufferers.

## MATERIALS AND METHOD

This is cross sectional, cohort study and was conducted in 2 urban slums (Jangayya Nagar and NTR Nagar) of Hyderabad, India. This study was undertaken with the following objectives: (i) To identify factors responsible for anemia in adolescent girls (ii) To promote safe mother hood by reducing anemia in adolescent girls.

## DATA

A proforma was developed specially after consultations among relevant skilled investigators from various agencies. The proforma attempted to capture both qualitative and quantitative data and was field tested by experienced investigators. The study group was formed of 300 adolescent girls and was followed for a period of 6 months from June 2010 to November 2010. They were tested for Hb concentration to know the prevalence of anemia. The data was entered on MS Excel and was analyzed using SPSS version software.

## RESULTS

**Table 1: Distribution of adolescent girls according to age and marital status**

Age (in years)	Marital Status				Total	
	Married		Unmarried			
	Number	%	Number	%	Number	%
10 – 14	0	0	195	65	195	65
15 – 19	34	11.33	71	23.67	105	35
Total	34	11.33	266	88.67	300	100

Out of the total adolescent girls 34 (11.33%) were married, who were in the age group of 15 – 19 yrs. None of the girls in the age group of 10 – 14 yrs were

married which suggests that child marriages are not prevalent. Only 71 (23.67%) were in the age group of 15 – 19 yrs who are also unmarried.

**Table 2: Distribution of adolescent girls according to Religion and Age**

Age in Years	Hindu				Muslim				Christian				Total	
	M		UM		M		UM		M		UM			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
10 – 14	0	0	159	53	0	0	31	10.3	0	-	5	1.67	195	65
15 – 19	28	9.34	64	21.3	6	2	4	1.3	0		3	1	105	35
Total	28	9.34	223	74.33	6	2	35	11.6	0		8	2.67	300	100

Maximum number of married girl were from Hindu religion (9.34%), followed by Muslim girls (2%) and none from Christians.

**Table 3: Relationship between age marital status and anemia**

Age in years	Married				Unmarried				Total	
	Anemic		Non Anemic		Anemic		Non Anemic			
	No	%	No	%	No	%	No	%	No	%
10 – 14	-	-	-	-	153	51	42	14	195	65
15 – 19	29	9.67	5	1.67	56	18.66	15	5	105	35
Total	29	9.67	5	1.67	209	69.66	57	19	300	100

Among 300 adolescent girls 34 were married. Out of which 9.6% were anemic and 1.67% were not anemic. 266 girls were unmarried, out of which 209 (69.66%) were anemic. 51% of unmarried girls who are

anemic was in age group of 10 – 14 years and 18.66% were in age group of 15 – 19 years. Among the 57 non anemic unmarried girls 42 girls were of from 10 – 14 years age group and 15 in the age group of 15 – 19 yrs.

**Table 4: Relationship between anemia and per capita income**

Per capita Income	Anaemic		Non-Anaemic		Total	
	Number	%	Number	%	Number	%
< 500	27	84.37	5	15.63	32	100
> 500	211	78.73	57	21.27	268	100
Total	238		62		300	

$$\chi^2 = 0.273; df = 1; p = 0.05$$

The percentage of anemia was higher i.e. 84.37% among the families with per capita income < Rs.500

when compared to 78.73% in families with income more than Rs.500.

**Table 5: Relationship between Types of Menstrual Cycle & Anemiae**

Type of Menstrual cycle	Anaemic		Non-Anaemic		Total	
	Number	%	Number	%	Number	%
Regular	131	72.77	30	16.67	161	89.44
Regularly Irregular	8	4.45	0	0	8	4.45
Irregularly irregular	6	3.34	5	2.77	11	6.11
Total	145	80.56	35	19.44	180	100

Among the 89.44% girls who were having regular menstrual cycle 72.77% were anaemic, 60.07% were non anaemic, 4.45% were anaemic with regularly

irregular cycles. 3.34% girls were anaemic with irregularly irregular cycles and 2.77% girls were non anaemic with irregularly irregular cycles.

**Table 6: Relationship between history of Menorrhagia & Anemiae**

Menorrhagia	Anaemic		Non-Anaemic		Total	
	Number	%	Number	%	Number	%
Present	27	9	6	2	33	11
Absent	118	39.33	29	9.33	147	48.66
Total	145	48.33	35	11.33	180	59.66

$$\chi^2 = 0.001 df = 1 p = > 0.05$$

Among 180 girls, 33 girls were having menorrhagia and out of 33 girls 81.82% were anaemic, 18.18% were non anaemic. Among 147 girls without history of

menorrhagia, 39.3% were anaemic and 9% were non anaemic.

**Table 7: Relationship between BMI of adolescent girls and Anemia**

BMI	Anaemic		Non-Anaemic		Total	
	Number	%	Number	%	Number	%
< 18.5 kg/m <sup>2</sup>	175	58.33	45	15	220	73.33
> 18.5 kg/m <sup>2</sup>	63	21	17	5.67	80	26.67
Total	238	79.33	62	20.67	300	100

$$\chi^2 = 0.020 \text{ df} = 1 \text{ p} = > 0.05$$

The above table shows out of 300 girls 238 were anaemic of which 175 were with BMI of < 18.5 kg/m<sup>2</sup>, 63 were BMI of > 18.5 kg/m<sup>2</sup>. 63 girls were not anaemic, of which 45 were below < 18.5, 17 were above > 18.5.

## DISCUSSION

In the present study "The prevalence of anemia in adolescent girls of urban slum of Hyderabad" was found to be 79.33%. This is almost parallel with findings of Anushusharma<sup>11</sup> who observed a prevalence of 85.4% in rural area, whereas the finding in the urban area is 61.9% which is lower than present study. Mehta<sup>13</sup> study showed that in urban slums of Bombay, the prevalence anemia in adolescent girls of 10 – 18 yrs was 63.8%. The present study finding is not in agreement with this. According to Chaturvedi<sup>13</sup> the prevalence of anemia in adolescent girls of rural Rajasthan was 61.9% and according to Seshadri study<sup>14</sup> the prevalence in rural Gujarat adolescent girls was 60%. In the present study the anemia is little higher probably since the sample is from the urban slums.

In the present study the prevalence of anemia is 57.78% and 21.45% respectively among the girls of illiterate and literate fathers. The percentage of anaemic girls among literate mothers was 20.67% whereas in illiterate mothers it was 58.67%. The percentage of anemia among literate girls was 77.30% and among illiterate girls it was 90%. It shows that literacy levels plays a role in reducing anemia by creating awareness in nutritional as well hygiene practices.

The present study findings are tallying with the observation of Jolly Rajaratnam<sup>15</sup> who stated that there was a significant association between hemoglobin concentration and the girl's educational status. In the multiple regression analysis also, girl's education, mother's education and the family type were identified as independent predictors for hemoglobin concentration. There is a decrease observed in the prevalence and an increase in the mean Hb as the father education increases however the difference is not significant.

In the present study the prevalence of anemia among post menarcheal girls was 48.33% which is an agreement with the findings of J.S. Asokan 1999<sup>16</sup> and Agarwal (1998)<sup>7</sup> 45.2% and 48.4% respectively. Whereas the prevalence of anemia among pre menarcheal girls was 31.67% which was lower than the findings of above said authors' i.e. 40.7% and 46.6% respectively.

In the present study 30.6% girls' attained menarche between 10 -12 yrs of age of which 79% were anaemic. The percentage of age of girls' attained menarche between 13 – 15 yrs of age was 29% of which 82.7% were anaemic. Hence there is not much difference in anaemic status and age at menarche. According to Loretta Brabin 1998<sup>17</sup> the mean age of menarche was 13.0 + 1.16 yrs. The mean hemoglobin, values were significantly higher for 14.4 % of women who has a late menarche at 15 yrs or more of age.

In the present study 19 % of girls were taking tea after meals of which 84.21 % were anaemic Shangighosh<sup>18</sup> mentioned that tea consumed along with meal inhibits the absorption of iron.

In the present study the prevalence of anemia among girls with weight below 38 kgs was 46.67% which is almost nearer to the finding of Rajartnam<sup>15</sup> where the prevalence was 42.9 %. Whereas in this study the prevalence was 38.33% in girls with weights more than 38 kgs. This is not tallying with the finding of above authors' i.e. 47.5%.

In the present study the prevalence of anemia in girls with BMI of <18.5 Kg/m<sup>2</sup> was 58.66% whereas in girls with BMI of > 18.5 Kg/m<sup>2</sup> it was 21 %. According to NFHS II<sup>3</sup> more than one third of women have a BMI below 18.5Kg/m<sup>2</sup> indicating a high prevalence of nutritional deficiencies. Present study findings are not in agreement with the above survey. This difference could be due to later survey includes population in rural area where the malnutrition is widespread.

Out of 34 married adolescent girls 85.29 % were anaemic and 14.7% were non anaemic. According to

NFHS II<sup>3</sup> the percentage of anemia in married girls was 55 %. These findings of the study are in the same direction as of NFHS. The high prevalence in the present study might be due to teenage pregnancy. In the present study the percentage of teenage pregnancy was 7 %. It was nearly parallel with the Arun Nayak<sup>19</sup> findings i.e. 8.61 %.

In the present study 77.27 % married girls taken more than 50 IFA tablets and 22.72% had taken below 50. RUHA's experience in anemia control by V. Joseph<sup>20</sup> mentioned that women should start consuming iron tablets one per day from the beginning of the fourth month until delivery.

In the present study the prevalence of anemia was high among worm passers. The prevalence of worm infestation was 40 %. According to Aswath Narayan et al<sup>21</sup> the prevalence of Ascaris and Hook worm infection is 50 – 60% and 20 – 30% respectively. The low prevalence in the present study might be due to improved sanitary facility than before.

### RECOMMENDATIONS

- Improvement of literacy status is needed to reduce the prevalence of anemia.
- All post Menarcheal girls should be supplemented with Iron and Folic acid tablets.
- Annual examination of blood for Haemoglobin percentage and stool for Helminthes infestation should be undertaken to rule out these problems in high risk group, with periodic Deworming.
- Health education on the causation and prevention of anemia should be given to the community through existing health infrastructure.

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# Health Care Utilization in Rural Community a Cross Sectional Study

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## ABSTRACT

**Objectives:** 1) To know utilization pattern of health services 2) To know the factors influencing the utilization of health services.

**Study Design & period:** Cross Sectional Study & March - December 2009.

**Setting:** PHC area of Vantamuri.

**Method:** A total of 439 households were enrolled in the study by random sampling technique .Data was collected from the head of the household using pre-tested and pre-designed interview schedule after obtaining informed consent.

**Statistical Analysis:** Percentages and Chi- Square Test.

**Results:** The present study reveals that most of the participants availed private health facilities (66.6%). Reasons for utilizing private were nearest facility and accessibility whenever needed. Majority of the households belonged to the class IV. About 69.02% of respondents were aware of distance of nearest health facility availability. Out of 103 pregnant women 95.15% were registered. Out of them 67.35% had registered in private health facilities and only 5% had registered with ANM.75% of the children were fully immunized and remaining 25 % were partially immunized.

**Conclusion:** The study shows widespread use of private services, but it also reveals that reasons for not utilizing public health services were due to inconvenience of time following waiting for long time.

**Keywords:** Health Services, Utilization, Rural Community

## INTRODUCTION

Primary Health Care is the key for achieving the goal for health for all, a strategy to achieve affordable universal health services coverage. The fundamental aim of Primary Health Care Centre is to ensure universal access to available health services to meet the health needs of the people. The thrust of Primary Health Care in the country has been to extend health services to underserved rural populations through the expansion and strengthening of PHC services.<sup>1</sup>

Most of the world's health-care systems rely on the most inequitable method of financing health services: like out-of-pocket payments by the sick or their families at the point of service. For 5.6 billion people in low- and middle-income countries, over ½ of all

healthcare expenditure is through out-of-pocket payments, which deprives many families . Also, more than 100 million people around the world are pushed into poverty each year because of catastrophic health-care expenditures.

Many developing countries strive to provide universal health care. Due to lack of sufficient resources, or inappropriate use of existing funds. Health inequality, therefore, is quite common. Poverty is a major problem. In some developing countries health facilities have improved considerably, creating a health divide where those who can afford it can receive good quality care.

Health gaps typically mirror equality gaps. For the enormous numbers of people without access to health,

there is a terrible paradox: poverty exacerbates poor health while poor health makes it harder to get out of poverty.<sup>2</sup>

India has achieved substantial improvement in its health indicators. Life expectancy has increased, infant and maternal mortality have declined, and the coverage of most of the National Health Programmes is better. However, this progress is uneven; there are large state wide variations and performance in some states is abysmally low.<sup>3</sup>

Healthcare in India is the responsibility of constituent states and territories of India. The Constitution charges every state with "raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties".

Providing healthcare to India's growing population of more than a billion people becomes challenging in the face of increased competition for resources. There are vast disparities in people's health even among the different states across the country largely attributed to the resource allocation by the state governments where some states have been more successful than others. Better efforts are needed by the local governments to ensure that the health services provided are actually reaching the poor in worst-affected areas. However, as the BBC reported, access to these services by the poor is plagued with corruption. While many foreign medical experts criticize medical tourism, many private hospitals are able to demonstrate that their level of care is comparable, if not better, than that received in developed countries.<sup>4</sup>

In India although there has been a significant growth, the present health facilities are inadequate to meet the health needs of the country. It was also indicated that the users of the rural health facilities are not satisfied with the quality and quantity of the services provided.<sup>6</sup>

Karnataka as a state has achieved improved health indicators over the past decades. However access and equity remain a challenge, with uneven accessibility of health facilities across the state, particularly in northern districts. The quality of public health services is not satisfactory, resulting in poor utilization of the Health services especially for Emergency Care of

women, newborns and children. Effective integration of health concerns with other determinants of health like sanitation, hygiene, nutrition, safe water and gender is still poor.<sup>27</sup>

There is poor decentralized management at the district level. This has resulted in poor management of Public Health service delivery. Management of human resources, with high vacancy rates is still an area which needs strengthening. There is shortage of specialists in the Emergency Obstetric Neonatal Care centers, especially in the northern districts. Family and community practices especially in rural areas continue to be poor with no timely decision making resulting in poor utilization of health services.

Providing primary health care to rural population of the country is one of the major prerequisites in realization of the nation's goal. Understanding various factors influencing utilization of services offered by PHC's and SCs will help in making them more accessible and acceptable to the community. The present study is an attempt towards the understanding the factors influencing the utilization of health services.<sup>6</sup>

Study of this kind will help to improve the utilization of the health services by removing possible obstacles.

## MATERIALS & METHOD

**Study Design:** The present study is a Community based undertaken to study the utilization of health services & factors influencing utilization pattern of health services.

**Study Area:** The study was conducted in Vantamuri PHC area which is the field practice area of Dept. of Community Medicine, J. N. Medical College, KLE University, Belgaum. The population of Vantamuri PHC is 33,031; PHC consists of 4 sub centers of 5000-6000 population each.

**Sample Size:** 439 families were selected, 110 from sub centre area.

**Duration:** March - December 2009.

**Inclusion:** Families residing in Vantamuri PHC area for at least one year. After obtaining informed consent from head of the family.

## METHODOLOGY

Information regarding socio demographic characteristics of family members' and utilization of health services for various health problems was collected interviewing the head of family by using pre-tested and pre-designed questionnaire. Ethical clearance was obtained from the IEC.

**Statistical analysis:** Data was analyzed using Microsoft excel and SPSS version 16.0, expressed in percentages. Chi square test was applied to know the association.

## FINDINGS

### Socio demographic characteristics of study populations

In the present study, 367(83.59%) males and 72(16.41%) females were the head of the households interviewed. Majority of males as well as females were above the age of 55 years, followed by 50.1% were illiterate, 21.4% subjects were educated up to primary level, 17.3% up to secondary level, and about 6.8% had completed degree. Major proportions were agriculture workers (66.4%) by occupation.

According to modified B.G.Prasad classification for socio economic class, majority of them belonged to Class IV (32.8%) followed by Class III (21.64%), Class II (17.53%), followed by Class V (15.73%), 12.3% were from class I, followed by 70(25.64%) of families had 4 persons in each household, who availed private health facilities whereas almost 30.12% of families who used government services had 3 members. The difference observed was not statistically significant ( $p=0.51$ ).

In this study population 48 % subjects were Hindus, 21.2% subjects were Muslims, 22% subjects were SC and 8.7% subjects were ST. Among the study population 84.7% subjects belonged to nuclear family, 13% to joint family and 2.3% to third generation family, followed by 84.1% subjects were married and 15.9% subjects were widow. Majority of the study population were residing since 10-30 years.

### Utilization of health services

Present study reveals that majority 294(66.97%) of them, utilized private services whereas 87(19.82%) preferred district hospital. Almost equal number of families utilized traditional services and pharmacy. Among the 439 families majority 303(69.02%) were

aware of distance of nearest health facility. Among the study participants majority of the participants were aware of private health facility 67% in their immediate vicinity. For almost 66% of the families, head of the family was the decision maker with respect to utilization of health services.

Out of 439 households, 134(30.52%) had utilized public health services. Almost 49.25% utilized them because they were affordable. Almost 52.11% did not avail the public health facilities because of no nearby facility.

Although 64.69% of the participants were satisfied with PHC services only 24.37 % of the study populations were satisfied with the behavior of the MOs.

Within the last 6 months 49.89% had utilized health services. Amongst them almost 118(53.88%) households' availed private services and about 101(46.12%) availed government services. Percentage of people satisfied in both the groups was almost similar. Majority 81.8% preferred private health care facilities in case of emergency.

### Utilization of MCH services

Out of the 103 pregnant women 41.75% were in first trimester and 23.33% were in full term. Out of 103 pregnant women 95.15% were registered. Among them 64.08% had registered in private health facilities and only 5% had registered with ANM.

Out of the 103 pregnant women 98 (22.32%) had undergone ANC checkup. 57.14% of them had less than 3 antenatal checkups.

Among the 95.15% registered pregnant women, majority 55% had done registration during first trimester. 44.90% had done during the second trimester. A significant number of the pregnant women 61.22% opined that they had undergone examination such as weight measurement, recording BP, Hb estimation and abdominal examination. However only 51.02% had received advice regarding family planning, immunization, ANC/PNC visits, delivery preparedness and dietary advice. About 50% of pregnant women preferred private facilities for delivery, while 3.3% preferred home. Majority preferred doctors (51.46%) while 31.06% preferred trained dai. A significant number utilized government services for immunization of children. Out of total 324



children, almost 225(69.44%) visited AWW and availed the services. A major proportion 75% of U5 children was fully immunized. Out of 225 children, 98(43.56%) had received food from the ICDS center and 20(8.89%) had not received.

### Factors influencing utilization of health services

Among the study participants there is a significant association between socio economic class and utilization of health services. Majority of the participants who utilized private health services belonged to class IV. However there is no significant association between educational status of participants and utilization of health services with illiteracy (50.1%). A significant association between occupation and utilization of health services. Majority of participants were labourers who utilized private services.

However significant association between religion and utilization. Most of them belonged to Hindus (32%) who availed private health facilities. Amongst the 439 households a total of 214 people were suffering from one illness or the other. 68.2% of them had preferred to take treatment from private health facility whereas 31.79% from government.

### CONCLUSION

The present study shows widespread use of private services in the rural community. The reasons for not utilizing public health services being inconvenience of time followed by waiting for long time.

However for preventive services government health facilities have been preferred. Coverage for primary immunization was satisfactory where majority of the households utilized public health sector due to easy accessibility and availability.

Although Government is spending enormous money in the public health sector. It is not being utilized by the poor and the needy because of the reasons like timings inconvenient, long distance, behavior of the health care personnel.

These findings recommend immediate attention of health policy makers to take appropriate steps to ensure accessibility and acceptability resulting in better utilization of primary level public health facilities by rural communities.

**Conflict of Interest:** None

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# Knowledge Index of Contraceptives among Married Women Residing in Rural Area - A Cross Sectional Study

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## ABSTRACT

**Introduction:** Knowledge of Married women regarding different methods of contraception is an important determinant of their use. Poor knowledge of contraceptives leads to less use of contraceptive methods, which leads to unintended pregnancy. Many such pregnancies end up with mistimed or unwanted births or abortion. Many of such abortions are clandestine, contributing to maternal mortality and morbidity. One of the consequences of unregulated fertility is unplanned population growth.

**Objectives:** To know the knowledge index of contraceptives among married women residing in rural area.

**Material and Method:** 400 married women were chosen from one Primary Health Centre using Population Proportion to size method and then systematic sampling method. Data was collected by giving house to house visit and with the help of pre tested questionnaire. Knowledge index was calculated for each contraceptive, Knowledge index was calculated by using formula,  $KI = \text{Actual Score} / \text{Maximum score} \times 100$ . Data was analysed by using percentages and Chi square test.

**Result:** Without prompting, about 60% knew about tubectomy. 68% of participants did not know about Oral contraceptives, 80% about condom and CuT. On prompting more than 90% of married women could mention one or the other method of contraception. Better knowledge of Contraceptives was positively associated with education, socio economic status and distance from Primary Health Centre.

**Conclusion:** Knowledge of married women about temporary contraceptives was poor in spite of their availability in health facilities within their vicinity.

**Keywords:** Knowledge Index, Contraceptives, Married Women, Rural Area

## INTRODUCTION

Human population is an important resource of a country and its quality of life determines the progress and development of a nation<sup>1</sup>. No other factor not even that of peace or war is so tremendously fatal for the long time destinies of democracies as the factor of population. Population as a human problem appears in varied forms in different parts of the world depending on size of population, density, resources, distribution of community amenities and several other deeply rooted factors in various cultures<sup>2</sup>. It required all the human history up to the year 1800 for the world population to reach 1 billion where as it took just 12 years for the population to become six billion from five

billion. On October 12<sup>th</sup> 1999 world population become 6 billion. It is expected to reach 8 billion by 2025<sup>3</sup>. Indian population has been steadily increasing since 1921. It was 238 million in 1901, doubled in 60 years to 439 million (1961) doubled again in only 30 years to reach 846 million by 1991, it crossed 1 billion mark on 11<sup>th</sup> May 2000, as on date it is 1.2 billion and is projected to reach 1.53 billion by the year 2050<sup>3</sup>. Reason for uncontrolled growth of the population is unregulated fertility.

Unregulated fertility many a times leads to unintended pregnancies. One of the harmful consequences of unintended pregnancy is abortion. More than 50 million out of 190 million pregnancies

worldwide each year end in abortions; many of these procedures are clandestine performed under unsafe conditions<sup>3</sup>.

In third Asian & Pacific Population Conference held in Colombo in 1982, emphasis was not only made on provision of information about contraception but also the provision of contraceptive methods. Many studies have been conducted to know the reasons for non use of contraceptives without assessing their knowledge about contraceptives. As the factors responsible for use or non use of Contraceptives depend upon various socio demographic factors, which vary from place to place. Also in rural area because of illiteracy, ignorance and cultural barriers, the knowledge of married women about different contraceptives is less compared to their urban counter parts, hence the present study has been undertaken in rural area to know the knowledge index of different contraceptives among married women.

### OBJECTIVE

1. To know the knowledge index of contraceptives among married women residing in rural area.
2. To know the socio demographic factors associated with knowledge of contraceptives.

### MATERIAL AND METHOD

This was a cross sectional study conducted amongst the population residing in a primary health centre area with population of about 25000. Assuming that 50% of married women know about one or the other method of contraception, sample size was calculated using formula  $4pq/d^2$  by taking error as 10% of p. The sample size came to 400. For non response extra 20 % sample was added making sample size to 480. We could collect data from 467 married women. These 467 women were chosen by using population proportion to size method to decide total number of married women to be selected from each sub centre and then systematic sample method to select eligible married women from each village belonging to sub centre. Every eighth married women in the age group 15-49 were included in the study after picking the first number randomly. Ethical clearance was obtained from institutional ethical committee to conduct the study. With the help of pre designed and pre tested questionnaire information was collected from the married women after obtaining informed consent. Information regarding the knowledge of contraceptives was collected without prompting. Analysis of result was done by using percentages and chi square test to find the association between knowledge index of contraceptives and socio demographic variables.

### Calculation of Knowledge index of Contraceptives

Contraceptive Method	Not naming the method Score 0	Naming the method Score 1	Knowing the place of availability Score 1	Knowing the side effects Score 1
Oral pill				
Condom				
CuT				
Tubectomy				
Vasectomy				

Maximum Score = 3

KI of Contraceptive = Actual Score/ Maximum Score X 100

### RESULTS

In our study out of 467 married women, 39 % were in the age group of 20 -24 years, 31.7 % were in the age group of 25 -29 year, least were in the age group 45 – 49 years ( 0.9%). About 43 % had studied up to secondary level, 26 % primary level, only 2.6% had studied up to degree level. 37.9% belonged to class IV, 23.6.% to class V, 19.30 % of married women belonged to class III of modified B.G. Prasad's classification of

socio economic status, where as 14.6 & 4.7 % belonged to class II and class I respectively. About 80% had two or less than two children, remaining 20 % had more than two children. In 41.8 % of married women duration of married life was less than 5 years, in 31.3 % it was 6-10 years, only in 5.6 % it was more than 20 years. About 65 % of the married women's residence was more than 5 kilometers from the Primary health centre and about 80 % lived within 2 kilometer distance from the sub centre. About 56.74% were using

contraceptives, out of them 40.5% were using permanent method (Tubectomy), 7.9% Oral pills, 6.2% Condoms and 2.14% CuT. We tried to collect information about their knowledge regarding contraceptives without prompting. Our study showed that about 60 % of them could name tubectomy, 33 % oral pills, 20 % condoms and copper T and only 0.6 % vasectomy. On prompting about 90% of women who earlier did not mention the name of any contraceptive could name at least one or the other contraceptive, but their knowledge about the source and side effects remained the same. Better knowledge regarding oral contraceptives was associated positively with literacy status, as the literacy level increased level of knowledge also increased, lesser the distance from PHC better knowledge about OCPs. Better knowledge regarding condoms was associated positively with age, as the age increased knowledge also increased, better education, high socio economic status, lesser distance from Sub centre were also associated with better knowledge of condoms. Better knowledge regarding CuT was associated positively with better education, high Socio economic status and lesser distance from Sub centre. Better knowledge regarding tubectomy was positively associated with increasing age, better education, higher socio economic status, more the number of children, more the duration of married life and lesser the distance from Primary health centre.

**Table 1. Distribution of married women according to socio demographic variables**

Particulars	Number	Percentage
<b>Age</b>		
15-19	12	2.6
20-24	182	25
25-29	148	31.7
30-34	71	15.2
35- 39	35	7.5
40- 45	15	3.2
45- 49	4	0.9
<b>Literacy</b>		
Illiterate	76	16.3
Primary	125	26.8
Secondary	202	43.3
PUC / Diploma	52	11.1
Degree/ PG	12	2.6
<b>Socio Economic Status</b>		
Class I	22	4.7
Class II	68	14.6
Class III	90	19.3
Class IV	177	37.9
Class V	110	23.6

**Table 1. Distribution of married women according to socio demographic variables (Contd.)**

Particulars	Number	Percentage
<b>Number of children</b>		
<2	373	79.87
>2	94	20.13
<b>Duration of married life</b>		
<5 years	195	41.8
6-10 years	146	31.3
11-15 years	66	14.1
15-20 years	34	7.3
>20 years	26	5.6
<b>Distance from Health Centre</b>		
Primary Health Centre		
< 5 kms	163	34.9
> 5kms	304	65.1
<b>Sub centre</b>		
< 2kms	382	81.79
> 2 kms	85	18.21

## DISCUSSION

In our study 56.74% of married women were using contraceptives, more than 2/3<sup>rd</sup> of them had undergone tubectomy, less than 1/3<sup>rd</sup> were using temporary methods. Among the participants 60 % knew about tubectomy, 23 % about oral contraceptives, 18 % about CuT and condoms. But many out of these didn't know about the side effects. In a study conducted in an urban slum of Delhi, found that about 65.4 % of married women were using contraceptives, 47 % knew about 2 to 3 methods of contraception, out of them only 61 % knew about their source and 25.6 % knew about the side effects. In spite of 65. 5% of married women using the methods, most of them did not know about all the 3 aspects of knowledge index.<sup>4</sup> In another study conducted in Andhra Pradesh showed about 81% knew about contraceptives, but only 41.3% were using contraceptives. This study showed that though the study population was tribal, the knowledge regarding contraception was good. <sup>5</sup>

In a study conducted by ICMR showed that almost all the women seeking abortion knew something about tubectomy, 86% about vasectomy, more than 90% about oral pills, CuT and condoms. But none of them knew 100% about tubectomy and vasectomy. 3% and 6% knew about all the three aspects of knowledge index for CuT and Condoms respectively.<sup>6</sup>

In a study by Sule ST and others in Zaire, Nigeria showed that 95% of women knew about tubectomy, 90% oral pills, 37% about condoms and only 8% about

CuT. None of them knew about Vasectomy. Knowledge about CuT was very less compared to other studies. There was no association between parity and knowledge of contraception.<sup>7</sup>

In contrast to most of the studies a study done at Manipur state showed that knowledge of women in reproductive age regarding temporary methods ( ranged from 25 – 76 %) was better than permanent method ( ranged from 15 – 60%).<sup>8</sup>

Our study found out that as the duration of married life increased, the knowledge about tubectomy also increased, because by then women would have had desired number of children. Association between younger age and use of condoms was statistically significant, this could be because younger men are more exposed to temporary methods of contraception especially condoms. Improved socio economic status was associated with increased knowledge regarding all family planning methods except oral contraceptives this difference was statistically significant. Lesser the distance from PHC better was the knowledge regarding tubectomy and CuT, because these methods are available in the PHC set up. Lesser the distance from sub centre was statistically associated with better knowledge about temporary method of contraception; this could be because Health worker was easily available to clients. In a study conducted in Bombay showed that high literacy rate not only improved the knowledge regarding contraceptives but also improved the acceptance of family planning methods.<sup>9</sup> Our study also showed that knowledge of contraceptives increased with higher level of education. According to Rajaretnam after having more than two children women prefer sterilization, but no relation between number of children and use of temporary method of contraception.<sup>10</sup> This finding was same as that of our study. A study done on tribal population of Andhra Pradesh showed that younger women's ( 15-24yrs) knowledge about contraception was better compared to older women (24 yrs and above). Education and monthly income was not associated with knowledge about contraception.<sup>5</sup>

### CONCLUSION

Our study showed that knowledge of married women about tubectomy was better compared to other

contraceptive methods. Knowledge about temporary methods and vasectomy was very less. Hence IEC activities for married women should be conducted frequently to enhance their knowledge. Health workers should be given training regarding counseling skills and use of cafeteria approach in providing family planning services.

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# Growth Pattern of Children Attending Anganwadis in a Rural Area in Karnataka, India

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## ABSTRACT

**Background:** Anthropometric measurements are integral to monitor the growth of the under five children of the Anganwadi. Under-nutrition, being one of the most common morbidities in the under fives, it was decided to assess the growth pattern of children attending 7 anganwadis in 6 villages situated in our field practice area.

**Objectives:** To assess the growth pattern of Under-five children attending the Anganwadis in 6 villages in our field practice area.

**Materials:** Study area-7 Anganwadis in 6 villages, under Sarjapura PHC area in Anekal taluk; Study period-July 2003 to July 2007; Study population-children in the age group of 2 to 5 years attending Anganwadi; Study design-longitudinal study; Instruments-A standard measuring tape, 'Salter and Harris' weighing scale;

**Method:** Weight and height of each child was taken at monthly intervals. Quarterly anthropometric measurement of all children was considered for analysis. Inclusion criteria: Children between 2 to 5 years of age, who had at least 2 readings in our quarterly measurements in 1 year, were included in the study.

**Results:** Out of the 403 children examined, 203 children (98 males and 105 females) fulfilled our inclusion criteria. The quarterly mean weights (in kgs) were calculated and 76.9% of these mean recordings were within normal limits. The quarterly mean heights (in cms) were calculated and it was found that all the mean heights were lower than 95% of the expected. Similarly, quarterly weights and heights for caste and gender were obtained and analysed. However, no significant difference was seen for these two categories.

**Conclusions:** The mean heights of the children in this study were lower than the expected under the IAP classification; while that for weight, was within normal limits for most of the children.

**Keywords:** Longitudinal Study, Under-Nutrition; Anthropometry, Weight, Height

## INTRODUCTION

Growth is an important physiologic phenomenon which begins with conception and continues till adulthood. "A sound mind in a sound body"

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emphasises the importance of physical growth in order to possess a sound mind. Children with better nutritional status perform better both cognitively and physically as compared to under nourished children<sup>1</sup>. As we all know, nutrition is recognised to be a key factor determining growth and development. Better the nutrition, better the growth and vice-versa. Hence, in order to take feasible steps to improve the nutritional status of children, it is essential to monitor their growth.

Malnutrition is a major public health problem in developing countries like India. Global prevalence of stunting and underweight among the under-5 children

was found to be 30% and 17.8% respectively while the prevalence of stunting and underweight among the under-5 children in India was 51.0% and 44.4% respectively<sup>3</sup>.

In India, anganwadis are the instruments for implementing various interventions under Integrated Child Development Services Scheme (ICDS). Growth monitoring, supplementary nutrition and nutrition education to mothers are activities which influence the nutritional status of the under-five beneficiaries in an anganwadi. Growth monitoring facilitates the assessment of growth pattern of under-fives which involves anthropometric measurements of the children attending the anganwadis.

The Community Health Training Centre (CHTC) at Mugalur, serves as a base for all the activities in the rural areas. The team from the centre undertakes weekly visits to seven anganwadis during which anthropometric measurements of all the children are recorded for assessing the growth and thus monitor their growth.

### OBJECTIVE

The objective of this study was to assess the growth pattern of Under-five children attending the anganwadis.

### METHOD

The present study was done in 7 Anganwadis in 6 villages, under Sarjapura PHC area in Anekal taluk, Bangalore District, Karnataka. All anganwadis in this study come under the same PHC and share similar socio-environmental conditions.

This was a longitudinal study conducted between July 2003 and July 2007. Children in the age group of 2 to 5 years attending the anganwadis formed our study population. However, those children with at least 2 recordings at quarterly intervals in a given year were included in the analysis for this study while the rest of the children were excluded.

A standard 'Salter and Harris' weighing scale was used to measure the weight of the children. A non stretchable plastic measuring tape with indelible markings of measurements in centimetres was used to measure the height. The weights and heights of the subjects were measured using standard techniques by trained personnel<sup>4</sup>.

The expected weight and height for a reference age was calculated using Weech's formulae [Formula for calculation of expected weight for age is  $W = (\text{Age in years} \times 2) + 8$ . Similarly, for height  $H = (\text{Age in years} \times 6) + 77$ ].

For the purpose of analysis quarterly anthropometric measurements of all those children who fulfilled the inclusion criteria was taken. The quarterly assessments ranged from 24<sup>th</sup> to 60<sup>th</sup> month. Analysis was done using standard statistical software packages.

## RESULTS AND DISCUSSION

Distribution of children by gender and caste (Refer table 1)

A total of 403 children attended these anganwadis between July 2003 and July 2007. Of these 403 children, 203 (50.3%) children (98 boys and 105 girls) were included in this study. 43 (21.1%) children belonged to the scheduled castes and scheduled tribes while 140 (68.9%) children belonged to the general category. Caste could not be ascertained for the remaining 20 (9.8%) children.

Distribution of Children by Mean Weights for Age (Refer table 2)

The expected weight was calculated using the formula  $8 + (2 \times \text{age in years})$ . 80% of the expected weight was considered as the cut-off. Mean weight for age starting from the 24<sup>th</sup> month was calculated and it was found that 76.9% of the recordings were within normal limits. The remaining 23.1% of the recordings were in the grade 1 category of malnutrition.

Distribution of Children by Mean Heights for Age (Refer table 3)

The expected height was calculated using the formula  $77 + (6 \times \text{age in years})$ . 95% of the expected height was considered as the cut-off. Mean height for age starting from the 24<sup>th</sup> month was calculated and it was found that all mean heights for age were below 95% of the expected according to the IAP classification.

The quarterly mean weights and heights were compared between males and females. There was no significant association between malnutrition and either of the sexes ( $p > 0.05$ ). Similarly, there was no significant difference in the mean weights and heights by caste ( $p > 0.05$ ).



It was observed that from the 33<sup>rd</sup> month till the 42<sup>nd</sup> month there was a gradual dip in both the mean weights and mean heights of the children. After the 42<sup>nd</sup> month, there was a gradual rise in the mean weights and mean heights till the 54<sup>th</sup> month. From then on, again there is a dip till the 60<sup>th</sup> month. It was also observed that both boys and girls and children from general caste and SC/ST had similar growth patterns.

**The reasons for this phenomenon could be**

- A child by about the age of 24 to 36 months begins to self feed. However, this self feeding may not be nutritionally sufficient. This may impact the child’s growth during this phase of life.
- In the period between 54<sup>th</sup> month and 60<sup>th</sup> month, the child spends a lot of time playing, outside the house; thus neglecting the consumption of food.
- The child may not consume food at regular intervals which could hamper the growth.
- The child is also exposed to various infections including worm infestations, which in turn could affect the growth pattern.

However, there could be other possible reasons for this dip in weights and heights at this reference age and those factors need to be identified.

Prevalence of under-nutrition was 23.1% (Grade 1 malnutrition) as per the IAP standards. It was also found that the mean heights for age of all the children were less than the expected height for age as per the IAP standards. As per the recent studies, majority of children are of mild-to-moderate grade malnutrition<sup>2</sup>.

The results of our study showed that all 23.1% who were malnourished were in grade 1 of malnutrition.

Mallik. S et al<sup>5</sup> in their hospital based study in Kolkata found that the prevalence of malnutrition among under-fives was 51.6% which was much higher

than in this study. They also found a high prevalence of 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> grade of malnutrition. However, in their study, since children were suffering from various illnesses (hospital based), it was expected that the prevalence would be much higher.

In a study conducted by Arthur M. Kwena et al<sup>6</sup>, in rural Kenya the prevalence of stunting and under-nutrition among under-five children was 30% and 20% respectively. The prevalence of under nutrition is similar to the results that we found in our study. However, prevalence of stunting was higher in the present study.

**CONCLUSIONS AND RECOMMENDATIONS**

It was found that mean weights from 24<sup>th</sup> to 39<sup>th</sup> month and 45<sup>th</sup> to 54<sup>th</sup> months of age was normal. However, mean weights at 42<sup>nd</sup>, 57<sup>th</sup> and 60<sup>th</sup> months of age were found to be in grade1 malnutrition range. The reasons for this dip in weights at this reference age needs to be investigated.

It was found that mean heights from 24<sup>th</sup> to 39<sup>th</sup> month and 45<sup>th</sup> to 57<sup>th</sup> months of age was normal. However, mean weights at 42<sup>nd</sup> and 60<sup>th</sup> months of age were found to be in grade1 malnutrition range. The reasons for this dip in mean heights at this reference age needs to be studied.

It was also found that children of all castes had similar growth pattern. It was found that gender had no influence on nutritional status.

**ACKNOWLEDGEMENT**

We thank all the Anganwadi workers and helpers who assisted us during the conduct of this study. We gratefully acknowledge all the Postgraduate students, Interns and the Staff of the Department of Community Health, St. John’s Medical College, Bangalore for their efforts in the collection of data during the conduct of this study.

**Table 1: Distribution of Children by Gender and Caste**

	General caste (%)	SC/ST (%)	Not known (%)	Total (%)
Boys	69 (70.41)	20 (20.41)	9 (9.18)	98 (48.28)
Girls	71 (67.62)	23 (21.90)	11 (10.48)	105 (51.72)
Total	140 (68.97)	43 (19.7)	20 (9.85)	n = 203 (100)

**Table 2: Distribution of Children by Mean Weights for age**

Month	N*	Mean Weights (in Kgs)±S.D	Expected weight**	Percentage	Nutritional status	Median	Mode
24 <sup>th</sup> m	20	10.30±1.35	12	85.8%	Nr***	10.1	9.6
27 <sup>th</sup> m	29	10.98±1.69	12.5	87.8%	Nr	10.5	9.7
30 <sup>th</sup> m	34	11.51±1.72	13	88.5%	Nr	11.05	9.5
33 <sup>th</sup> m	37	11.44±1.45	13.5	84.7%	Nr	11.3	11.5
36 <sup>th</sup> m	37	11.56±1.29	14	82.5%	Nr	11.8	11.8
39 <sup>th</sup> m	42	11.85±1.53	14.5	81.7%	Nr	11.5	11.5
42 <sup>th</sup> m	50	11.87±1.66	15	79.1%	Grade 1	11.9	12.5
45 <sup>th</sup> m	52	12.63±1.78	15.5	81.4%	Nr	12.7	11
48 <sup>th</sup> m	42	12.90±1.69	16	80.6%	Nr	12.95	13.5
51 <sup>th</sup> m	46	13.41±1.56	16.5	81.2%	Nr	13.25	11.5
54 <sup>th</sup> m	46	13.70±1.60	17	80.5%	Nr	13.9	14
57 <sup>th</sup> m	41	13.85±1.70	17.5	79.14%	Grade 1	13.7	14.5
60 <sup>th</sup> m	36	13.59±1.75	18	75.5%	Grade 1	13.65	14.3

\* 'N' indicates the total number of recordings in each age group. And it does not add up to 203 because each child has more than one recording

\*\* The expected weight was calculated using the formula (8+age in years)/2

\*\*\* Nr = Normal

**Table 3: Distribution of Children by Mean Heights for Age**

Month	N*	Mean Heights (in Cms)±S.D	Expected height**	Percentage	Nutritional status	Median	Mode
24 <sup>th</sup> m	20	83.42±4.5	89	93.7%	Grade 1	82.75	78.5
27 <sup>th</sup> m	29	85.04±4.82	90.5	93.9%	Grade 1	85	80
30 <sup>th</sup> m	33	87.09±4.29	92	94.6%	Grade 1	87	86
33 <sup>th</sup> m	36	87.86±5.09	93.5	93.9%	Grade 1	86.75	85
36 <sup>th</sup> m	37	89.22±4.3	95	93.9%	Grade 1	89	87
39 <sup>th</sup> m	42	90.49±5.01	96.5	93.7%	Grade 1	90.25	90
42 <sup>th</sup> m	49	91.44±4.6	98	93.3%	Grade 1	91	89
45 <sup>th</sup> m	51	94.04±4.86	99.5	94.5%	Grade 1	95	95
48 <sup>th</sup> m	43	94.63±4.53	101	93.6%	Grade 1	94	94
51 <sup>th</sup> m	46	97.02±4.72	102.5	94.6%	Grade 1	97	93
54 <sup>th</sup> m	46	98.16±4.69	104	94.38%	Grade 1	98.25	100
57 <sup>th</sup> m	41	100.17±4.15	105.5	94.94%	Grade 1	101	96
60 <sup>th</sup> m	36	99.75±6.41	107	93.22%	Grade 1	99.25	96

\*'N' indicates the total number of recordings in each age group. And it does not add up to 203 because each child has more than one recording

\*\* The expected height was calculated using the formula (age in years\*6) +77

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# Esthetic Restoration of Maxillary Anterior Teeth using Ribbond : A Case Report

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## ABSTRACT

Restoration of root filled teeth is critical final step for successful root canal treatment. Loss of dentin along with other anatomical tooth structure may result in tooth tissue fracture after the final restoration. Therefore intracoronal strengthening of endodontically treated tooth is important and this can be achieved by the combination technique, using polyethylene woven fibre with esthetic composite resin material. This shift of paradigm from composite resin restoration to the polyethylene fibre usage along with composite resin has open a new scenario by increasing its esthetic value, stress distribution and strength.

In the following case report, endodontically treated maxillary central incisor was restored using polyethylene Ribbond fibre along with esthetic composite restoration.

**Keywords:** Endodontically Treated Tooth, Polyethylene Woven Fibre, Esthetic Composite Restoration

## INTRODUCTION

Root canal treatment is considered complete after placement of final restoration, which is inserted to recover strength, aesthetics, protect the remaining tooth structure and avoid microleakage.<sup>1</sup> An ongoing change in the restorative paradigm of endodontically treated teeth has allowed more conservative techniques to be developed, with the aim of maintaining the integrity of the tooth.<sup>2</sup>

Resin bonded composite (RBC) restorations showed a strengthening effect on the tooth structure, with fracture resistance similar to that of unaltered teeth. For many years, direct adhesive restorations have been used for anterior teeth with conservative access and marginal ridges. Conversely, for many years, full coverage restorations have been indicated when the teeth are weakened by additional cavities on both the anterior and posterior area.<sup>3</sup>

Use of Flowable resin in root-filled molar teeth with MOD cavities did not increase their fracture strength. On the other hand when a Leno Weave Ultra High Modulus (LWUHM) polyethylene fibre was inserted into bed of Flowable resin, fracture strength of teeth was increased.<sup>4</sup> Use of an LWUHMW polyethylene

fibre ribbon (Ribbond Inc., Seattle, WA, USA) in combination with bonding agent and Flowable composite under composite restoration may act as a stress absorber because of its lower elastic modulus; this elastic layer between the composite and dentin may have increased the fracture strength. Another explanation for this phenomenon may be because of the bonding ability of the material, the cusps might have been bonded together. If the bonding ability of the LWUHM polyethylene fibre was the reason for increased fracture strength, then an alternative insertion technique may allow higher fracture strength to be achieved.<sup>5</sup>

In the present case report, Polyethylene fibres along with esthetic composite material were used to restore the esthetics and functional integrity of the endodontically treated teeth with fracture.

## CASE REPORT

A 15 year old male patient reported to the department of Conservative Dentistry and Endodontics, Subharti Dental College with the history of trauma 2-3 years back with missing 12,13. On examination, 11, 21(FDI) were found to be non-vital and radiograph was recorded.

Root canal therapy was initiated by preparing access cavity, 11, 21(FDI). Working length was determined and biomechanical preparation was done using stainless steel K-file upto master file size 50 using step back method. Irrigation was done following each instrumentation with Saline, EDTA and 1.25% Sodium Hypochlorite, alternatively. Obturation was done with lateral condensation technique.

As the age of the patient was critical and not indicated for fixed partial denture we decided to restore his esthetics and functional integrity using polyethylene fibre ribbon (Ribbond Inc., Seattle, WA, USA). Access for placement of the polyethylene fibre was achieved through access cavity in relation to 21 (FDI). 5 mm long Ribbond fibre (with 2mm of width) was cut and soaked in the unfilled resin. Etching of the teeth were done using 30% Phosphoric acid for 15 seconds, this was followed by Adper (fifth generation bonding agent application) and light cured for 20 seconds. One end of the cut Ribbond fibre was placed in the access cavity and the other end was at the fractured mesial angle of the tooth 21(FDI). Access cavity was filled with flowable composite and light cured for 40 seconds. This was followed by mesial angle build up in relation to 21 with esthetic composite restoration. Since, there was diastema, it was closed using esthetic composite resin in relation to 11, 21 (FDI). 12 months follow up done.

## DISCUSSION

Endodontically treated teeth are weakened this could be because of a decrease in water content and loss of dentin.<sup>5</sup> The decay process and/ or tooth fracture may also be responsible for the structural weakening of non-vital teeth; the tooth preparation required for adequate endodontic treatment may also contribute to the increased fragility.<sup>6</sup> Several factors have been reported to affect the fracture resistance of teeth including: the amount of tissue lost and its location<sup>7</sup>, the magnitude and duration of the load<sup>8</sup>, tooth type, direction of applied load, slope of the cuspal inclines.<sup>9</sup> In recent years, the choice of materials used for restoration of root filled teeth has changed from exclusive usage of very rigid materials to materials with mechanical characteristics more like dentin.<sup>10</sup>

According to Rudo & Karbhari (1999), the successful performance of the Leno Weave Ultra High Modulus Polyethylene Fibre is because of the properties of the fibre itself, the degree of chemical bonding between the resin and the fibre and the effect

of the leno weave with regard to crack resistance and deflection as well as resistance to shifting within the resin matrix.<sup>11</sup> These fibre exhibits the structural aesthetics and easy handling characteristics. The plasma treatment ensures an adequate bond to the resin matrix. The tightly woven leno weave unique to Ribbond provides a fixed position between the warp (lengthwise) and weft (crosswise) fibres. The weave is open enough to allow for efficient infusion and wetting of the resin on the fibres and ease of manageability.<sup>5</sup>

In the present case the Leno Weave Ultra High Modulus Polyethylene Fibre was used with flowable composite to provide an increase in fracture strength to the endodontically treated tooth with mesial angle build up. The higher modulus of elasticity and lower flexural modulus of the polyethylene fibre might have a modifying effect on how the interfacial stresses are developed along the etched enamel/resin boundary.



Fig. 1. Preoperative clinical photograph



Fig. 2. Preoperative Clinical photograph; Palatal view



Fig. 3. Obturation, Intra oral periapical Radiograph, 11,21 FDI



Fig. 6. 12 months follow up clinical photograph



Fig. 4. Clinical photograph; placement of RIBBOND fibre as a pin



Fig. 5. Post operative clinical photograph; aesthetic composite restoration and diastema closure

### CONCLUSION

The esthetic appearance of teeth is a mixture of each individual tooth shape, the position of the teeth within the dental arch, and the inter-relationships of the teeth to the opposing dental arch. By using reinforcement material which is embedded within composite, such as polyethylene ribbon fibre, better esthetics is achieved along with the maintenance of structural and functional integrity of the restored tooth.

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# A Study of effect of Perindopril and Candesartan on Pain Perception in Albino Rats

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## ABSTRACT

**Background & objectives:** Pain is universally understood as signal of disease. It is unique among the sensation in that it has a built in unpleasant effect. It is the most common symptom that brings patient to physician attention. The cardiovascular and renal system shares a numerous anatomic and functional pathways with the nociception network. Besides well known role of Angiotensin system in Blood pressure control and an interaction of angiotensin and pain perception has been suggested. Hence this study was conducted to evaluate and compare the effect of Perindopril (ACEI) and Candesartan (ARB) on pain perception in albino rats.

**Method:** Inbred albino rats (Wistar strain) weighing 200-250g of either sex were used for the study. Animals were divided in seven groups containing 6 animals each (control group, treatment groups). Drugs were injected (i.p) as per the individualized dosages to the animals and the reaction time of animal's recorded using hot plate and tail flick latency method at different time points (pre-treatment, 15, 30, 60, 90 and 120 min post drug administration). The data collected were subjected to statistical analysis using SPSS.

**Results:** Following drug administration there was a dose dependent reduction in reaction time at different time points irrespective of the models and treatment groups. Significant reduction ( $p < 0.05$ ) in reaction time (hot plate model) was observed at highest doses (2mg/kg) in the treatment groups.

**Conclusion:** Both Perindopril (ACEI) and Candesartan (ARB) showed to have hyperalgesic effects on dose to dose basis in thermal induced pain models. It is also inferred that Perindopril produced more hyperalgesic effects than Candesartan on dose to dose basis.

**Keywords:** Perindopril, Candesartan, Pain Perception

## INTRODUCTION

Pain is a perception and as such, it is one of the outputs of a system in more highly evolved animals- the nociceptive system- which itself is a component of the overall set of controls responsible for homeostasis. In this context pain constitutes an alarm that ultimately has the role of helping to protect the organism: it both triggers reactions and induces learned avoidance behaviours, which may decrease whatever is causing the pain, and as a result may limit the damaging consequences. <sup>1</sup>

The cardiovascular and renal system shares a numerous anatomic and functional pathways with the

nociception network. Besides well known role of Angiotensin system in Blood pressure control and an interaction of angiotensin and pain perception has been suggested. <sup>2</sup>

Angiotensin converting enzyme (Carboxypeptidase) inhibitors and Angiotensin receptor blockers are widely used compounds in various cardiovascular disorders. Angiotensin converting enzyme, converts Angiotensin-I to Angiotensin- II and also involved in degrading the Kinins like Bradykinin and sub-P. <sup>3</sup> Hence ACE inhibitors and not ARB's decrease the plasma concentration of A-II and the tissue concentration of Kinins .



The role of A-II in pain perception is not clear. Evidences also suggest that A-II has pro-nociceptive activity and has anti opioid activity. Involvement of bradykinin in inflammation and pain is well established. <sup>4,5</sup>

Both preclinical and clinical studies predicted hyperalgesic effect of ACEI's. <sup>6,7,8</sup> Such reports for ARB's like Candesartan are limited. A clinical study has reported that both ACEI's and ARB's acted similarly on pain threshold, pain sensitivity being increased during these two antihypertensive treatments. <sup>2</sup> There is not much data about enhanced activity of bradykinin and prostaglandins with the administration of ARB. However an experimental study found an increase in bradykinin concentration following AT<sub>1</sub> receptor blockade, due to unopposed action of Angiotensin II on AT<sub>2</sub> receptor. <sup>9</sup> These conflicting results tempted to evaluate and compare the effect of Perindopril (ACEI) and Candesartan (ARB) on pain perception in albino rats.

**MATERIAL AND METHOD**

The experiment was conducted in JSS medical college, Mysore. Prior approval from institution ethics committee was obtained before the start of the study.

**ANIMALS**

Inbred albino rats (Wistar strain) weighing 200-250g of either sex were used for the study. They were housed in clean, clear polypropylene cages in groups of four and kept on a standard diet and water ad libitum.

**DRUGS**

- Perindopril (Coversyl: 0.5mg; 1.0mg; 2.0mg per kg body weight)
- Candesartan (Candelong: 0.5mg; 1.0 mg; 2.0 mg per kg body weight)
- Normal saline (0.9%NaCl).

**EQUIPMENTS:** Eddys hot plate, Analgesiometer

**METHOD**

Rats were weighed and numbered. Animals were divided in seven groups containing 6 animals each (as below). Drugs were injected (i.p) as per the individualized dosages to the animals and the reaction time of animal's recorded using hot plate and

tail flick latency method at different time points (pre-treatment, 15, 30, 60, 90 and 120 min post drug administration).

Treatment		No. of animals	Dose /kg
Saline (control)	Group 1	6	10ml
Perindopril	Group 2	6	0.5 mg
Perindopril	Group 3	6	1.0 mg
Perindopril	Group 4	6	2.0 mg
Candesartan	Group 5	6	0.5 mg
Candesartan	Group 6	6	1.0 mg
Candesartan	Group 7	6	2.0 mg

**A. HOT PLATE METHOD <sup>10</sup>**

Animals were placed on the hot plate maintained at constant temperature (55°C). The basal reaction time was noted by observing hind paw licking or jump response (supraspinally integrated responses), whichever appears first. Normally animals showed such response in 6-8 sec. A cut off period of 15 sec was taken to avoid damage to the paws.

**B. TAIL FLICK METHOD <sup>1</sup>**

Each animal was held in a restrainer in such a way that the tail lies over the nichrome wire of the analgesiometer. Some amount of time was allowed for the rat to settle down so that it doesn't move its tail. The rate of inflow of water into the water jacket was adjusted so as to register the same temperature at the outlet and the inlet when the wire was heated. The temperature of the nichrome wire was adjusted by varying the current flow through galvanometer. The analgesiometer was switched on and the stop clock was started simultaneously, time taken for the rat to respond by flicking the tail was noted and termed as the reaction time.

**RESULTS**

The method of multivariate analysis of variance (MANOVA) was used utilizing SPSS package version 12. The MANOVA analysis taking into consideration the two drugs (Perindopril, Candesartan) at different dosages (0.5mg/kg, 1mg/kg, 2mg/kg) and Controls together to estimate the overall significant difference between the reaction time of the two drugs.

The post Hoc Bonferroni test was used to test the significance difference between each of the two groups eg: between the controls and Perindopril at different doses and between controls and candesartan at different doses.

Table 1 provides data of comparison of mean reaction time before and after treatment at different time points. Following drug administration there was a dose dependent reduction in reaction time at different time points irrespective of the models and treatment groups.

**Table 1: Table showing the Comparison of mean reaction time ( $\pm$ S.D) before and after administration of drugs at different time points using two different methods.**

	Drug	Dose mg/kg	Baseline Before treatment sec	Reaction time after drug administration sec			
				15min	30min	60min	90min
<b>HOT PLATE METHOD</b>							
Control	(Saline 10ml/kg)	5.83 $\pm$ 0.48	5.83 $\pm$ 0.48	5.66 $\pm$ 0.50	5.54 $\pm$ 0.43	5.66 $\pm$ 0.50	5.66 $\pm$ 0.50
Perindopril	0.5	6.83 $\pm$ 0.95	6.00 $\pm$ 1.13	5.00 $\pm$ 0.93	4.50 $\pm$ 0.85	4.50 $\pm$ 0.85	4.33 $\pm$ 0.85
	1.0	7.00 $\pm$ 0.97	5.66 $\pm$ 0.72	5.50 $\pm$ 0.62	5.00 $\pm$ 0.63	4.33 $\pm$ 0.50	4.00 $\pm$ 0.45
	2.0	8.50 $\pm$ 0.67	7.16 $\pm$ 0.91	6.00 $\pm$ 0.73	4.83** $\pm$ 0.48	4.16** $\pm$ 0.68	4.00** $\pm$ 0.52
Candesartan	0.5	7.83 $\pm$ 0.75	7.83 $\pm$ 0.75	7.83 $\pm$ 0.75	7.66 $\pm$ 0.89	7.16 $\pm$ 0.88	6.66 $\pm$ 0.67
	1.0	7.16 $\pm$ 0.71	7.16 $\pm$ 0.71	7.00 $\pm$ 0.69	6.83 $\pm$ 0.60	6.50 $\pm$ 0.72	6.00 $\pm$ 0.78
	2.0	7.16 $\pm$ 0.60	6.33 $\pm$ 0.62	5.83 $\pm$ 0.48	5.16 $\pm$ 0.31	5.00* $\pm$ 0.37	5.00* $\pm$ 0.37
<b>TAIL FLICK METHOD</b>							
Control	(Saline 10ml/kg)	5.83 $\pm$ 0.75	5.83 $\pm$ 1.17	5.67 $\pm$ 1.03	5.67 $\pm$ 1.03	5.83 $\pm$ 1.17	5.83 $\pm$ 1.17
Perindopril	0.5	5.67 $\pm$ 1.21	5.33 $\pm$ 1.63	4.67 $\pm$ 1.63	4.50 $\pm$ 1.67	3.50 $\pm$ 1.38	3.17 $\pm$ 1.17
	1.0	6.50 $\pm$ 1.52	5.67 $\pm$ 1.63	5.17 $\pm$ 1.72	4.33 $\pm$ 1.63	4.33 $\pm$ 1.63	3.33 $\pm$ 1.50
	2.0	7.83 $\pm$ 0.75	7.0 $\pm$ 0.89	5.50** $\pm$ 1.05	4.50** $\pm$ 0.84	3.17** $\pm$ 0.75	2.83** $\pm$ 0.75
Candesartan	0.5	7.17 $\pm$ 1.47	7.0 $\pm$ 1.09	7.0 $\pm$ 1.09	7.0 $\pm$ 1.09	7.0 $\pm$ 1.09	7.0 $\pm$ 1.09
	1.0	7.0 $\pm$ 1.55	6.0 $\pm$ 0.89	5.50 $\pm$ 0.84	5.17 $\pm$ 0.98	5.00* $\pm$ 0.89	4.83* $\pm$ 1.17
	2.0	7.50 $\pm$ 1.64	6.33 $\pm$ 1.50	5.17 $\pm$ 1.47	4.67* $\pm$ 1.37	4.33** $\pm$ 1.21	4.17** $\pm$ 1.33

\* indicates  $p < 0.05$ , \*\* indicates  $p < 0.01$

Significant reduction ( $p < 0.05$ ) in reaction time (hot plate model) was observed at highest doses (2mg/kg) in the treatment groups.

The table gives the mean difference of reaction time between Perindopril and Candesartan at increasing doses at 60, 90 and 120 min time period after administration in tail flick method. There is considerable difference observed between both the drugs at all the doses. Significant difference in mean reaction time is observed between perindopril (all doses) and candesartan 0.5mg at 60, 90 and 120 min periods.

## DISCUSSION

Pain is a unpleasant sensation localized to a part of the body. It is understood as signal of disease. Inflammatory mediators like prostaglandins, leukotrienes, bradykinin play a major role in sensation to pain. Evidences indicates the involvement of bradykinin and prostaglandins in pain.<sup>11</sup>

The role of angiotensin II in pain perception is not clear. Modulations of pain with ACE inhibitors suggest that there is interplay between renin angiotensin system and pain perception.<sup>12, 13</sup> Evidence also indicates that angiotensin II by acting centrally at area postrema regulates the blood pressure and pain perception. In hypertensive patients who were showing the hypalgesia, enalapril treatment normalized the pain perception.<sup>14, 15</sup>

This study was sought to investigate whether an ACEI (Perindopril) which facilitates bradykinin, algesic peptides and / or ARB (Candesartan) may modify pain perception in albino rats. The study suggests that both Perindopril and Candesartan at the doses studied have hyperalgesic effects in both the experimental models studied. On dose to dose basis Perindopril exhibited higher and long lasting hyperalgesic effect than Candesartan as indicated by the persistent reduction in reaction time in Hot plate and Tail flick methods.

Thus hyperalgesia produced by Perindopril could be due to; decreased angiotensin II concentration, increased bradykinin levels and enhanced prostaglandin level.

There is not much data about enhanced activity of bradykinin and prostaglandins with the administration of Candesartan. However an experimental study found an increase in bradykinin concentration following AT<sub>1</sub> receptor blockade, due to unopposed action of Angiotensin II on AT<sub>2</sub> receptor.<sup>9</sup> Hence possibility of involvement of bradykinin and prostaglandins in hyperalgesic effect of ARB's is yet to be determined.

Our study is in accordance with the Study "Effect of Captopril on pain perception in rats" using 0.5, 1 and 2mg/kg of captopril using tail flick method suggested significant reduction in tail flick reaction time after captopril administration.<sup>16</sup> Previous study has reported that the hyperalgesic effect of bradykinin in mice was significantly increased by co administration with captopril as shown by the significant increase in writhing response induced by bradykinin.<sup>11</sup> Effect of acute and chronic treatment of losartan potassium on tail-flick response in mice suggested that Losartan provokes anti nociceptive effects when ingested for a relatively long period of time, but with single dose treatment it does not show any such effect.<sup>17</sup>

When spontaneously hypertensive rats are treated with enalapril and losartan they reduced hot plate latency, this study investigated the effects of subcutaneous (sc) and intracerebroventricular infusions of AII on blood pressure, locomotor activity and tail flick and hot plate latencies in the wistar-kyoto (WKY) and outbred wistar rats. Peripheral but not central administration of AII increased hot plate latencies in WKY and Wistar rats to a level observed in SHR. ICV administration of Losartan (1,3mg/kg) to SHR had no effect on BP or nociception. This indicated that AII has role in altered pain perception observed in SHR and that site of action is peripheral.<sup>18</sup>

This was further supported by the study investigated the effects of captopril, hydralazine and losartan in locomotor activity, tail flick and hot plate latencies in SHR and genetic controls the WKY rats. The increase in hot plate latency normally exhibited by SHR were reduced or abolished by Captopril and losartan. There were no observable effects in tail flick

latencies and locomotor activity. These results highlight a potential role for AII in Pain independent of BP changes.<sup>18</sup>

Recent study "Effects of Captopril and Losartan on thermal and chemical induced pain in mice" reported both captopril and losartan on dose to dose basis showed hyperalgesic effect in both experimental models shown by decrease in hot plate latency and decrease in onset of writhing time.<sup>19</sup>

A study on 22 hypertensive patients who were on ACEI and ARB suggested changes in pain perception during the treatment. Patients were subjected to dental pulp stimulation. Results indicated significant decrease in pain threshold and tolerance during anti hypertensive treatment.<sup>2</sup>

Our finding do not go with the findings of Takai.et.al, who stated that on single administration of ACEI's like spirapril, trandolapril (but not enalapril) and an ARB, losartan have no effect on pain perception, while chronic administration they had anti nociceptive effect.<sup>20</sup>

These drugs are commonly used antihypertensive. Patients who are on these drugs may show higher sensitivity to various noxious stimuli. Our findings suggest that both drugs enhance pain perception. Care should be taken while prescribing these drugs to patients in the presence of pain. Enhanced sensitivity to pain by ACEI's and ARB's may be helpful. Diabetic patients with hypertension show reduced sensitivity to painful stimuli and a generalized impairment of pain sensitivity has been associated with silent ischemia.<sup>21, 22, 23</sup> ACEI's and ARB's by facilitating the perception of painful stimuli, at least in these patients with coronary artery disease may possibly interfere with silent episodes.<sup>24</sup> Further studies are required to support these findings in humans as the animal data cannot be directly extrapolated on humans.

## CONCLUSION

Both Perindopril (ACEI) and Candesartan (ARB) showed to have hyperalgesic effects on dose to dose basis in thermal induced pain models. It is also inferred that Perindopril produced more hyperalgesic effects than Candesartan on dose to dose basis. The results obtained by this study cannot be directly extrapolated to humans; further studies are required to establish the effect on pain perception in humans.

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# A Study on Knowledge and Awareness about HIV/AIDS among First Year Medical Students in Guntur, Andhra Pradesh

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## ABSTRACT

HIV/AIDS is undoubtedly the deadliest disease entity of recent times; unabated spread and lack of cure has made this disease assume the magnitude of a pandemic. The best approach to control it remains prevention of this infection.

The current study was done to study the awareness and knowledge about HIV/AIDS among the first year medical students. A Cross sectional study was done among 138 first year medical students. The information was collected from them within 2-3 weeks of admission using pre-test semistructured questionnaire. All the students had heard about HIV/AIDS. Only 55.79% of them could tell all the modes of transmission correctly. 26.78% students had the misconceptions regarding the mode of spread of this disease. The commonest misconception was that HIV get transmitted through working in same environment (6.52%) followed by superficial kissing (5.79%) and sharing utensil with patient in 4.35% students. All the preventive measures were known to 77.53 % students.

**Keywords:** Knowledge, HIV/AIDS, Awareness

## INTRODUCTION

HIV/AIDS is undoubtedly the deadliest disease entity of recent times; unabated spread and lack of cure has made this disease assume the magnitude of a pandemic. The HIV/AIDS epidemic represents the most serious public health problem in India.

The epidemic of HIV/AIDS is now progressing at a rapid pace among young people.

Studies have reported that young people form a significance segment of those attending sexually transmitted infection clinic & those infected by HIV<sup>(1)</sup>. India presently had 2.27 million cases of HIV/AIDS and is the second country after South

Africa in respect of number of HIV/AIDS cases .AIDS is affecting many people in sexually active age group. Majority of theHIV infections are in the age group of 15-44 yrs, out of which 35% are in the age of15-24 yrs <sup>(2, 3)</sup>.

The best approach to control it remains prevention of this infection. Adolescent age group remains a focus group for I.E.C. activities regarding HIV / AIDS as they pass through a phase of experimentation and initiation of sexual activities. As new entrant medical studentsalso form a part of this vulnerable section, their knowledge assessment about HIV/AIDS will help us in planning for teaching related to these issues.

## MATERIAL AND METHOD

The present cross-sectional study was conducted among 138 new entrant medical students (52 males and 86 females) of Katuri Medical College and Hospital,Guntur(A.P.).

The study period was within 2-3 weeks of admission to the college.A pre-tested semi-structured questionnaire was administered to the students after having obtained their informed consent. All the

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questions were explained and all queries were clarified.

## RESULTS

All the respondents had heard about HIV/AIDS. 59.42% of them knew that it is a viral disease and 45.65% knew that it has been reported from India. 63.04% students knew that no vaccine is available for prevention of HIV/AIDS. 67.39% students knew that it is a fatal disease. Sexual route was considered most common mode of transmission by 95.65% of the students followed by blood and blood products by 89.85% of the students. Only 55.79% of them could tell all the modes of transmission correctly. 26.78% students had the misconceptions regarding the mode of spread of this disease. The commonest misconception was that HIV get transmitted through working in same environment (6.52%) followed by superficial kissing (5.79%) and sharing utensil with patient in 4.35% students. The high risk groups identified by the students were prostitutes (70.28%), intra-venous drug users (67.39%), homosexuals (65.94%), truck drivers (57.24%), migrant labourers (48.55%). All the preventive measures were known to 77.53 % students. The commonest preventive measure known to students was be faithful to one's partner (94.92%) ,safe blood practices(89.85%) ,condom usage(89.13%).2.89% students did not give any response. Most common source of information regarding HIV/AIDS was television (82.6%) followed by textbooks (80.2%), newspaper (75.2%), friends/family members (59.5%), radio (49.6%), hoardings (46.3%), and health personnel (20.6%).

## DISCUSSION

All of them had heard about HIV/AIDS. Similar findings were observed by Singh et al <sup>(4)</sup> amongst medical students of Delhi and K Meenakshi et al <sup>(5)</sup> amongst medical students of Rohtak. 67.39% students knew that AIDS is a fatal disease. Bhasin et al <sup>(6)</sup> reported that 73.2% students knew that it is a fatal disease. This figure is higher than the knowledge amongst school students of Haryana <sup>(7)</sup>. Present study reported that 63.04 % students knew that no vaccine is available against this disease whereas only 36 % students of Delhi reported that no vaccine is available<sup>(4)</sup>. The observed differences may be because of the intellectual differences in the students. 89.13 % students knew that condom usage prevents spread of

HIV/AIDS. The awareness level is higher than that students of Sr. Sec. School of Delhi and university students of Delhi <sup>(4,8)</sup>.

Present study reported misconceptions regarding mode of spread in 26.78% of students viz working in same environment (6.52%), superficial kissing(5.79%) sharing utensils with patient(4.35%), sharing toilet with patient(3.62%), mosquito bite(1.44%). Singh et al <sup>(4)</sup> also observed similar findings from medical students of Delhi. K Meenakshi et al <sup>(5)</sup> reported 11% medical students had misconceptions Edwin et al <sup>(9)</sup> reported higher misconception on transmission by mosquito bite (10%) from medical students of Madras.

Lal et al <sup>(1)</sup> reported higher misconceptions regarding HIV transmission by kissing (52.8%), shaking hands (25.8%) among university students of Delhi.

70.28% students identified prostitutes as a high risk group whereas truck drivers and migrant labourers as high risk group was known to 57.24% and 48.55% students respectively which reflects greater need for IEC activities covering all the high risk groups. Other studies from Haryana <sup>(7)</sup>, Delhi <sup>(4)</sup>, Madras <sup>(9)</sup> also laid stress on emphasizing upon high risk group identification.

Television was identified as the most common (82.6%) source of information followed by textbooks (80.2%) and other mass media like newspaper (75.2%), radio (49%), etc. Singh also reported television as the main source of information regarding HIV/AIDS in young adults of Gujarat <sup>(10)</sup>.

## Conclusion and recommendations

The present study highlighted that 100% of them were aware of HIV/AIDS. However some of them had incomplete knowledge about modes of transmission, high risk groups for HIV/AIDS and preventive measures against HIV/AIDS. It is apparent that many health care professional like doctors & nurse feel that they have inadequate clinical and counseling skills to deal with HIV & its implications. Thus their should be training programme for health care professional like doctors, nurse & other categories. As there is no cure for HIV/AIDS and no effective vaccine to prevent HIV/AIDS infection till date.

Health promotion through extensive information, education and communication to influence the

behavior of group of individuals is key element in efforts to limit spread of HIV and it remains the single most important component in National AIDS Prevention and Control Programme of any country.

There is strong need that school education must directly address stigmatizing attitude about HIV/AIDS because teachers play a pivotal role in imparting education.

Since textbooks are an important medium of knowledge, sex education should be made an integral part of school/college curriculum.

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**Conflict of Interest:** None declared

**Table 1: Awareness about HIV/AIDS**

Statement	Yes	No	Total
Heard about HIV/AIDS	138(100%)	0(0%)	138(100%)
Knew that it is a viral disease	82(59.42%)	56(40.58%)	138(100%)
Knew that it is reported from India	63(45.65%)	75(54.35%)	138(100%)
No vaccine available for prevention	87(63.04%)	51(36.96%)	138(100%)
AIDS is a fatal disease	93(67.39%)	45(32.61%)	138(100%)

**Table 2: Awareness about modes of transmission\***

Modes of transmission	No of Positive respondents	Percentage
Sexual contact	132	95.65
Blood/blood products	124	89.85
Contaminated needles/ syringes	121	87.68
Mother to child	123	89.13
All the 4 modes	77	55.79

\* Multiple response answers

**Table 3: Misconceptions regarding the mode of spread\***

Misconception	No of positive respondents	percentage
Superficial Kissing	8	5.79
Sharing Utensils with patient	6	4.35
Working in same environment	9	6.52
Sharing bed/clothes with patient	3	2.17
Sharing toilet with patient	5	3.62
Mosquito bite	2	1.44
Polluted air	4	2.89

\* Multiple response answers

**Table 4: Awareness about high risk groups for HIV/AIDS\***

High Risk Groups	No of positive respondents	Percentage
Prostitutes	97	70.28
Homosexuals	91	65.94
Truck Drivers	79	57.24
Migrant Labourers	67	48.55
Intra-venous drug user	93	67.39

\* Multiple response answers

**Table 5: Knowledge about Preventive Measured against HIV/AIDS\***

Preventive Measure	Positive respondents	Percentage
No Response	4	2.89
Remaining faithful to one's spouse	131	94.92
Safe Blood products	124	89.85
Sterilized/Disposable needles/syringes	121	87.68
Condom usage	123	89.13
All methods	107	77.53

\* Multiple response answers

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# Assessment of Improvement in Subcenter Performance with Appointment of a Second Health Worker (Female)

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## ABSTRACT

**Background:** Health workers have been increasingly recognized as the most important inputs in a health system. The World Health Report 2000 notes "performance (quality and efficiency) of a health system depends ultimately on the knowledge, skills and motivation of the people responsible for delivering services". Recognizing the importance of Health Workers (Female) for the delivery of health care delivery, Government of India decided to appoint a second HW (F) in every subcenter under NRHM, which was launched in India in 2006. The present study was undertaken to assess if the performance of subcenters improved after introduction of a second health worker.

**Method:** The present study was conducted in twenty subcenters from seven PHCs in Wardha from March 2010 to April 2010 using both quantitative and qualitative methods.

**Results:** The findings of the in-depth interviews showed that there is an improvement in field visits and reporting of vital events especially in subcenters with more population. The improvement was also observed in pregnancy registration, institutional deliveries and subcenter deliveries.

The improvement in subcenter functioning, both in terms of quality & quantity were not as expected after doubling of manpower at subcenter.

**Conclusion:** Our assessment suggested there is an improvement in subcenter performance with appointment of a second Health Worker (Female).

**Keywords:** Health Worker, Subcenter

## INTRODUCTION

In the rural health care system, the health worker female [HW(F)] is the key field level functionary who interacts directly with the community and has been the central focus of all the reproductive and child health programs. Over the years with changes in program priorities, the role and capacity of the HW(F) has changed substantially. Today's multipurpose worker (MPW) is more involved in family planning and preventive services in contrast with ANM of sixties, who was providing delivery and basic curative services to the community.<sup>1</sup> As per the population norms, one Sub-centre caters to approximately 5000 population in plain areas and 3000 population in hilly/tribal/ desert areas.<sup>2</sup> A Sub-centre provides interface with the community at the grass-root level, providing all the primary health care services. As sub-centres are

the first contact point with the community, the success of any national health program would depend largely on well functioning sub-centres.

The immunization, family planning and infectious diseases prevention activities requires the field worker to travel to villages to cover the target population and has reduced the time she spends at the head quarters. Targets given for family planning and immunization led to improved accountability of the HW(F).<sup>3</sup>

Recognizing the importance of Health Workers (Female) for the delivery of health care delivery, Government of India decided to appoint a second HW (F) in every subcenter under NRHM, which was launched in India in 2006.

In Wardha district, second HW(F) has been appointed in all the 181 subcenters by 2009. Therefore,

this study was undertaken to assess whether the performance of subcenter improved with the introduction of the second HW (F).

## MATERIALS & METHOD

The present study was conducted in twenty subcenters from seven PHCs in Wardha district from March 2010 to April 2010 using both quantitative and qualitative methods.

As part of quantitative method, a pre-designed and pretested checklist was prepared in consultation with the district health authorities of Wardha. This format was sent to the

ANMs of identified subcenters and they were asked to furnish data for 1) March 2006-April 2007 2) March 2009-April 2010. The qualitative part included in-depth interview with i) ten HW (F) (five old ones and five new ones); ii) Three medical officers of identified PHCs; iii) RCH officer of Wardha district.

Data analysis: Data collected by quantitative method was entered and analyzed using Epi Info 6 software. For the in-depth interviews, detailed notes were taken by a recorder during the interview. These notes were revisited by the investigator immediately after the interview so that any extra points including impressions, changes in behaviors or attitude that won't appear in the verbatim could be recorded. The transcript was coded and recoded to understand the meaning and thematic analysis was done.

## RESULTS

The interviewed people varied in their opinion regarding the need of the second HW (F). However, majority of them opined that second ANM was necessary considering the work load of the ANM, especially after introduction of NRHM. First ANMs posted in area where population is around 3,000-5,000, felt second ANM was not required as the workload was less in these subcenters. While responding to the query regarding the need for the second HW(F), none of the respondents mentioned the need to improve the quality of services or to strengthen those service components which are weak at present.

The findings of the in-depth interviews also showed that there is an improvement in field visits and

reporting of vital events especially in subcenters with more population. In a few subcenters a small number of deliveries were conducted in the period 2009-2010. In 2006-07, there were no deliveries conducted in these subcenters. However, it is important to note that infrastructure for conducting deliveries was missing in 2006-07 and with launching of NRHM, the required equipments and other infrastructure has been built up. The quantitative information showed that the coverage with essential maternal and child health care services had increased after the appointment of second ANM in subcenters with more population. In Subcenters with less population, there was no change in the performance.

The findings of the in-depth interviews also showed improvement in field visits and reporting of vital events especially in subcenters with more population. However, adequate efforts for improvement in quality of services were not noticed during the in-depth interviews. Many ANMs admitted to not conducting deliveries and not inserting IUDs at subcenters and they were not residing at the subcenter village.

Around 40% of subcenters had a population between 3000-5000, 27% of subcenter's population is between 5000-7000 and 20% of subcenters have population less than 3000. whereas subcenters population of 7000-10000 and 10000 are of one (6.7%) each. The mean age of the first HW (F) was  $44 \pm 6.4$  years, while the mean age of the second HW(F) was  $26 \pm 4$  years. Majority of the first HW(F) (60%) belonged to the age-group 40-49 years and more than three fourth of the second HW(F) were from age-group 20-29 years. About 66.7% of the first HW(F) had more than 20yrs of experience, 26.7% had 10-19 years experience and 6.7% had 5-9 years of experience. All the second HW(F) had less than 5 years of experience).

Table 1 shows the performance of subcenter in the year 2006-07 (before appointment of second HW(F) and in the year 2009-10 (after appointment of second HW(F)). There had been improvement in pregnancy registration, institutional deliveries and subcenter deliveries. There is no corresponding increase in ANC registration before 12 weeks gestation, coverage with Tetanus Toxoid during pregnancy, registration of high risk pregnancies, and Post-natal Care visits.

**Table 1. Indicators related to reproductive and child health services before and after introduction of second HW(F)**

Indicator	2006-07	2009-10	difference
Registration of pregnancy per 1000 population	16.2	18.5	2.3*
Proportion of pregnancy registration before 12 weeks	84.6	78.9	-5.7
ANC TT	73.6	66.5	-6.9
Registration of high risk pregnancy	12.5	9.9	-2.6
Institutional deliveries	92.0	95.7	3.6*
Subcenter deliveries	8.2	10.3	2.1*
PNC visits	75.6	71.4	-4.2

\*= significant P value <0.05%

## DISCUSSION

Policy-makers and planners are starting to realize that attaining the Millennium Development Goals (MDG) is simply not possible if the human resource (HR) crisis is not addressed effectively.<sup>4</sup> For health policy-makers and planners, sufficient and qualified staff is a better guarantee of achieving a well-functioning health system to contribute to improved health outcomes.

The National Rural Health Mission (NRHM) launched in the country in April 2005 aims to do architectural correction in the health system. One of the components of the mission was to increase human resources in health and a specific activity was to increase the number of HW(F) in the subcenters to two.<sup>5</sup> The reasons for the decision to increase the HW(F) were: 1) the work description of the HW(F) was such that one person could just not achieve it; 2) in tribal and difficult areas, the 5000 could be dispersed around 7 to 12 habitations.

An HW(F) had to make field visits and she is entrusted with implementation of national programs like maternal and child health, control of vector borne diseases, conduction of immunization sessions away from her sub centre. If this were so, she could not combine this with providing maternal and child services in the subcenter on a 24 hour basis.<sup>6</sup> If there were a second HW(F) and a male multi purpose worker than the centre could be kept open. Another dimension of this same issue relates to population dispersion.

Secondly in tribal and difficult areas, population is usually dispersed over 7 to 12 habitations. Providing the basket of health services to the community in all the habitations, therefore, is difficult. It has been usually seen that the coverage with services in nearby habitations has been found better than the distant habitations. However in such areas if there were two

HW(F), sharing the burden of work made it easier for them to reach every habitation.<sup>7</sup>

Moreover, subcenters were created according to population norms, decades later demographic profiles changed, but subcenters are not restructured accordingly, resulted in increased work load of HW (F).

Present study was conducted in twenty subcenters from seven PHCs in Wardha. This operational study was conducted from March 2010 to April 2010 using both quantitative and qualitative methods. As apart of quantitative method a pre-designed and pretested checklist was prepared in consultation with the district health authorities of Wardha district. This format was sent to the HW(F) of identified subcenters and they were asked to furnish data for 1) March 2006-April 2007 2) March 2009-April 2010. As a part of qualitative method in-depth interview were conducted with i) Ten HW(F) (this includes five interviews for first HW(F) and five interviews for second HW(F) of the identified subcenters); ii) Three medical officers of identified PHCs ; iii) RCH officer of Wardha district.

The data collected from quantitative method was not entirely reliable, as many data provided did not tally with the registers brought by HW(F) and lots of discrepancy in the data was observed during the data analysis. For certain data they retracted later during the in-depth interviews; e.g. while filling the pre - designed format all the HW(F) (first and second) claimed that they were residing in the subcenter village. However, on in-depth interview several of them accepted that they do not reside in the subcenter village.

From the in-depth interview of various functionaries, it emerged that there had been some marginal improvement in the performance of a few subcenters. The improvement was mainly in the

coverage of services. There has not been any marked improvement in the quality of the services delivered. Moreover, the improvement in the coverage of services was not uniform in all the subcenters where a second HW(F) was appointed. Wherever, the population of the subcenter was less, the first HW(F) admitted that the coverage with essential services remains the same as earlier before appointment of second HW(F).

Efforts had not been made to develop a system of quality assurance and therefore, no improvement in the quality of service delivery which could have been expected with the appointment of second HW(F), was recorded in any of the in-depth interviews conducted with the health functionaries.

Results showed improvement in pregnancy registration, institutional deliveries and subcenter deliveries. There was no corresponding increase in ANC registration before 12 weeks gestation, coverage with Tetanus Toxoid during pregnancy, registration of high risk pregnancies, and Post-natal Care visits.

The findings of the in-depth interviews also showed that there is an improvement in field visits and reporting of vital events especially in subcenters with more population. In a few subcenters a small number of deliveries were conducted in the period 2009-2010. In 2006-07, there were no deliveries conducted in these subcenters. However, it is important to note that infrastructure for conducting deliveries was missing in 2006-07 and with launching of NRHM, the required equipments and other infrastructure has been built up. Therefore, the improvement in institutional delivery cannot be related to appointment of the second HW(F).

However, many HW(F) frankly admitted to not conducting deliveries and not inserting IUDs at subcenters. The reasons given by first HW(F) are non availability of labor room, and vicinity of subcenter population to PHC, RH and medical college. Second HW(F) limitation is that none knew the skill of conducting labor and they could not get skill, as there was not enough exposure during their training period.

One of the expectations from the appointment of the second HW(F) was that the coverage and quality of outreach immunization sessions would improve. However, only marginal improvement in coverage and no improvement in quality was reported. During in-depth interviews, most of the first HW(F) and MOs expressed that second HW(F) do not have the skills to give immunizations, especially BCG. This situation

has led to a decision at the PHC level that both the first and second HW(F) will attend all the immunization sessions. Most of the second HW(F) were unaware of the concept of VHND (Arogya din), waste disposal. Their knowledge about other national programs was also found limited. Hence, there was no improvement in the coverage and quality of immunization sessions held.

This kind of situation where two HW(F) are attending every immunization session could have been utilized to initiate additional activities related to maternal and child health. However, efforts were not made to add any additional activity. Already several functionaries; viz. ASHA, Anganwadi Workers and Helpers, and 4-5 members of SHG are attending immunization sessions and have the major responsibility to mobilize the beneficiaries. Thus the time of second HW(F) is mostly wasted here as this time could have been utilized for doing additional activities.

Another important activity for which the second HW(F) could have been utilized was to increase the institutional deliveries. On in-depth interview several HW(F) (both first and second HW(F)) accepted that they do not reside in the subcenter village. Moreover, the second HW(F) does not have the competence and confidence to conduct deliveries and other emergencies. Place of residence is the most important factor having a bearing on the reliability and availability of curative services provided by the staff.<sup>8</sup> Service delivery is influenced by the place of residence of the HW(F) in two ways: quality of services and range of services.<sup>3</sup> Those who stay at the headquarter are more likely to keep time of subcenter and work schedule because they save commuting time, and are less likely to take leave for personal work/ sickness in the family. Non-resident HW(F) would not be able to provide 24 hours services such as delivery care.<sup>9</sup>

It would be unfair if the blame is put squarely on HW(F). Many second HW(F) felt that the training that they received is inadequate. They admitted that their pre-service training was of poor quality and they did not receive enough practical training. They require more training on conduction of deliveries, IUD insertion and other skills. Same views were expressed by the first HW(F) and the PHC medical officers also. In addition, the first HW(F) also voiced the need for more training for themselves also.

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**Conflict of Interest:** None

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# Correlation of Fasting Blood Glucose with Obesity Status in Postmenopausal Women in the Age Group of 45-49 yrs.

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## ABSTRACT

**Background:** The association between type 2 Diabetes Mellitus and Obesity is very close. Obesity is common in women aged between 45-49 yrs. Prevalence of Prediabetes i.e. Impaired Fasting Glucose (IFG) also seems to be higher in women than men in Indian population. The present work was planned to explore the correlation if any between fasting blood glucose & obesity in postmenopausal women.

**Objectives:** To study the correlation if any; between fasting blood glucose levels & obesity status in postmenopausal women.

**Materials & Method:** Study group comprised of 106 asymptomatic postmenopausal women with no family history of Type 2 Diabetes Mellitus in the age group of 45-49 yrs. On the basis of Body Mass Index, they were divided in 3 groups viz. Normal, Preobese & Obese. Fasting Blood Glucose levels (FBG) were estimated in all the subjects & results were analyzed using ANOVA test.

**Results & Conclusions:** Mean FBG levels in preobese and obese group were found to be significantly higher than those in control group in our subjects. So, it can be said that obesity in postmenopausal women may act as an important predictor for type 2 D.M. Early lifestyle modifications may prove to be an important means of prevention of obesity & reduction in risk of subsequent type 2 D.M. in postmenopausal women.

## INTRODUCTION

More than 220 million people worldwide have diabetes. In 2004, about 3.4 million people died from consequences of high blood sugar. More than 80% of deaths due to diabetes occur in low and middle income countries. WHO projects that deaths due to diabetes will double between 2005 and 2030<sup>1</sup>.

The incidence of Diabetes Mellitus increases with age. So, American Diabetes Association (ADA) recommends screening of all individuals more than 45 yrs of age every 3 years for early detection of the disease which might help to improve its outcome<sup>2</sup>. Expert Committee of American Diabetes Association continues to recommend fasting blood glucose as the preferred diagnostic tool for Diabetes Mellitus because it is more convenient, more reliable and less expensive.

Obesity may be considered as a dynamic process of accumulating and filling of fat cells, resulting in an additional burden on vital organs such as the heart, liver, and kidneys. This process of 'supporting and

carting' of weight for many years apparently takes its toll on the vascular system as when the crude relative risks of obesity for each disease condition are calculated, diabetes mellitus is found to be the highest<sup>3</sup>. It is also projected that in India out of 41 million diabetic people, 20 millions are obese<sup>4</sup>. The connection between obesity and type 2 D.M is so strong that attempting to treat diabetes alone without managing any coexisting obesity is almost futile. So many experts consider obesity and type 2 D.M to be different ends of the same spectrum therefore together called as diabetes<sup>5</sup>.

Prediabetes or Impaired Fasting Glucose (IFG) is defined as fasting plasma glucose level between 100-125 mg/dl<sup>6</sup>. There is growing evidence that it reflects an intermediate condition between normality and diabetes. Obesity is more common among women than men especially in the age group of 45 – 49 years<sup>7</sup>. Prevalence of IFG also seems to be higher in women than men in the Indian population<sup>8</sup>. So present study was planned to explore if there is any correlation

between fasting blood glucose & obesity status in postmenopausal women in the age group of 45-49 yrs.

### MATERIALS AND METHOD

The study was a cross sectional study & the research protocol was approved by institutional ethical committee. It was conducted in private dispensaries & department of Physiology & Biochemistry of Bharati Vidyapeeth Deemed University Medical College, Pune 411043, India; in the period between February 2008 & December 2009.

106 postmenopausal women volunteers aged between 45-49 yrs were recruited as subjects in the study. Amenorrhea for a duration of twelve months or more was considered as a criterion for menopause<sup>9</sup>. Volunteers suffering from any chronic ailment, volunteers with family history of Diabetes Mellitus and those having Diabetes Mellitus, history of taking any kind of long term medication were excluded from the study.

The purpose of the study was explained to all the subjects & informed written consent was obtained from each of them prior to inclusion in the study. Detailed medical history was taken & thorough physical examination was performed in all the subjects.

The anthropometric measurements of the subjects were carried out using standard instruments. Height

was measured to the nearest 0.1 cm when the subject was standing in erect position with bare feet on flat floor with heels touching the wall and head straight against a vertical scale. Body weight was measured while the subject was minimally clothed and without shoes, standing motionless on a weighing scale and it was recorded to the nearest of 0.1kg. Body mass index (BMI) was calculated as weight in kilograms divided by square of height in meters (kg/m<sup>2</sup>). BMI in the range of 18.50 to 24.99 kg/m<sup>2</sup> was considered to be normal. The subjects were divided as follows:

**Table 1: Classification of subjects on the basis of BMI<sup>10</sup>**

BMI (Kg / m <sup>2</sup> )	Group
18.50 – 24.99	Control group( having normal BMI)
25.00 – 29.99	Pre obese group
≥ 30.00	Obese group

Fasting Plasma Glucose levels were estimated in all the subjects. They were asked to take regular dinner before 10 PM on the previous night to ensure the 8-10 hours fasting period. The fasting blood sample of 2 ml was collected with appropriate aseptic precautions in a fluoride bulb between 7–8 am. Plasma was separated by centrifugation and fasting plasma glucose was estimated by Glucose Oxidase Peroxidase (GOD/POD) method using Han's 0392 filter Colorimeter in Biochemistry Laboratory.

**Analysis of data:** The results were analyzed statistically by using ANOVA test.

### OBSERVATIONS & RESULTS

**Table 2: Demographic distribution of subjects according to BMI**

Obesity Status	Control group	Preobese group	Obese group	Total
No. of Subjects	27	33	56	106

**Table 3: Comparison of Fasting Blood Glucose (FBG) in mg/dl in three groups**

Parameter	Control group (n=27)	Preobese Group (n=33)	Obese Group(n=56)	F value	p Value
FBG mg/dl Mean ± SD	81.48 ± 1.86	84.48 ± 1.93	87.87 ± 2.86	4.53	<0.01*

\* statistically significant

FBG levels were found to be significantly higher in preobese & obese groups as compared to control group (subjects having normal BMI).

### DISCUSSION

As shown in table no.2, we had 27 subjects in control group (BMI between 18.50 - 25.00 Kg / m<sup>2</sup>), 33 subjects in preobese group (BMI between 25.00 – 29.99

Kg / m<sup>2</sup>) & 56 subjects in preobese group (BMI > 30.00 Kg / m<sup>2</sup>). As shown in table no.3, we have found that fasting blood glucose levels were significantly higher in preobese & obese group compared to control group.

Correlation between type 2 D.M & obesity has been studied by many researchers & similar finding have been noted by them<sup>11,12,13</sup>. According to the Diabetes Epidemiology Collaborative Analysis of Diagnostic

Criteria in Asia (DECODA) Study Group, the prevalence of Impaired Fasting Glucose (IFG) seemed to be higher in women than men in Indian population<sup>8</sup>. Obesity is a morbid phenotype of excess body fat resulting from an excess energy balance in the form of fat accumulation. It is certain that obesity, both general and abdominal is an important risk factor in the etiology of type 2 DM<sup>3</sup>.

Insulin resistance is a characteristic feature of type 2 D.M. & central obesity plays a key role in its development. Fat depots are viewed as endocrine tissues that secrete various chemicals collectively known as adipokines i.e. leptin, resistin, tumor necrotic factor  $\alpha$ , adiponectin, ghrelin, angiotensinogen, plasminogen activator inhibitor & many others. It was found that alteration in the levels of most of these chemicals levels is responsible for development of insulin resistance<sup>14,15</sup>.

Experimental evidence supports the above observations. When glucose transporters were selectively knocked out in adipose tissue of animals, glucose transport in muscle in vitro was found to be normal but when those animals are tested in vivo, there was decrease in glucose transport in muscle<sup>16</sup>. This is probably due to release of chemical signals from the adipose tissue which act on the glucose transporters in the muscle. This means that fat depots are not inert lumps but are actually endocrine tissues that secrete various chemicals which modulate insulin secretion and insulin action which may contribute to insulin resistance.

Obesity is commonly associated with menopause. Some studies have tried to render an explanation for weight gain after menopause<sup>17, 18,19,20,21</sup>. They have reported that natural menopause is associated with reduced energy expenditure, during rest as well as during physical activity and this was responsible for obesity. Estrogen deficiency is claimed to result in accelerated loss of fat-free mass with increased central adiposity leading to obesity<sup>22, 23</sup>.

But besides the menopause related factors responsible for development of obesity; changes in lifestyle, consisting of physical inactivity, diet rich in fat, sugar and salt coupled with a high level of mental stress are also playing a big role in development of obesity in postmenopausal women.

Our study reiterates the findings of other researchers that increase in BMI being associated with

increase in FBG levels in postmenopausal women & underline the need of health education to aim for primary prevention of type 2 D.M. General public does not recognize the connection between overweight/obesity with diabetes so greater efforts for educating the obese and preobese are needed. Unfortunately obesity is difficult to treat & requires a high order of motivation on patient's part.

Strategies to reduce weight by way of calorie restriction complemented by minimum 1 hour of aerobic exercises should be prescribed to postmenopausal women with BMI above normal range. It has been reported that reduction in amount of body fat increases the sensitivity to endogenous insulin, diminishes the need for excessive secretion of insulin by beta cells and prevents beta cell exhaustion<sup>25</sup>. It is also noted that people with impaired fasting glucose can change their life style, reduce weight & can delay the onset of diabetes<sup>26</sup>. At the same time monitoring of fasting blood glucose should also be done periodically for early detection of D.M.

India has the notorious distinction of being the diabetic capital of the world. It is necessary to have interventions to reduce the risk factors leading to development of this disease in susceptible populations. This will go a long way to ease the economic & health burden of diabetes in India.

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# Accreditation of Private Labs for Quality Participation by Private Practitioners in RNTCP: A Cross Sectional Study

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## ABSTRACT

**Setting:** Privately practicing doctors trained in modern system of medicine in East Delhi area

**Objective:** To determine the reliance on sputum microscopy as ordered by private medical practitioners for diagnosis of pulmonary Koch's as well as monitoring their progress

**Method:** Quantitative data was obtained using a semi- structured interview schedule administered to 102 private practitioners trained in modern system of medicine who were registered with the East Delhi Branch of Indian Medical Association as listed in its Directory 5th Edition. Corresponding qualitative data was obtained from key informants through interviews of government functionaries that focused on their experiences regarding PPP in RNTCP.

**Results:** It was found that although 50% of private doctors considered three consecutive sputum examinations for acid fast bacilli (AFB), as their most reliable criteria to diagnose pulmonary tuberculosis but this was actually carried out on only 38% of the patients. Various contributing factors cited being, inadequacy of laboratory services in terms of number as well as reliability, poor patient paying capabilities, lack of time and ignorance with the patients and medical practitioners

**Conclusion:** Network of accredited laboratories can increase reliance on sputum microscopy as the diagnostic & treatment tool.

**Keywords:** Tuberculosis; Sputum Microscopy; Accreditation

## INTRODUCTION

Since the discovery of Mycobacterium Bacillus in March 1882 by Dr. Robert Koch in Germany, Tuberculosis has remained as the oldest and the most widespread killer disease of mankind. One-third of the world's population is infected with tuberculosis bacillus. Untreated, a person with active TB can infect 10-15 people a year on average. Eight to nine million new cases of tuberculosis occur in the world each year and nearly two million deaths due to this disease<sup>1</sup>.

Around 1.2 million TB cases were detected & put on DOTS in the year 2004 under the RNTC Programme of which about 4.65 lakh cases were are new sputum-positive, 3.81 lakh were newly diagnosed cases but spuutn negative, 1.44 lakh cases were belonged to extrapulmonary category and remaining 2.1 lakh were seeking treatment after default or relapse<sup>2</sup>. Overall the

percentage of sputum negative cases was much higher than sputum positive cases. Moreover as per The Directorate Of Health Services, Government of India, it is estimated that almost an equal number of TB cases i.e. about 1.1 million, report to the physicians practicing in private sector<sup>3</sup>. Diagnosis of TB cases is made through quality sputum microscopy, by examining three sputum samples of the suspected cases. Facilities for sputum microscopy are available free of cost at RNTCP microscopy centers.

In Delhi, under the Delhi Tapedik Samiti there are 14 district level T.B. Control Societies. There were 138 drug distribution & microscopy centers under designated 20 district T.B. societies all over Delhi at time of study. One center caters to a population of one lakh and is manned by one T.B. Health Visitor and one microscopist. At time of study there were are 20 chest clinics, 109 treatment cum diagnostic centres & 89

Treatment centers functioning. Maximum number of pulmonary tuberculosis were reported from East Zone of Delhi.<sup>3</sup>

Under the RNTCP, a designated microscopy centre (DMC) should be established for approximately 100,000 population (50,000 for tribal and mountainous areas). At each DMC, there are provisions for one RNTCP-trained laboratory technician. The programme also provides for up gradation of the laboratory facilities, supply of a binocular microscope and requirements of laboratory consumables. Although there were 7,800 microscopy centers working under RNTCP<sup>7</sup> as of end December 2003, rapid expansion and with ensured quality of the sputum smear microscopy services is required.

### Laboratory Accreditation & RNTCP

Accreditation is a process of certification of competency, authority, or credibility of an organisation. In the present context, accreditation ensures that the practices at the laboratory are acceptable, typically meaning that they are competent to test third parties, behave ethically and employ suitable quality assurance methods. Presently there are many accreditation agencies working in the field of medical laboratories, like NABL (National Board for Accreditation), ICRA, National Assessment and Accreditation Council (NAAC) etc.

Laboratory Accreditation enhances customer confidence in accepting testing / calibration reports issued by accredited laboratories

The globalization of Indian economy and the liberalization policies initiated by the Government in reducing trade barriers and providing greater thrust to exports makes it imperative for Accredited Laboratories to be at international level of competence.

Formal recognition of competence of a laboratory by an Accreditation body in accordance with international criteria has many advantages

1. Potential increase in business due to enhanced customer confidence and satisfaction.
2. Savings in terms of time and money due to reduction or elimination of the need for re-testing of products.

3. Better control of laboratory operations and feedback to laboratories as to whether they have sound Quality Assurance System and are technically competent.
4. Increase of confidence in Testing / Calibration data and personnel performing work.
5. Customers can search and identify the laboratories accredited by NABL for their specific requirements from the Directory of Accredited Laboratories.
6. Users of accredited laboratories will enjoy greater access for their products, both in domestic and international markets, when tested by accredited laboratories.

NABL has established policies and procedures for granting, suspending and withdrawal of accreditation of accreditation in accordance with ISO/IEC 17011:2004

Directory of NABL Accredited Laboratories is published at regular interval, which contains laboratories' contact details and information on their Scope of Accreditation.

Process of accreditation is from Stage 1 to 5 starting from applying for accreditation, assessment of laboratory and granting of accreditation for a period of two years which involves periodic surveillance

Also, there is considerable evidence to show that accreditation programs improve clinical outcomes of a wide spectrum of clinical conditions. Accreditation programs should be supported as a tool to improve the quality of healthcare services<sup>7</sup>.

### Involvement of Private practitioners

The private practitioner is the first contact window for health services to majority of patients. Public sector care is free in India, yet three quarters of India's medical expenditure takes place in the private sector<sup>4</sup> & so the complete and whole hearted voluntary participation by such doctors becomes imperative.

The use of private health care providers in low- and middle-income countries (LMICs) is widespread and is the subject of considerable debate. In a review of a new model of private primary care provision, now a days emerging in South Africa, in which commercial

companies provide standardized health care services at relatively low cost. The features of these companies were compared with the most probable alternatives: a private general practitioner or a public sector clinic. In a case study of cost and quality of services, the clinics were popular with service users and run at a cost per visit comparable to public sector primary care clinics. However, their role in tackling important public health problems was found to be limited. The authors commented "Encouraging the use of such clinics by those who can afford to pay for them might not help to improve care available for the poorest population groups, which are an important priority for the government. Encouraging such providers to compete for government funding could, however, be desirable if the range of services presently offered, and those able to access them, could be broadened. Even without such contractual arrangements, these models provide an important lesson to the public sector that acceptability of services to users and low-cost service delivery are not incompatible objectives.<sup>6</sup>

A study from the Tuberculosis Research Centre (TRC), Chennai, India, states that more than 50% of individuals with chest symptoms approach Private practitioners for diagnosis & treatment of tuberculosis. Therefore, the involvement of Private practitioners in the National TB Control Programme is of vital importance as a good proportion of patients seek treatment from them.

As per then Programme guidelines, the Private Practitioner could be involved under the following schemes

Scheme 1 - Referral

Scheme 2 - Provision of directly observed treatment

Scheme 3 A - Designated Paid microscopy center – microscopy only

Scheme 3B - Designated Paid microscopy center-microscopy and treatment

Scheme 4A - Designated microscopy center - microscopy only

Scheme 4B - Designated microscopy center - microscopy and treatment

**Study area & Sampling Technique:** The directory of doctors (5<sup>th</sup> edition) published by East Delhi Branch of IMA (Indian Medical Association) was used by the authors to obtain the list of doctors practicing in East Delhi Area. The sample was drawn using systematic random sampling technique from the directory database. Only those private doctors who were actually treating the cases of pulmonary tuberculosis (either as specialist or general practice) were included in the study. The data was collected from the month of October 2004 to February 2005 and analyzed using the SPSS 10.5. An analysis of the frequency distribution with respect to preferred diagnostic modalities, treatment initiation/ cessation criteria, treatment regimens, record keeping etc were generated.

**Limitations Of The Study;** Record keeping at the level of private practitioners was very minimal and insufficient to confirm the information provided.

## DISCUSSION

It was found that nearly 50% of private doctors considered sputum examination for acid fast bacilli (AFB) for a period of three consecutive days, as their most reliable criteria to diagnose pulmonary tuberculosis but this was actually carried out on only 38% of the patients. Various contributing factors were cited like inadequacy of laboratory services in terms of number as well as reliability, poor patient paying capabilities etc. Data seems to suggest there is extreme reliance on chest X-ray as a diagnostic method, being done by nearly 40% of the respondents as their first investigation. To ascertaining the level of prevailing knowledge among the private practitioners w.r.t diagnosis of pulmonary tuberculosis, the private practitioners were asked to name out the most reliable methods/procedures/investigations, which should be followed in order to diagnose a case of pulmonary tuberculosis irrespective of what actual conditions in the clinic scenario demand. These doctors were also asked to name such procedures in the order of preference or decreasing specificity.

**Table 1. Knowledge regarding, diagnostic criteria for tuberculosis**

First Preference Investigation Relied Upon	Second Preference		Third Preference			
	No. of respondents	Percent	No. of respondents	Percent	No. of respondents	Percent
blood investigations including ESR	1	1.0	26	25.7	53	52.5
Chest X-ray	36	35.6	61	60.4	4	4
Single sputum examination	3	3.0	5	5	8	7.9
Two consecutive sputum samples examination for AFBs	3	3.0	1	1	0	0
Three consecutive days sputum examination	58	57.4	6	5.9	8	7.9
Symptomatic assessment	0	0	1	1	21	20.8
Other investigations(montoux test, sputum culture , ELISA)	0	0	1	1	6	6
Total	101	100.0	101	100	101	100

Based on the above table it can be seen that out of 101 doctors interviewed, 58 (57.6%) doctors mentioned sputum examination for acid-fast bacilli for a period of three consecutive days, as the most reliable criteria to diagnose pulmonary tuberculosis. Sputum examination also happens to be the only investigation to be relied upon to definitively diagnose a patient as a case of pulmonary tuberculosis as per RNTCP, chest radiograph and other investigations being only capable of giving supportive evidence.

Even with such importance of Sputum examination for AFB only few patients go to reliable laboratories. Many reasons can be cited

1. Most of the patients are poor and not able to afford private laboratories
2. Many are daily wage labourers and can't go to laboratories during their duty timings (9am – 5pm)
3. There are very few government laboratories which many patients can't access
4. A sample to be given one time can still be tried but giving samples for three days continuously is not acceptable for their daily routine.

**RECOMMENDATIONS**

It would be well suggested that all the diagnostic laboratories (public and private) should be accredited according to prescribed universal guidelines to maintain the quality control. A simplistic arrangement which is understandable & replicable on ground can be used.

**For example**

**Group A:** Highly equipped laboratory with well experienced pathologists/microbiologist for rare or high level investigations like hormonal studies, PCR, DNA mapping or Genetic studies etc

**Group B:** Well equipped laboratory with trained technicians in detecting mycobacterium bacilli, malaria parasites, Gram or ZN staining techniques, serum analyses, CSF , pleural or ascitic fluid investigations, culture and sensitivity etc

**Group C:** laboratory with routine investigations like complete blood count, urine routine and microscopy

It may also be suggested to make sputum microscopy for AFB at nominal rates at all accredited laboratories which can be reimbursed on percentage basis by Government. The benefits of such arrangement can be manifold:

First, we will get more patients going for AFB microscopy as their own reputed and accessible laboratories are investigating at nominal rates. Secondly government will have access to data on how many patients getting AFB microscopy with no extra cost as they would be applying for reimbursement. Such patients can be monitored for treatment completion

**Policy Implications**

- Augmentation of laboratory services, both in terms of quality as well as quantity, perhaps through collaboration with standard accredited private laboratory.

- Development of a feedback system in the form of a referral link as a medium of mutual exchange of information.

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# A Case Report of Abnormal Spina Bifida Cystica

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## ABSTRACT

**Introduction:** Spina bifida is a developmental congenital disorder caused by the incomplete closure of the embryonic neural tube. Some vertebrae overlying the spinal cord are not fully formed and remain unfused and open. If the opening is large enough, this allows a portion of the spinal cord to protrude through the opening in the bones.

**Aims of Study:** To study an abnormal case of Spina Bifida Cystica

**Material and Method:** The present study is a case report of a 11 day old female child who reported to the pediatric surgery department with the chief complaint of a cystic swelling of 5\*3cm in a thoraco lumbar region since birth. The swelling was soft but tense and the skin over the swelling was thinned out. The child showed some signs of lower limb involvement which need to confirmed.

**Result:** On anatomical examination it was found to be a case of developmental anomaly of vertebral column in thoraco lumbar region which is against the lumbo-sacral region which is the most common site, with spinal cord involvement (neural tube defect).

On test of illumination, it was found to be partially illuminated and X rays and MRI findings showed non fusion of vertebral column with abnormal protrusion of spinal cord through the defect.

**Conclusion:** It is a case of meningocele (spina bifida) caused by abnormal closure of neural folds of IIIrd and IV weeks of developments leading to neural tube defect. It was a spina bifida of cystic variety which mostly accomplish with lower limb involvement.

**Keywords:** Meningocele, Spina Bifida, Neural Tube Defect

## INTRODUCTION

By Definition Spina Bifida Cystica has been defined as

“A bony defect in the vertebral column that causes a cleft in that column.”<sup>(1)</sup>

Spina bifida is a developmental congenital disorder caused by the incomplete closure of

the embryonic neural tube. Some vertebrae overlying the spinal cord are not fully formed and remain unfused and open. If the opening is large enough, this allows a portion of the spinal cord to protrude through the opening in the bones.

The term spina bifida is used to cover a wide range of defects, which may result in neurological defects, but are not usually associated with mental retardation. Such abnormalities are usually localized in sacrolumbar region, covered with skin and are not noticeable on the surface except for the presence of a small tuft of hair over the affected area (spina bifida occulta). Sometimes this sac is so large that it contains not only meninges but also the spinal cords and its nerves. The abnormality is then known as meningocele.<sup>(2)</sup>

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Spina bifida malformations fall into three categories: spina bifida occulta, meningocele, and spina bifida cystica (myelomeningocele). The most common location of the malformations is the lumbar and sacral areas.

### **Epidemiology of Spina Bifida Cystica:<sup>(3)</sup>**

Spina bifida is one of the most common birth defects, with an average worldwide incidence of 1–2 cases per 1000 births, but certain populations have a significantly greater risk.

The highest incidence rates worldwide were found in Ireland and Wales, where 3–4 cases of myelomeningocele per 1000 population. The rate has fallen dramatically with 0.15 per 1000 live births reported in 1998, though this decline is partially accounted for by the fact that some fetuses are aborted when tests show signs of spina bifida. Parents of children with spina bifida have an increased risk of having a second child with a neural tube defect. This condition is more likely to appear in females; the cause for this is unknown

### **Aim of the study:**

To study an abnormal case of Spina Bifida Cystica

## **MATERIAL AND METHOD**

### **Introduction to Case**

The present study is a case report of a 11 days old female child (baby of Kunta D/O Jeeran) from the Nipari district, Shajapur who reported to the pediatric surgery department with the chief complaint of a cystic swelling in a thoraco lumber region since birth.

History revealed that mother did not have any nutritional supplement including folic acid during pregnancy.

### **On Examination**

#### **Gross Examination**

There was a swelling 5 x 3 cms in size over lower thoracic and upper lumber region. The swelling was soft but tense and the skin over it was thinned out. The child showed some signs of lower limb involvement which need to confirmed.(Fig 1 and Fig 2)

### **Anatomical Examination**

On anatomical examination it was found to be a case of developmental anomaly, of vertebral column (spina bifida) with spinal cord involvement (neural tube defect).

On test of illumination, it was found to be partially illuminated

### **Investigations**

- Plane radiograph of the spine revealed developmental defect in the lower thoracic and upper lumber region of vertebral column. (Fig 3)
- MRI revealed abnormal protrusion of the meninges and spinal cord through the defect.

## **DISCUSSION**

The present case is an interesting variation from the normal pathophysiology of Spina Bifida Cystica. The rates of myelomeningocele vary widely among countries and by geographic regions within countries. The average worldwide incidence of spina bifida is 1 case per 1000 births, but marked geographic variations occur. The birth prevalence rate of myelomeningocele was slightly higher in females than in males (1.2:1). A higher proportion of females than males exhibit thoracic-level malformations.<sup>(4)</sup>

Myelomeningocele results from failed closure of the caudal end of the neural tube, resulting in an open lesion or sac that contains dysplastic spinal cord, nerve roots, meninges, vertebral bodies, and skin, thus mostly the lesion is localized to lumbar-sacral region. However in the present case the lesion is localized in the lower thoracic and upper lumber region which is the variation from its normal predisposition. Studies carried out by Keshavarzi S et al<sup>(5)</sup> in Iran has also quoted that the incidence of spina bifida cystica in the thoracic lumber region is very low.

The etiology in most cases of myelomeningocele is multifactorial, involving genetic, racial, and environmental factors, in which nutrition, particularly folic acid intake, is key. Cytoplasmic factors, polygenic inheritance, chromosomal aberrations, and environmental influences (eg, teratogens) have all been considered as possible causes. In the present case also there is a clear history of lack of folic acid intake by



the mother during the period of gestation. The cytological studies of the above case cannot be carried due to lack of facilities in the institute and thus can be consider as the limitation of the study. There are various studies in the past which exemplified the role of folic acid in the etiology of Spina Bifida Cystica<sup>(6-8)</sup>

In the majority of the cases Spina Bifida is not associate with any neurological deformities. However if the gap is large, as in the present case, the meninges along with spina cord and its nerve may herniate through it and this may result in some neurological deformities. In the present case also the child showed some signs of lower limb involvement which need to confirmed. Sakakibara R et al<sup>(9)</sup> had noted that a combination of flaccid and spastic paresis, with dominant lower motoneuron signs in the cystic form, whereas there were dominant upper motoneuron signs in the occult form.



Fig. 1. Showing the close look on gross examination of the case.



Fig. 2. Showing the distant look on gross examination of the case

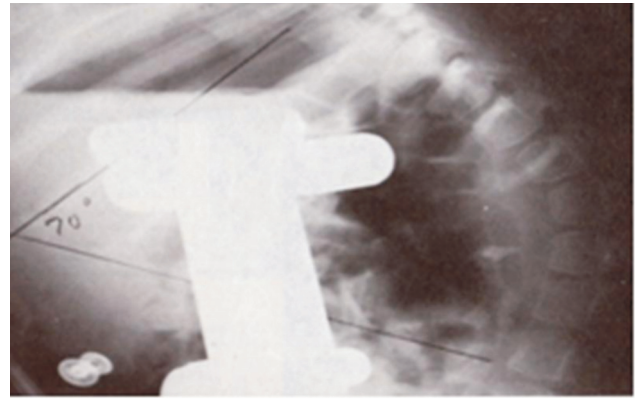


Fig. 3. Showing the X- ray findings of the case

### CONCLUSION

It is a case of meningocele( spina bifida) caused by abnormal closure of neural folds of IIIrd and IV weeks of developments leading to neural tube defect in lower thoracic and upper lumbar region. It was a spina bifida of cystic variety which mostly accomplish with lower limb involvement.

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# A Study on Knowledge and Practice of Hand Washing among Slum Children and their Mothers in Bhubaneswar, Odisha

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## ABSTRACT

**Objective:** To study the knowledge and practice of hand washing among mothers and children of shikharchandi slum of Bhubaneswar, Odisha and to recommend possible measures to improve the current practices.

**Methodology:** Present cross-sectional study was carried out in the Shikharchandi slum located in the Bhubaneswar city of Orissa state in India. 150 women and 80 children were interviewed. Children questionnaire were prepared to suit to their age and according to local context. Components of sanitation like food handling and hand washing were covered in this questionnaire.

**Results:** Hand washing before preparing food is being practiced by 85% of women. Of all women interviewed, 77% wash hands before serving food. Only 15% children said soap was available in their school to wash hands. Out of total children interviewed, 76% told that their teachers tell about sanitation and hand washing in the class. Only 5% children told they were consulted by doctor/ health worker during last 3 months. As many as 81% children told that they wash their hands before taking food and 19% children said they take their food without washing hands. Though most of the children told that they wash hands before taking food, but only 17.5% told that they use soap for hand washing. Only 29% children told that their teachers check hand washing in school. When asked about critical timing of hand washing, 44% children told about at least two critical timings and 56% were unaware about the critical timings of hand washing.

**Conclusion:** Inadequate knowledge on this among our study participant is a point of concern. Systematic integration of health and hygiene education in schools through curricular modifications could be an appropriate strategy.

**Keywords:** Hygiene, Hand washing, Slum, Knowledge, Attitude

## INTRODUCTION

Communicable diseases continue to be the major contributor to global morbidity and mortality.<sup>1</sup> Sixty two percent and 31 % of all deaths in Africa and south-Asia, respectively are due to infectious diseases.<sup>2</sup> According to WHO estimates, 3.8 million children aged less than five die each year from diarrhea and acute respiratory tract infections.<sup>3</sup> An estimated 88 percent

of diarrheal deaths worldwide are attributable to unsafe water, inadequate sanitation and poor hygiene.<sup>4</sup> Clean water and hand-washing are viewed as the most cost effective intervention for preventing diarrheal diseases.<sup>5</sup> Various studies have highlighted that simple act of hand-washing and basic hygiene behavior could prevent diarrhea, acute respiratory infection and skin infections.<sup>6,7</sup> Despite much evidence supporting the effectiveness of personal hygiene behavior, they are yet to be practiced widely. It is observed that young children and their mother in developing countries fail to wash their hand adequately after fecal contact.<sup>8</sup> Magnitude of the problem is more in urban slums with reduced access to safe water and sanitation.

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Children from poorest urban are three times more likely to die before the age of five than children from wealthiest urban and rural areas.<sup>9</sup> Study conducted in Mumbai slum shows that 30% of all morbidity can be accounted for by water related infection.<sup>10</sup> Understanding usual hand-washing is an important baseline assessment for any programme intended to improve sanitation, hand hygiene and water quality. However, there are limited data that have assessed the hand hygiene behavior of children and their mothers particularly in slums.

Keeping this in view present study was taken up to study the knowledge attitude practices relating to hand-washing of urban slum children and their mothers. The objective of the study was to access hand-washing behavior among the participants so as to identify and overcome barriers to proper hand hygiene practices.

## METHOD

Present cross-sectional study was carried out in the Shikharchandi slum located in the Bhubaneswar city of Orissa state in India. Sikharchandi slum is authorized and the largest slum of the city with 1500 hundred household and total population of around 6000. It was decided to take 10% of the all households for the study purpose. Thus a total of 150 households

were selected for the study purpose. This slum is divided into three clusters. There are total 600 households each in cluster one and cluster three and 300 households in cluster two. Stratified random sampling was carried out to select the households from each of these three clusters proportionately. For the study 10% of households are selected from each cluster. Total selected houses were 60 households each from cluster one and three and 30 households from cluster two. 150 women and 80 children were interviewed. Children between age group of 6 to 12 were separately interviewed. Questionnaire was prepared by adopting the theme of core questionnaire on sanitation by WHO and EHP. Semi structured questionnaire was developed which was suitable to local context. Children questionnaire were prepared to suit to their age and according to local context. Components of sanitation like food handling and hand washing were covered in this questionnaire. This questionnaire contains both quantitative and qualitative questions. The questionnaire was pretested in non study area and necessary changes were made accordingly. Data was entered in MS Excel and analyzed using statistical software SPSS Version 17.0. Verbal consent was taken before interview of mothers and they were well informed about purpose of the study and confidentiality. Verbal consent of parents was taken prior to interview of children.

## RESULTS

**Table I: Demographic Characteristics of participant (Mother).**

S. No.	Characteristics	Response	Number	Percentage (%)
1	BPL Cards	Yes	54	36
		No	96	64
2	Education	Literate	80	53
		Illiterate	70	47
4	House	Rent	53	35
		own	97	65
5	Household condition	Kutchha	83	55
		Pakka	67	45
6	Rooms in house	Less than 2	45	30
		Two	74	49
		More than two	31	21
7	Caste	SC	36	24
		ST	10	7
		OBC	72	48
		Other	32	21
8	Language	Oriya	76	51
		Hindi	19	13
		Telugu	52	34
		Bengali	3	2

**Table I: Demographic Characteristics of participant (Mother) (Contd.)**

S. No.	Characteristics	Response	Number	Percentage (%)
9	Native state	Orissa	94	63
		Andhra Pradesh	41	27
		West Bengal	13	9
		Other states	2	1
10	Size of family	Less than 5	91	61
		6 to 9	48	32
		10 and above	11	7
11	Income(in rupees/month)	Less than 5000	33	22
		5000 to 10000	86	57
		Above 10000	31	21
12	Occupation	Housewife	57	38
		Skilled*	14	9
		Unskilled**	79	53

**Table II: Hand-washing Practices among women.**

S. No	Characteristics	Options	Numbers (%)
1	Hand washing before preparing food	YesNo	128 (85)22 (15)
2	Hand washing before serving food	YesNo	116(17)34(23)
3	Hand wash with soap after toilet	YesNo	108(72)42(28)
4	Use of slipper	YesNo	93(62)57(38)
5	Hand washing with only water is as good as hand washing with water and soap	YesNo	7(4)143(96)

**Table III: Hand-washing Practices among children**

S. No.	Characteristics	Options	Number (%)
1.	Soap is available in school to wash hands.	YesNo	12 (15)68 (85)
2.	Teacher tells about sanitation and hand washing in class.	YesNo	61 (76)19 (24)
3.	Visited by health worker/Doctor in school during last 3 months.	YesNo	4 (5)76 (95)
6	Hand washing before taking food.	YesNo	65 (81)15 (19)
7	Use soap for hand washing before taking food.	YesNo	14 (17.5)66 (82.5)
8	Teacher checks hand washing in school.	Yes No	23 (29)57 (71)
9	Who enforce to wash hands.	Mother	47(59)
		Sister	20 (25)
		Other	18 (22)
		family members teacher	23 (29)
10	Tells at least 2 critical time of hand washing.	YesNo	35 (44)45 (56)
11	Hand washing with soap after toilet.	YesNo	49 (61)31 (39)

A total of 150 participants are selected for study, out of which 36% are having the BPL card. Mean age of women participant is 31 years and the range is from 17 to 55 years. Participants are comprised of all castes, 24% of them belong to SC, 7% are from ST community, 48% belongs to OBC and 21% belongs to other caste. Main languages spoken in the community are Oriya, Telugu, Hindi and Bengali. Out of all households interviewed, 55% live in kaccha house and 45% live in pakka house; 30% families lived in single room, 49% living in two room house and 21% lived in more than

two room house; 63% are from Orissa and 37% are migrated from neighboring states like 27% are migrated from Andhra Pradesh, 9% are migrated from West Bengal and 2% are migrated from Bihar. Participants are grouped as housewives and working women. Working women are either I skilled or unskilled profession. Pre-primary teacher, ASHA, tailor are labeled as skilled workers. Those who are working as daily laborer, maid servant, sari seller, vegetable seller and rag pickers are grouped as unskilled workers. Among participants 38% are

housewives, 9% are skilled workers and 53% are unskilled workers. Twenty two percent households have income less than 5000 rupees per month, 57% households earn 5000 to 10000 rupees per month and remaining 21% households have monthly income more than 10000 rupees.

Hand washing before preparing food is being practiced by 85% of women. Still 15% reports that they are not practicing hand washing. Of all women interviewed, 77% wash hands before serving food. When asked about who serves, 43% reported that mother serves the food while in 42% families children take food themselves and remaining 15% told other members like grandmother, sister or aunt serves the food. When asked about availability of soap in school, 15% children said soap was available in their school to wash hands but for 85% students soap was not available in school to wash hands. Out of total children interviewed, 76% told that their teachers tell about sanitation and hand washing in the class while 24% told that their teacher doesn't tell about sanitation and hand washing. Only 5% children told they were consulted by doctor/health worker during last 3 months. As many as 81% children told that they wash their hands before taking snacks in school and 19% children said they take their snacks without washing hands. Though most of the children told that they wash hands before taking snacks in school, but only 17.5% told that they use soap for hand washing. Only 29% children told that their teachers check hand washing in school. When asked about critical timing of hand washing, 44% children told about at least two critical timings and 56% were unaware about the critical timings of hand washing.

## DISCUSSION

In this study of urban slum mothers we assessed the knowledge attitude and practices of hand hygiene. Of the mother surveyed, seventy two percent were found to practice hand washing by soap after defecation. This is lower than the WHO study where they found this was practiced by 84% women. The Lower level could be due to non availability of soap and decreased perceived susceptibility to diarrhea. Although, 96% of the women were of the opinion that hand washing with water and soap is better compared to simple hand washing, it is not reflected in their practice. This could be explained by the fact that women are not able to link infections like diarrhea directly with their own hand washing behavior.

Limited knowledge appears not to be constraint in this case. However, the translation of knowledge into sustainable behavior needs to be reinforced. Behavioral Intervention aimed to improve hand hygiene practices should focus on this important issue should be taken up in order to improve the hand hygiene practices of the respondents. Earlier studies by Ray *et al* have also highlighted similar findings.<sup>11</sup> In our study area 85% of the mother use hand washing before preparation of food, which encouraging. This differs from the study by Ray SK in two communities of eastern India where hand washing was not practiced before "preparing food" and after handling "raw vegetables".<sup>12</sup> Another encouraging finding of the present study was 77 % women practicing hand washing before serving food. These behaviors need to be reinforced for preventing Fecal-Oral transmission of infectious agent. Use of slippers was found to be practiced by 62% of the mothers, which could be taken as satisfactory, considering their socio-economic condition.

Our study additionally explored the knowledge, attitude and practices of hygiene among school children (6-12 years) from the same households. We attempted to find the contextual factors contributing to hand washing practices of the children. It included both school and family level influencers. As many as 81% children practiced hand washing before taking food out of which only 17.5% use soap for hand washing. Sixty one percent children used soap for hand washing after toilet. This could be due to Non or limited availability of soap in both school and household. In a similar study on hand washing among school children in Colombia, it was observed that only 33.6% of children were washing hands with soap before eating and after defecation.<sup>13</sup> Our participants have better hygiene practice which could be attributed to increased awareness. There appears to be low supervision by the teachers when compared to mothers for enforcing hand washing. This might lead to decreased motivation among the students for regular hand washing. Educating teachers to inculcate hygiene behavior among the students is of prime concern. Future school based hand hygiene interventions should take this into account. Health educators (physician, nurse, health worker) play an important role in this regard. Bearing in mind that, the school has been recognized as a vital setting for health promotion, our findings display a strong deficit of such initiatives. When asked about at least two critical times of hand washing only 44% of surveyed students could answer correctly. In a KAP study of

hygiene in Ethiopia found that 52% of the students have adequate knowledge of proper hygiene, which is higher than the present study.<sup>14</sup> Critical times of hand washing are crucial in breaking the chain of fecal oral contamination, a major cause of diarrheal diseases. Inadequate knowledge on this among our study participant is a point of concern. Systematic integration of health and hygiene education in schools through curricular modifications could be an appropriate strategy.

Due to the restricted time period and resource constraint, study was conducted only in one slum and it cannot represent the entire situation of the other slums of the Bhubaneswar and that of entire state. So the results of this study cannot be generalized to the other slums. So it is suggested that more such studies should be taken up to assess sanitation status of such areas in future.

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# A Study of Pattern of Blood Supply of Stomach in Cadavers in a Medical College of Andhra Pradesh

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## ABSTRACT

**Background:** The knowledge of normal location, awareness on usual and rare variations of major blood vessels and their branches supplying the stomach is of immense help to Surgeons and research workers for deciding the areas of resection of tissues by surgeons and to add additional information on existing and available material by researchers in conditions like Esophageal carcinoma, Ca head of pancreas, Ca of fundus of stomach, Cysts and tumors related to lesser and greater curvatures and head of pancreas etc.

**Objectives:** 1. To study the blood supply of stomach in detail & the different anatomical pattern of the blood supply. 2. To see any variations in the branching pattern.

**Materials And Method:** Around 100 cadavers were studied. The site of origin, course and area of stomach supplied by different arteries and their branches and their anastomoses with the neighbouring branches were studied in detail in 100 cadavers from the period of 2006-2009.

**Results:** Some variations are seen in left & right gastric artery, right gastroepiploic artery, short gastric arteries whereas maximum specimens showed the standard branching pattern of stomach.

**Conclusions:** Many variations are seen apart from the normal branching pattern. Though majority of specimens showed the normal branching pattern, the variations in the pattern of each branch & the main artery supply cannot be ignored.

The knowledge of normal location, awareness on usual and rare variations of major blood vessels and their branches supplying the stomach is of immense help to Surgeons and research workers for deciding the areas of resection of tissues in various situations & conditions.

**Keywords:** Blood Supply, Stomach, Branching Pattern etc

## INTRODUCTION

Blood supply of the stomach is normally derived from the coeliac artery which arises as a ventral branch of abdominal aorta between crura of the diaphragm and behind the posterior wall of omental bursa at the level of lower border of 12<sup>th</sup> thoracic vertebra. The major vessels reach the cardiac and pyloric ends of

stomach and run along both the lesser and greater curvatures. In these positions they are accompanied by corresponding veins.

The knowledge of normal location, awareness on usual and rare variations of major blood vessels and their branches supplying the stomach is of immense help to Surgeons and research workers for deciding the areas of resection of tissues and to add information on existing and available material in various carcinomas of stomach, Cysts and tumors related to lesser and greater curvatures and head of pancreas, Incomplete and malrotation of gut leading to abnormal positions of gastric vasculature during gastrostomy, gastrectomy and various conservative surgical

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procedures. Ischaemias occurring in lesser curvature associated with direct vascularisation of mucosa from vessels of left and right arteries from outside the gastric wall instead of branches from submucosa is of surgical importance since they pierce the serosa and take a long course.

Our study is an attempt to know the variations in the pattern of blood supply of the stomach which can be helpful in gastric surgeries in order to prevent the surgical complications.

## MATERIALS AND METHOD

**Study area:** Department of Anatomy, G.S.L Medical College, Rajahmundry, A.P

**Sample size:** 100 cadavers

**Study period:** March 2006 to March 2009.

**Study variables:** Site of origin, Course, Relations, Distribution, Branches, Arterial anastomoses, Variations

**Statistical analysis:** Percentages and proportions

## METHODOLOGY

The cadavers were embalmed with the embalming fluid. The site of origin, course and area of stomach supplied by different arteries and their branches and their anastomoses with the neighbouring branches were studied in detail after careful dissection & exposing the part to be studied. (Photo 1)

## RESULTS

The site of origin, course and area of stomach supplied by different arteries and their branches and their anastomoses with the neighbouring branches were:

### Left gastric artery

The normal course and distribution of the left gastric artery was found in nearly 80 out of 100 (80%) cadavers dissected (Table-1)

In 13 cases, the left gastric artery has given a branch to the left lobe of the liver. In these cases, the left hepatic artery was normally absent. It ran through the upper part of the lesser omentum to the porta hepatis in about 13% cases studied.

In 3 % of cadavers, accessory left gastric artery was found arising from the left branch of the hepatic artery and it entered between the two layers of the lesser omentum to the lesser curvature. This variation was found in 3% of cases observed. In 4 cases (4%) it was observed that left gastric artery is divided into anterior and posterior branches which is abnormal. (Photo 2)

### Right gastric artery

It arises from the common hepatic artery above the superior part of duodenum before the gastroduodenal artery descends in the lesser omentum to the pyloric end of the stomach. It passes to the left along the lesser curvature supplying the upper parts of the anterior and posterior gastric surfaces. It ends by anastomosing with the left gastric artery.

The above mentioned course and distribution was observed in 81 cases out of 100 (81%) cases studied which is the standard pattern.(Table -2) In 3% of cases the right gastric artery after its origin from common hepatic artery, has given anterior and posterior branches and supplied the anterior and posterior surfaces of the stomach. In 5 % of cases, the size and caliber of the right gastric artery was very small and it only supplied a small area on the anterior surface. In 5% of cases out of 100, the right gastric artery was found to be arising from the left hepatic artery and then passed along the lesser curvature to supply both the surfaces of the stomach. In six cases out of 100 (6%) right gastric artery has taken its origin from the gastroduodenal artery.

### Right gastro-epiploic artery

Origin from inferior terminal branch of splenic artery was seen in 3 cases out of 100 whereas remaining showed normal origin.

### Left Gastro-epiploic artery

It is the largest branch of the splenic artery, it arises near the splenic hilum and runs antero- inferiorly and to the right, sending branches through the gastrosplenic ligament to supply the proximal third of the greater curvature. Origin from inferior terminal branch of splenic artery was in 3 % of cases remaining showed normal origin.

### Gastroduodenal artery

- The first branch of common hepatic artery is usually the gastroduodenal artery.

It was observed in 5% of the cases that the gastroduodenal artery has taken its origin from the right hepatic artery. (Table-3)

It was observed in 3 % of cases the gastroduodenal artery coursing down wards behind the common bile duct.

Variable number of short gastric arteries was found in the present study.( Table -4) They were usually five to seven in number and these arise terminally from the inferior divisions of the splenic artery. They pass between the layers of gastro-splenic ligament to supply the fundus of the stomach, and anastomosing with the

branches of the left gastric and gastro-epiploic arteries. In 5% of cases there were 7 to 9 branches of short gastric arteries. All the branches have arisen from the splenic artery. (Photo 3)

In 3 cases the short gastric arteries was seen taking origin from the left gastro-epiploic artery.

#### Posterior gastric artery

It has been observed that it was a branch from the middle section of the splenic artery which was ascending behind the peritoneum of the omental bursa towards the gastric wall in the gastrophrenic fold in 20 out of 100 (20%) specimens.

**Table 1: Branching pattern of left gastric artery**

Observation of vasculature	No. of cases	%
Standard pattern.	80	80
Abnormal branch to the left lobe of the liver.	13	13
Accessory left gastric artery.	3	3
Abnormal branching pattern	4	4
Total	100	100

**Table 2: Branching pattern of right gastric artery**

Observation of vasculature	No of cases	%
Standard pattern	81	81
Small size and caliber of the right gastric artery.	5	5
Abnormal origin of right gastric artery from the left hepatic artery.	5	5
Abnormal branching pattern.	3	3
Abnormal origin of right gastric artery from the gastroduodenal artery.	6	6
Total	100	100

**Table 3: Branching pattern gastroduodenal artery**

Observation of vasculature	No of cases	%
Standard pattern	92	92
Origin of gastroduodenal artery from the right hepatic artery	5	5
Gastroduodenal artery coursing downwards behind the common bile duct.	3	3
Total	100	100

**Table 4: Branching pattern of short gastric artery**

Observation of vasculature	No of cases	%
Standard pattern	92	92
7 to 9 branches of short gastric arteries.	5	5
Abnormal origin from the left gastro-epiploic artery.	3	3
Total	100	100

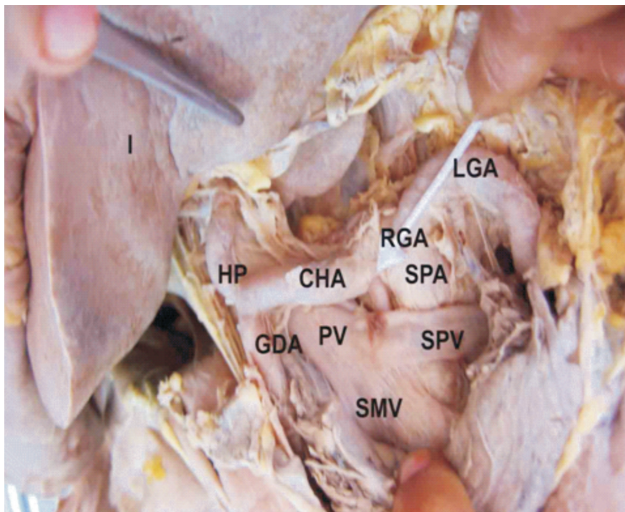


Fig. 1. Showing blood supply of stomach

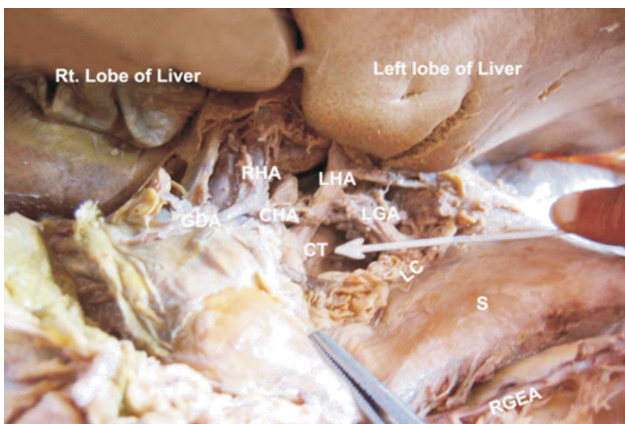


Fig. 2. Showing Left gastric artery giving branch to the left lobe of liver

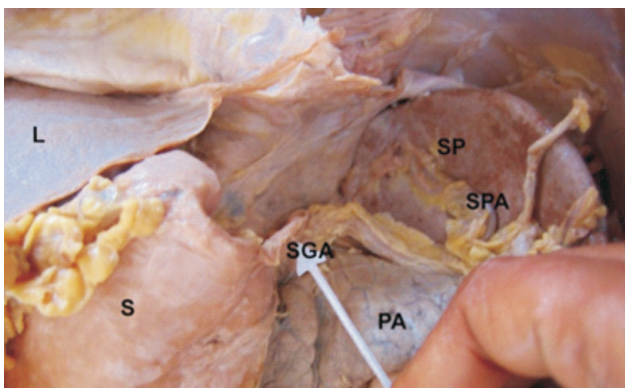


Fig. 3. Showing short gastric arteries arising from splenic artery

## DISCUSSION

The blood supply to the stomach is derived normally from the celiac artery. The chief arterial branches are multiple, reach the stomach towards both its cardiac and pyloric ends and run along both greater and lesser curvatures.

The arteries at the pyloric end, the right gastro-epiploic and right gastric, are typically derived from the hepatic artery, while the arteries towards the cardiac end, the left gastric and the left gastro-epiploic are derived from different celiac branches, the former being an independent branch of coeliac artery while the latter is the continuation of the splenic artery which is in concordance with Grays<sup>1</sup>.

### Left gastric artery

In the present study branching of the left gastric artery into anterior and posterior branches was seen in 4% of cases. But Reeves described that the left gastric artery commonly divides into an anterior and posterior branches<sup>2</sup> Lipshutz found that it divides similarly into anterior and posterior branches in 35 percent of cases<sup>3</sup> which is similar to our study except that more cases showed variation.

Abnormal branch of the left gastric artery to the left lobe of the liver was seen in 13% of cases in the present study. But it has been reported in the literature that the incidence of left gastric artery giving rise to the left hepatic artery was as high as 35 percent. Hollinshead has reported about the left hepatic artery has taken its origin from the left gastric artery in 5-7 percent of cases.<sup>4</sup> This percentage of origin of left hepatic artery from left gastric artery is variable.

In the present study there was a accessory or additional left gastric artery in 3% of cases which coincides with the views of Michels N.A<sup>5</sup>, William P.L.<sup>6</sup>, and Richard Snell<sup>7</sup> though the percentage is a little higher.

In all cases it anastomosed with the right gastric artery and supplied both surfaces of the stomach adjacent to lesser curvature. Some branches supplied cardiac part of the stomach and anastomosed with the splenic branches. This finding is in accordance with view given by William, P.L.<sup>6</sup>

### Right gastric artery

In the present study it was seen that the right gastric artery was of very small size and calibre in 5 percent of the cases which is similar to the findings of Browne.E.Z<sup>8</sup> and Keith L.Moore<sup>9</sup> & Reeves<sup>2</sup>

In the present study it was seen that the right gastric artery has taken its origin from the left hepatic artery in 5 percent of the cases. But Michels N.A<sup>5</sup>. has mentioned that the origin of right gastric artery from

the left hepatic artery was as frequent as 40% which differs from our study in percentage.

In the present study the right gastric artery after its origin from the common hepatic artery has given anterior and posterior branches in 3% which is similar to the study by Lipshutz .B<sup>3</sup>.except for percentage (21%).

#### **Left gastro- epiploic artery**

In 97 out of 100 cases dissected, the left gastro-epiploic artery arose as the largest branch of the splenic artery near the splenium hilum before the latter divided into terminal branches. This observation is slightly higher as compared to the findings of Inderbir Singh<sup>10</sup> who found it in 72 percent of cases.

In the present study it was seen that the left gastro-epiploic artery has taken its origin from the inferior terminal branch of the splenic artery in 3 percent of cases studied. Michels N.A.<sup>5</sup> found an origin of left gastro-epiploic artery from the inferior terminal branch of splenic artery in 22% of his cases.

#### **Right gastro-epiploic artery**

In 97% of cases of the present study it was seen that the right gastro-epiploic artery as the larger terminal branch of the gastro-duodenal which ended in direct anastomoses with the left gastro-epiploic branch of splenic artery. It supplied the inferior aspect of the duodenum's superior part. In the present study it was seen that the right gastro-epiploic artery has taken its origin from the right hepatic artery in 3 percent of cases studied which is a rare finding.

#### **Gastro-duodenal artery**

In the present study it was observed that the gastro-duodenal artery has taken its origin from the right hepatic artery in 5 percent of cases. Browne's.<sup>11</sup> and T.S Ranganadhan<sup>12</sup> has reported the origin of gastro-duodenal artery from the right or left hepatic artery rather than the common hepatic or from an hepatic artery of abnormal origin, or even directly from the celiac or superior mesenteric artery occurring in 16 percent of cases.

In the present study it was observed that the gastro-duodenal artery was coursing in front of the common bile duct in 3% percent of cases, which was also reported by Williams .P.L<sup>6</sup> and Browne's<sup>8</sup> in 27.6 percent of cases.

#### **Short gastric arteries**

In the present study variable number of short gastric arteries was seen in 5%of cases studied. The abnormal origin of short gastric artery from the left gastro-epiploic artery was observed in 3% of cases studied. Helm H.M.<sup>14</sup> and Last's anatomy 2001<sup>15</sup> has also reported the origin of short gastric arteries from gastroduodenal artery, which appears to be very uncommon.

#### **Posterior gastric artery:**

In the present study the presence of an additional artery that is the posterior gastric artery was observed by Williams .P.L arising from the splenic artery in 20 percent of cases. Williams.P.L.<sup>6</sup> and Datta.A.K<sup>16</sup> has also reported about the presence of posterior gastric artery, its origin and distribution to the posterior gastric wall.

In the present, work, the posterior gastric artery was observed to be arising from the middle of the splenic trunk and ran behind the peritoneum of the omental bursa towards the gastric fundus. But as reported by Quain.R.<sup>17</sup> its origin from any part of splenic artery, especially from the middle section is very common, reaching as high as 65 percent.

### **CONCLUSION**

Many variations are seen apart from the normal branching pattern. Though majority of specimens showed the normal branching pattern, the variations in the pattern of each branch & the main artery supply cannot be ignored.

The knowledge of normal location, awareness on usual and rare variations of major blood vessels and their branches supplying the stomach is of immense help to Surgeons and research workers for deciding the areas of resection of tissues in various situations & conditions in order to prevent the complications.

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# A Study of Prognostic Predictors in Organophosphate Poisoning in a Critical Care Unit of a Medical College of Andhra Pradesh

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## ABSTRACT

**Background:** Diagnosis of organophosphate poisoning is purely clinical, through some biochemical test will help in diagnosis of organophosphate poisoning. There is no specific prognostic predictor in terms of duration of hospital stay and course of recovery. Good prognostic predictor can guide the clinician for further treatment.

**Objectives:** 1. To study the prognostic predictor with special reference to duration of the hospital stay. 2. To predict duration of hospital stay from initial clinical sign and biochemical parameters.

**Materials and method:** Around 240 patients of organophosphate poisoning who were admitted in the critical care unit in the hospital from January 2007 to January 2010 were examined, investigated and interview with help of semi structured proforma.

The initial clinical presentation and biochemical parameter were recorded for the study.

**Result:** Patients who presented clinically with severe symptoms at the time of admission, increased leucocytes counts, electrolytes and low serum acetyl choline esterase level, those patients stayed more days in ICU and most of the patients required ventilator supports.

**Conclusion:** It is very important to predict and select the case by detailed clinical history and biochemical examination, so that better treatment and reduction of the mortality can be achieved.

## INTRODUCTION

Pesticides are toxic chemical and there ingestion is common cause of self poisoning in developing world.<sup>1</sup> There are many such poisoning reported indifferent parts of world and also from India<sup>2,3,4,5</sup>

Acute toxicity OP compound poisoning manifest as cholinergic crisis and diagnosis is based on clinical sign and symptom as well as measurement of erythrocyte/plasma choline esterase activity.<sup>6</sup>

Management of organophosphate poisoning depends on early diagnosis, assessment of severity and early treatment with necessary supporting measures. Till now there is no specific prognostic predictor of OP poisoning, through serum choline- esterase was thought to be prognostic indicate of OP poisoning but it was proven wrong in subsequent study<sup>7,8,9</sup>.

Our study is an attempt to identify the various prognostic factors in Organophosphorus poisoning which can be helpful for better management of such patients & prevention of further complications in them.

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## MATERIALS & METHOD

**Study design:** Hospital based study

**Study Area:** Intensive Care Unit and Medical ward of  
GSL Medical College, Rajahmundry, A.P.

**Study Subject:** All the cases of OP Poisoning admitted in ICU and Medical ward, during January 2007 to January 2010, who stayed more than 24 hours in hospital.

**Sample size:** 240

**Study period:** January 2007 to January 2010

**Sample technique:** Simple random Sample technique.

**Study variables:** Age, sex duration of hospital stay, TLC, Serum Electrolytes, Serum choline esterase etc.

**Study Instruments:** Pre tested questionnaire, Equipments and material requirement for examination

**Statistical analysis:** Percentage, proportion, mean, Chi – square test.

**Inclusion criteria:** All the OP Poisoning in hospital at least stayed more than 24 hours & were willing to participate in the study.

#### Exclusion criteria

1. OP poisoning those stayed less than 24 hours or died.
2. Suspected poisoning later proved to be malingering/other medical condition
3. Those who were not willing to participate in the study

### METHODOLOGY

Study was carried out in Inpatient department of Medical ward & ICU in GSL Medical College Rajahmundry, Andhra Pradesh during period of January 2007 to January 2010.

All the diagnosed cases of OP Poisoning through thorough clinical examination detailed history and preliminary laboratory testing at the time of admission were considered for the study. In our study, 240 patients fitting the inclusion criteria were included. All the patients were interviewed with help of pre tested semi structured proforma which included required detail after obtaining their or their relative's consent. They were also subjected to various laboratory investigations during their hospital stay. They were followed up day by day. For those who were discharged after recovery within 15 days of admission was taken as a favorable prognostic sign as compared to those who stayed for more than 15 days. Data collected were analyzed.

### RESULTS

In the present study, out of 240 patients it was found that 212 patients stayed for less than 15 days and 28 patients stayed more than 15 days in the hospital. Out of 212 patients, 174 patients (82.08 %) were males and 38 patients (17.92 %) were females.

Those patients stayed more than 15 days duration i.e. 28 patients out of those 18 patients were male (62.50%) and 10 patients (37.50 %) were females. The prognosis among males was better than the females which was statistically significant ( $P < 0.05$ )

The patients who belonged to 20-40 age group had better prognosis (180 out of 240 i.e. 75% compared to those above 40 i.e. 60 out of 240 (25%) which is statistically significant ( $P < 0.001$ ).

In 212 patients who stayed less than 15 days, 150 patients (70.76 %) showed clinical presentation which was mild or moderately severe and 62 patients (29.24%) presented with more severe clinical manifestation. Out of 28 patients who stayed for more than 15 days duration, 8 patients (28.57%) were found to be mild or moderately severe and 20 patients i.e. (71.43 %) patients showed more severe signs & symptoms. Patients who presented initially with severe clinical manifestations had bad prognosis compared to those who presented with mild or moderate symptoms which was statistically significant ( $P < 0.001$ ) The muscarinic symptoms were considered as mild symptoms, the muscarinic as well as nicotinic symptoms were considered as moderate symptoms whereas the above mentioned symptoms along with the CNS symptoms were considered as severe symptoms.

In laboratory investigations, out of 212 patients who stayed for less than 15 days, 84 patients (39.52 %) were having high Total Leucocyte Count (TLC) and 128 patients (60.47 %) showed normal TLC count. Out of 28 patients who stayed for more than 15 days, 6 patients, (21.43%) showed abnormal TLC count and 22 (78.57%) of them showed normal TLC count. Patients with abnormal TLC count showed bad prognosis compared to those with normal TLC count & the difference was found to be statistically significant. ( $P < 0.001$ ) (Reference values out of 4000 to 11,000/cumm was considered as abnormal )

Serum electrolytes were found in 58 patients (27.36%) out of 212 patients who stayed for less than 15 days duration to be abnormal (decreased serum

potassium /decrease in serum Sodium) whereas in 154 of them (72.64 %) it was normal. Patient who stayed for more than 15 days duration, 17 patients (60.71 %) out of 28 patients had abnormal serum electrolytes and 11 patients (39.28 %) were having normal values. Patients with abnormal electrolytes at the time of presentation had bad prognosis as compared to those who had normal serum electrolytes which is statistically significant ( $P < 0.01$ ).

Serum cholinesterase analysis, out of 212 patients who stayed for less than 15 days in hospital i.e. 140 patients (66.04 %) having normal value and 72 patients (33.96 %) had reduced value. Those patients who

stayed for more than 15 days duration it was found that 5 patients (17.86%) out of 28 cases had normal values and in 23 patients (82.14%) found to have reduce enzyme value. The patients with low Serum Acetyl cholinesterase at the time of admission had bad prognosis than those with higher values, the difference being statistically different ( $P < 0.001$ ). (The normal values for serum cholinesterase are between 4500 to 10500 IU/ml.) It was also observed that those patients who were brought to the hospital sooner stayed less days in hospital (212 out of 240 i.e. 88.33%) than those who came after 6 to 10 hours or more i.e.28 out of 24(11.67%).

**Table 1. Gender distribution among the Organophosphorus poisoning cases.**

Gender distribution	Duration of Stay				Total
	less than 15 days	%	More than 15 days	%	
Male	174	82.08	18	62.50	192 (80.00%)
Female	38	17.92	10	17.92	48 (20.00%)
Total	212	100.00	28	100.00	240 (100.00%)

$P < 0.05$

**Table 2. Clinical severity among the Organophosphorus poisoning cases**

Clinical severity	Duration of Stay				Total
	Less than 15 days	%	More than 15 days	%	
Mild/ moderately severe	150	70.76	8	28.57	158 (65.83%)
More severe	62	29.24	20	71.43	82 (9.77%)
Total	212	100.00	28	100.00	240 (100.00%)

$P < 0.001$

**Table 3. Total Leucocyte Count among the Organophosphorus poisoning cases**

Duration of Stay	TLC Count				Total
	Less than 15 days	%	More than 15 days	%	
Normal count	128	60.47	6	21.43	134 (55.83%)
Abnormal count	84	39.52	22	78.57	106 (44.17%)
Total	212	100.00	28	100.00	240 (100.00%)

$P < 0.001$

**Table 4. Serum cholinesterase levels in among the Organophosphorus poisoning cases**

Serum cholinesterase levels	Duration of Stay				Total
	Less than 15 days	%	More than 15 days	%	
Reduced Count	72	33.96	23	82.14	95 (39.58%)
Normal count	140	66.04	5	17.86	145 (60.42%)
Total	212	100.00	28	100.00	240 (100.00%)

$P < 0.001$



## DISCUSSION

Diagnosis of OP Poisoning was bested essentially on clinical assessment, followed by laboratory investigations. maximum survival has been reported in patients to whom the medical care was provided with in 2 to 3 hours of consuming poisoning, while mortality were seen in when medical care was delayed more than 10 hours <sup>9,10,11</sup>

In this study, mean age of the patients who suffered from OP poisoning was 30 +/- 2 years as reported in other study. <sup>12</sup> In hospital duration stay and mortality rates are higher in males than females. Since suicide attempt by male patients are serious in attempt and result in higher success rate due to their more sever clinical picture, the number of days the male patients spends in hospital is higher <sup>13</sup>.

In the present study, it was observed that 37.50% female patients stayed more than 15 days in hospital as compared to 7.74% stayed less than 15 days duration which may be due to high co- morbid condition in female patients as compared to male patients.

Patients who presented initially with severe clinical manifestations had bad prognosis & stayed in the hospital for longer time compared to those who presented with mild or moderate symptoms & this was statistically significant. Early death could be attributed due to late referral & presentation with severe symptoms to the hospital in most of our patients.

Old age, male gender, and impaired consciousness, patients those are transfers without any medical intervention period of, two hours and longer spent before hospital arrival, those spent high number of days in hospital with considerable increase mortality<sup>14</sup>.

In our study we found old age patients were having more number of stay in hospital than young individual. Mortality is also more in those groups. These observation was also found in other study <sup>15</sup>

Patients with abnormal TLC count showed bad prognosis compared to those with normal TLC count & the difference was found to be statistically significant. (P<0.001) There were many number of studies correlate this finding i.e. abnormal TLC count found in severe OP poisoning<sup>16</sup>.

In the present study, it is found that the patients who stayed more than 15 days there were significant abnormal electrolyte value (increase K, Decrease K)

as compared to those stayed 24 hours to 15 days in hospital which is similar to study by Haynes.<sup>9</sup>

The patients with low Serum Acetyl cholinesterase at the time of admission had bad prognosis than those with higher values, the difference being statistically different (P<0.001) In several studies it was found there was no specific correlation between OP poisoning and severity. But in our study we found those patients stayed >15 days in hospital were having significant decrease in cholinesterase value.<sup>17</sup>

## CONCLUSION AND RECOMMENDATION

Organophosphates poison is very common in India. So we should have very practical approach to every patient. Early diagnosis, urgent referral, categorization of patients with help of good prognostic predictor and early intervention with required ventilator support and adequate necessary drugs can improve the survival with reduction of hospital stay. This study throws some light in direction of duration of hospital stay.

In our observation we found those patients who were having severe clinical symptom, increased T.L.C count, abnormal electrolyte values and marked decreased serum cholinesterase at the time of presentation stayed in hospital more days due to late recovery.

We require further studies to substantiate and predict future prognostic indicator for better management of patients.

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# Alpha-1-Antitrypsin Gene Subtypes and the Risk of Chronic Obstructive Pulmonary Disease

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## ABSTRACT

Chronic obstructive pulmonary disease (COPD) is the most prevalent clinical disorder. It is generally considered to be due to an imbalance between proteolytic enzymes and their inhibitors. Deficiency of alpha 1-antitrypsin ( $\alpha$ 1-AT) is a recognized risk factor for COPD and is characterized by the progressive obstruction of airways, which is not fully reversible. Alpha-1-antitrypsin deficiency is widely under-diagnosed in many populations with majority of the individuals remaining undetected due to the delay in the onset and variability of respiratory symptoms. In 1997, WHO stated that 2-3% of all alpha-1-antitrypsin deficient individuals were homozygous for PiZ and recommended screening for  $\alpha$ 1-AT deficiency in individuals with COPD, all adults and adolescents with asthma as well as neonates, children and adults with unexplained liver disease.

**Keywords:** COPD, Genetic Predisposition, Alpha-1-Antitrypsin Deficiency

## INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is the most common chronic disease of the lungs characterized by a slowly progressive irreversible airflow obstruction. COPD is responsible for >29 million disability adjusted life years and one million years of life lost per annum around the world. COPD is expected to become the third leading cause of death after ischemic heart disease and cardiovascular diseases and the fifth leading cause of disability by 2020. COPD is also predicted to explode in developing countries such as India, Mexico, Cuba, Egypt, South Africa and China.<sup>1,2</sup>

### Genetic predisposition

Exposures to environmental factors such as tobacco smoke or occupational air pollutants play a significant role in the pathogenesis of COPD<sup>3</sup>, however a marked variability in the development of airflow obstruction in response to smoking has been reported.<sup>4</sup> Interestingly many countries with high rates of smoking have a low prevalence of COPD. For example, despite the highest tobacco consumption, the prevalence of COPD in China is reported to be very low.<sup>5</sup> In Caucasians, only 10-20% of chronic heavy cigarette smokers develop symptomatic COPD. This

suggests that other factors are likely to be important in determining which cigarette smokers are at the risk of developing airflow obstruction.<sup>6</sup>

Population studies of families and twins have demonstrated familial aggregation of respiratory symptoms.<sup>7</sup> Case control studies also demonstrated an increased prevalence of COPD in relatives of COPD patients.<sup>8</sup> COPD is more common in whites than blacks and other racial and ethnics groups.<sup>9</sup> The prevalence of COPD in Japanese Americans was found to be very low when compared with Caucasian Americans.<sup>10</sup> It is also uncommon in Chinese living in the USA.<sup>11</sup> These differences in the prevalence of COPD among different racial groups indicated that genetic factors may play an important role in the development of COPD.

### COPD and Proteinase – Antiproteinase Hypothesis

The association of COPD to inherited severe deficiency of the serine protease inhibitor alpha-1-antitrypsin ( $\alpha$ 1-AT) has been known since 1963 and remains the only proven genetic risk factor for severe, early onset of COPD. Laurell and Eriksson<sup>12</sup> observed that members of families who have low concentrations of serum  $\alpha$ 1-AT have a high prevalence of pulmonary emphysema related COPD than the usual smoking population that acquired emphysema. Gross *et al*<sup>13</sup>

reported that when lung tissues of rats were treated with the elastolytic enzyme papain, it degrades them to produce parenchymal destruction resembling centrilobular and panacinar emphysema. Subsequently, it was demonstrated that the normal human neutrophil contained a potent serine elastase.<sup>14</sup> The serum from patients with  $\alpha$ 1-AT deficiency also showed less inhibitor capacity specifically for elastase.<sup>15</sup> These observations led to the protease-antiprotease imbalance hypothesis for the development of lung destruction in pulmonary emphysema. The proteinase-antiproteinase hypothesis originated with the observation that subjects with inherited deficiency of plasma alpha-1-antitrypsin were particularly susceptible to the development of emphysema. Thus research into human emphysema and COPD concentrated on the role of  $\alpha$ 1-AT and neutrophil elastase in the pathogenesis of the disease.

### Molecular Genetics of Alpha-1-antitrypsin gene (*aat*)

The synthesis of  $\alpha$ 1-AT is controlled by a pair of genes at the Pi (Protease inhibitor) locus and is inherited as co-dominant alleles.<sup>16</sup> The gene-encoding human  $\alpha$ 1-AT resides in an approximately 320kb gene cluster of serine protease inhibitor genes. This region also includes the genes encoding  $\alpha$ 1-antichymotrypsin, protein C inhibitor, kallistatin, corticosteroid binding globulin and an antitrypsin related pseudo gene. These six genes are organized into two discrete sub clusters of three genes each, which have similar genomic organizations.<sup>17</sup>

The *aat* gene locus is highly polymorphic and is mapped to chromosome 14q 31-32.<sup>318</sup> Long *et al*<sup>19</sup> obtained the complete cDNA sequence of the *aat* gene. The gene length was 12.2kb with a 1,434bp coding region. According to the gene structure, *aat* is composed of seven exons separated by six introns. Exon I, the 5' prime portion of exon II and 3' prime portion of exon V are non-coding regions. The first intron contains a 143 amino acid open reading frame, an Alu family sequence and pseudo transcription initiation region. The major transcription site starts from the middle of exon Ic. Cis acting promoter sequences are present in the 5' to exon Ia and in the middle of exon Ic. Two different hepatocyte nuclear proteins bind in the region between Ib and Ic. C-jun protein binds within exon Ib region. The start codon (ATG) lies in the exon II followed by sequences coding for a 24 residue signal peptide. The sequences for the matured protein start in exon II and end in the exon V. Three identical carbohydrate attachment sites, two in

the exon II (Asn46 and Asn83) and one in the exon III (Asn 247) are present. The sequence for the active residue is in the exon V region. There is a promoter region specific for hepatocytes and an alternate promoter for monocytes and macrophages.

### Genotypes of Protease Inhibitor (Pi) System

With respect to circulating  $\alpha$ 1-AT levels, Pi alleles may be classified as "normal" (normal levels of functional  $\alpha$ 1-AT protein), "deficient" (low serum  $\alpha$ 1-AT protein level), "dysfunctional" (normal level of a non-functional  $\alpha$ 1-AT) or "null" (no  $\alpha$ 1-AT detectable). From the viewpoint of *aat* gene evolution,  $\alpha$ 1-AT variants can be categorized into two groups: the variants derived from the oldest human *aat* gene- PiM1 Ala213 (example: PiZ, PiM Heerlen, and PiNull Granitefalls) and those derived from the newer *aat* gene PiM1 Val213 (example: PiM3, PiM2 and PiNull Bellingham).<sup>20</sup>

The normal M alleles represent by far the largest group of *aat* alleles. The normal *aat* alleles are characterized by their association with normal levels of  $\alpha$ 1-AT in serum and normal function of the  $\alpha$ 1-AT protein. Inheritance of any homozygous or heterozygous combinations of the M family proteins is associated with "normal" levels of  $\alpha$ 1-AT. Among the Caucasians of northern European descent, M1 (Val213) allele is the most common allele (allelic frequency- 44-49%) followed by M1 (Ala213) - 20-23%, M2 - 14-19% and M3 - 10-11%.<sup>21</sup>

The deficiency group is characterized by *aat* genes that code for  $\alpha$ 1-AT present in serum but in amounts insufficient to protect the lower respiratory tract from progressive destruction by neutrophil elastase. Deficiency alleles of *aat* gene represent the clinically relevant group and include mainly the PiZ and PiS alleles. The PiZ variant differs from the PiM variant by a single nucleotide substitution of G by A at codon 342 exon V resulting in the amino acid substitution of Glu (GAG) to Lys (AAG). The origin of PiZ was proposed to be approximately 2000 years old. With frequency higher in the northern Europe it has been accepted that the PiZ gene had first arose in the northern Europe and subsequently spread to other European countries. It has an allelic frequency of 1-2% in Caucasians of northern European descent.<sup>22</sup>

Individuals carrying the PiS gene exhibited reduced  $\alpha$ 1-AT plasma levels (60% for PiSS, and 80% for PiMS. Molecular characterization of the PiS allele revealed

an A to T transversion resulting in a Glu to Val substitution at residue 264, exon III.<sup>19</sup> It is hypothesized that the origin of PiS allele occurred around 10,000 to 15,000 years ago making the PiS mutation much older than the PiZ allele. The PiS allele has an allelic frequency of 2-4% in Caucasians of northern European descent and varies from 10% in the southern Europe to 5% in the north, a distribution gradient with opposite direction to Z allele frequency.

Null phenotype is defined as the total absence of immunologically cross-reactive  $\alpha$ 1-AT in serum. The two parental  $\alpha$ 1-AT genes are not expressed, such that they produce no or insufficient  $\alpha$ 1-AT to be detected in the serum. It is estimated that among the Caucasians, null  $\alpha$ 1-AT alleles have a haplotypic frequency of approximately 0.001. When inherited with certain deficient haplotypes such as Z or with other null haplotypes, the affected individuals are at high risk for the development of emphysema. The molecular mechanisms responsible for absence of serum  $\alpha$ 1-AT include splicing abnormalities, deletion of *aat* coding exons and premature stop codons. Some of the null variants are Null Granitefalls, Null Bellingham, Null Hong kong.<sup>22</sup>

Dysfunctional variants are present in normal levels but do not function normally. In the P<sub>1</sub>-P<sub>1</sub> loop of Pi Pittsburg, methionine is replaced by arginine residue. This results in the inhibition of the highly effective coagulation proteases-thrombin instead of neutrophil elastase. The consequence is life threatening hemorrhagic disease.<sup>23</sup>

### Alpha-1-Antitrypsin Deficiency in Emphysema and COPD

The respiratory tissues are normally protected from neutrophil elastase specific antiprotease, particularly by  $\alpha$ 1-AT. In alpha-1-antitrypsin deficiency, the alveoli and bronchial tubes are destroyed due to excessive proteolytic action of the uninhibited neutrophil elastase. The oxygen-carbon dioxide transfer becomes much less efficient and the stale air is trapped in the isolated sacs. More air is required to provide the same amount of oxygen to the blood via the parts of the lung that are still functioning. This need for more air eventually leads to lung over-inflation. As the lung over expands, it gradually enlarges, completely filling the chest cavity and causing a sense of shortness of breath.<sup>24</sup>

### Alpha-1-Antitrypsin Deficiency related Liver diseases

In addition to obstructive pulmonary disease, liver disorders are also found. Liver disease in association with  $\alpha$ 1-AT deficiency was first recognized by Sharp *et al*<sup>25</sup> (1969) and has a less common prevalence than lung diseases. It is associated with PiZ homozygotes, PiM Malton, Pi Siiyama and the compound heterozygotes PiSZ, PiZ- *aat* variant.<sup>26</sup> The suggestive mechanism in the development of liver abnormalities in these variants is that the base change from the normal sequence reduces the rate at which the  $\alpha$ 1-AT peptide folds to form the tertiary structure. This slow folding allows the peptide monomers to come together by a loop sheet insertion mechanism to form polymer, which is retained within the endoplasmic reticulum.<sup>27</sup>

### World-wide distribution of Alpha-1-antitrypsin Deficiency

Studies on Caucasian populations gave a frequency of 1 in 2,857<sup>28</sup>, 1 in 5,097<sup>29</sup> and 1 in 3,694.<sup>30</sup> Crystal<sup>22</sup> reported that  $\alpha$ 1-AT deficiency occurs at a frequency of 1 in 2000-7000 Caucasians but only rarely in African or Asian populations. In a worldwide analysis on the racial and ethnic distribution of  $\alpha$ 1-AT deficiency,  $\alpha$ 1-AT deficiency was reported to be prevalent in populations of African blacks, Arabs and Jews in the middle east, central, far east and southeast Asians, whites in Australia, Europe, New Zealand and north America.<sup>31, 32</sup>

### CONCLUSION

Alpha-1-antitrypsin deficiency appears to be widely under diagnosed.<sup>31, 32</sup> Based on the predicted gene frequencies, even in the most intensely studied populations, only a small proportion of those predicted to have  $\alpha$ 1-AT deficiency have been diagnosed.<sup>33</sup> (Stoller, 2003). Studies on the prevalence of  $\alpha$ 1-AT deficiency have demonstrated that  $\alpha$ 1-AT deficiency will, in the near future, become one of the most common serious hereditary disorders in the world. Thus studies to identify  $\alpha$ 1-AT deficient individuals in all populations should be undertaken as unidentified individuals lose opportunities for important life style changes and preventive measures.

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# Morbidity Profile of Women of Reproductive Age Group in an Urban Slum

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## ABSTRACT

**Background:** Morbidity problems in women of reproductive age need to be studied extensively for effective strategies to improve their health.

### Objectives:

1. To study prevalence of morbidity in women of reproductive age group.
2. To study various factors influencing health of women in reproductive age group.

**Method:** A cross-sectional study was carried out among women of reproductive age group 15-44 years from November 2005 to October 2006 in an urban slum. Sample size of 203 was calculated and systematic random sampling was done. Haemoglobin estimation was done by Sahli's method. Statistical analysis included percentages, mean and standard deviation, and chi-square test.

**Results:** Prevalence of general morbidity was 31.03% consisting of mainly dental caries in 6.40% and body aches in 5.91%.

Prevalence of gynaecological morbidity was 52.22% comprising mainly menstrual problems in 41.38% and white discharge in 12.81%. 59.61% of women were anaemic.

Education and anaemia were significantly associated with general morbidity. Association between anaemia and gynaecological morbidity was significant.

**Interpretation & Conclusions:** Prevalence of gynaecological morbidity and anaemia are high and need to be addressed. More emphasis should be placed on Iron and folic acid supplementation in order to prevent anaemia.

**Keywords:** *General Morbidity, Reproductive Morbidity, Prevalence, Anaemia*

## INTRODUCTION

Mothers and children constitute approximately 70% of the population in developing countries. In India, women of the child-bearing age (15-44 years) constitute 19% of the total population<sup>1</sup>.

Women's health is of utmost importance since her health impacts on the health of her family and in turn reflects the wellbeing of society that she lives in. Illness or morbidity in women includes general morbidity and reproductive morbidity. Morbidity conditions that are commonly associated with reproductive morbidity include urinary tract infections, anemia, hypertension,

obesity and syphilis<sup>2</sup>.

So far, morbidity studies on women's health have been fewer as compared to those on mortality. The National Sample Survey data for 1973-74 reported the incidence of morbidity in women as 12% for India<sup>3</sup>.

An understanding of the morbid conditions in women will help health planners to focus on programs designed to improve the health status of women and thus, reduce the burden of ill-health among the women.

**The objectives of the study are**



1. to study the prevalence of morbidity in women of reproductive age group and
2. to study the various factors influencing health of women in the reproductive age group.

## MATERIALS AND METHOD

The study was carried out in an urban slum, Rajapur which comes under the field practice area of Department of Community Medicine, M.R. Medical College, Gulbarga.

**Study design:** A cross-sectional study was carried out to determine the prevalence of health problems in women of reproductive age group 15-44 years.

**Study period:** November 2005 to October 2006.

**Inclusion Criteria:** All women in the reproductive age group 15-44 years.

**Exclusion Criteria:** Women less than 15 years and more than 44 years were excluded from the study.

**Sample size:** The size of the sample was calculated based on prevalence rate of general morbidity of 33% as reported in similar study<sup>4</sup>. Using the formula  $n=4pq/L^2$ , sample size was calculated to be 203 women.

**Sampling technique:** Systematic random sampling method was used. The population of Rajapur being 3000, the total number of women in reproductive age group 15-44 years was estimated to be 570 (taking 19% as percentage of women aged 15-44 years in total population<sup>1</sup>). Assuming on an average that there is one woman of reproductive age group per family, sampling interval was calculated and every third woman of reproductive age group was chosen for the study. If there were more than one woman in the age group of 15-44 years in the particular family, then lottery method was used to choose the woman for the study purpose.

## METHODOLOGY

A schedule was prepared incorporating relevant aspects of the study. A pilot study was initially done on 30 women. Based on the pilot study, the schedules were modified and then finalized.

A house to house visit was made in the selected area. The nature, purpose and objectives of the study were explained to the woman chosen for the study.

The woman was interviewed using the pre-tested proformas. After the information was collected and recorded, a general physical examination was done. The findings were then recorded in the proforma. Repeated visits were made to the houses where the woman was not found during the time of first visit. If the woman was still not available or the house still found locked, the adjacent house was taken for the study.

Haemoglobin estimation using Sahli's method was done on those willing in order to diagnose anaemia.

According to criteria laid down by WHO Expert group<sup>5</sup>, anemia was diagnosed when haemoglobin was below 12gm/dl in non-pregnant adult females and below 11gm/dl in pregnant adult females.

The data was analysed and tabulated. Analysis was done separately for general morbidity, gynaecological morbidity and anaemia. Statistical analysis included percentages, mean and standard deviation, and chi-square test.

Ethical clearance was obtained from the medical college for conducting the study.

**Socioeconomic classification:** Modified Kuppuswami's classification was used<sup>6</sup>. Per capita income was updated by applying correction factor<sup>7</sup>.

## FINDINGS

Out of 203 women in the study population, 64 (31.53%) and 52 (25.61%) belonged to the age group of 15 to 19 years and 20 to 24 years respectively. 29 (14.29%), 26 (12.81%) and 19 (9.36%) of the women were in the age groups of 25 to 29 years, 30 to 34 years and 35 to 39 years respectively. 13 (6.40%) were between 40 and 44 years of age. The mean age was 24.55 years.

Majority of the women i.e. 65 (32.02%) were illiterate. 55 (27.10%) and 39 (19.21%) had high school and middle school education respectively. 21 (10.34%) were graduates. 18 (8.87%) and 5 (2.46%) had secondary and primary education respectively.

128 (63.05%) were married women, 67 (33.01%) were unmarried and 8 (3.94%) were widows.

139 (68.47%) of the women attained menarche between the ages of 12 and 14 years and 55 (27.10%) after 14 years of age. 9 (4.43%) attained menarche

before 12 years of age. The mean age of menarche was 12.84 years (SD 1.18 years).

47 (34.56%) women had got married between the ages of 15 and 18 years, followed by 46 (33.82%) before 15 years of age and 43 (31.62%) after 18 years of age. The mean age of marriage was 15.78 years (SD 3.01 years).

63 (31.03%) of the women had general morbidity. The prevalence of general morbidity was highest among 20 to 24 year age group i.e. 18 (28.57%) followed by 15 (23.81%) in 15 to 19 year age group. 9 (14.29%) each belonged to the age groups of 30 to 34 years and 35 to 39 years. 6 (9.52%) each were in the age groups of 25 to 29 years and 40 to 44 years. It was observed that there was no significant association between age of the women and general morbidity.

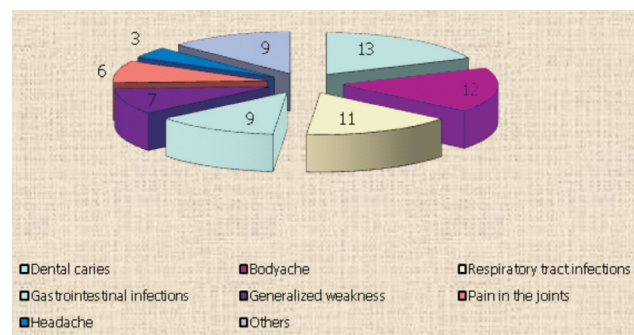
Ravindran T.K.S<sup>4</sup> in her study found that the prevalence rate of general health problems among women was 33% which is comparable to the present study. This shows that although her study was rural based and the present study was an urban study, the prevalence of general morbidity among women in both studies is similar. In her study, majority i.e. 38.20% of the women with general morbidity belonged to 25 to 29 year age group, followed by 26.10% between 30 to 34 years, 16.50% between 35 to 39 years, 13.90% between 20 and 24 years and 4.30% between 15 and 19 years.

**Table 1: Distribution of general morbidity among the women**

Type of Morbidity	No. of Women (n=203)	Percentage*
Dental caries	13	6.40
Body aches	12	5.91
Respiratory tract infections	11	5.42
Gastrointestinal infections	9	4.43
Generalized weakness	7	3.45
Pain in the joints	6	2.96
Headache	3	1.48
Others**	9	4.43

\* Some women had more than one complaint

\*\* Others included morbidity problems like earache, deformity, diabetes, conjunctivitis, filariasis and injury.



**Fig. 1. Distribution of general morbidity among the women**

Ravindran T.K.S<sup>4</sup> in her study found that fever accounted for 27% of all affected, severe backache for 19% and respiratory infections for 15%. Other problems included oral infections, diarrhoea, eye infections and injury.

**Table 2: Relation between education and general morbidity**

Education	General Morbidity				Total	
	Yes		No		No.	%
	No.	%	No.	%		
Illiterate	26	41.27	39	27.86	65	32.02
Primary	4	6.35	1	0.71	5	2.46
Middle	10	15.87	29	20.71	39	19.21
High School	16	25.40	39	27.86	55	27.10
Secondary	3	4.76	15	10.72	18	8.87
Graduate	4	6.35	17	12.14	21	10.34
Total	63	100.00	140	100.00	203	100.00

$\chi^2=11.83;$

df=5;

p<0.05

The distribution of the women with general morbidity against education of the women showed - illiterate 26 (41.27%), high school 16 (25.40%) and middle school 10 (15.87%).

A statistically significant association was observed between education and general morbidity ( $p < 0.05$ ).

Ravindran T.K.S<sup>4</sup> in her study found that 90.40% of the women with general morbidity were illiterate compared to 9.60% of literate women with general morbidity. Both studies were comparable showing that general morbidity was found to be more among illiterate women than literate women.

Majority with general morbidity were housewives i.e. 31 (49.20%), followed by 19 (30.16%) of unskilled

workers, 9 (14.29%) of students and 4 (6.35%) of skilled workers. There was no significant association between occupation and general morbidity.

Ravindran T.K.S<sup>4</sup> in her study found that 81.60% of women with general morbidity were labourers followed by 13.10% of housewives, 3.50% of owner-farmers and 1.80% of non-farm employees. The findings differ since her study was a rural based study and majority of women were labourers.

30 (47.62%) of women with general morbidity belonged to socioeconomic class IV followed by 19 (30.16%) in class V and 7 (11.11%) each from class II and III. Statistically, no significant association was observed between socioeconomic status and general morbidity.

**Table 3: Relation between anaemia and general morbidity**

Anaemia	General Morbidity				Total	
	Yes		No		No.	%
	No.	%	No.	%		
Yes	44	69.84	77	55.00	121	59.61
No	19	30.16	63	45.00	82	40.39
Total	63	100.00	140	100.00	203	100.00

$\chi^2=3.98$ ;  $df=1$ ;  $p < 0.05$

Table-3 reveals that out of 203 women, 121 (59.61%) had anaemia after estimation of haemoglobin by Sahli's method. 82 (40.39%) of the women did not have anaemia. Also, out of 63 women with general morbidity, 44 (69.84%) were anaemic while 19 (30.16%) did not have anaemia. There was a statistically significant association between anaemia and general morbidity ( $p < 0.05$ ).

NFHS II data<sup>8</sup> revealed that the prevalence of anaemia in married women aged 15 to 49 years was 52%.

106 (52.22%) out of 203 women had gynaecological morbidity. Majority i.e. 33 (31.13%) belonged to 15 to 19 year age group. 22 (20.76%) , 18 (16.98%) and 13 (12.27%) were in the age groups of 20 to 24 years, 25 to 29 years and 30 to 34 years respectively. 10 (9.43%) each belonged to age groups of 35 to 39 years and 40 to 44 years. There was no significant association between age and gynaecological morbidity.

Kambo I.P<sup>9</sup> observed in her study that gynaecological problems were 25.40% among women more than 29 years, 20.90% for women between 20 and 29 years of age and 16.70% in women below 20 years

of age. This finding differs from the present study because menstrual problems were more prevalent among the younger age groups in the present study and accounted for the higher prevalence of gynaecological morbidity in these age groups.

**Table 4: Distribution of gynaecological morbidity among the women**

Type of morbidity	No. of Women (n=203)	Percentage*
Menstrual problems	84	41.38
White discharge	26	12.81
Infertility	17	8.37
Dysuria	13	6.40
Low backache	6	2.96
Low abdominal pain	5	2.46
Dyspareunia	1	0.49

\* Some of the women had more than one complaint

Table-4 reveals that among 203 women, majority i.e. 84 (41.38%) had menstrual problems like dysmenorrhoea, menorrhagia, oligomenorrhoea, hypomenorrhoea, etc. The mean number of gynaecological morbidities per woman was 1.69.

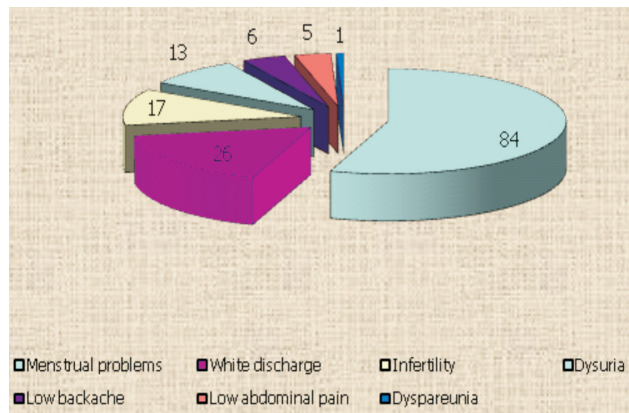


Fig. 2. Distribution of gynaecological morbidity among the women

Latha K et al<sup>10</sup> in their four studies in West Bengal, Gujarat, Baroda and Bombay found that the leading causes of morbidity were menstrual problems among 33% to 59% of the respondents, excessive discharge among 22% to 57% and low backache among 5% to 39% of the women. Nearly 40.70% of women in urban Bombay complained of menstrual problems, which is comparable to present study.

Majority of women with gynaecological morbidity i.e. 36 (33.96%) were illiterate, 29 (27.36%) had high school education, 16 (15.10%) had middle school education and 12 (11.32%) were graduates. 10 (9.43%) and 3 (2.83%) of women had secondary and primary education respectively. No significant association was observed between education and gynaecological morbidity.

Ravindran T.K.S<sup>4</sup> observed in her study that the prevalence of gynaecological morbidity was 94.50% among illiterate and 5.50% among literate women. Both studies showed greater prevalence among the illiterate group. However, the reason for the lower percentage among the illiterate women in the present study could be because the present study was in an urban area where the literacy status was better compared to the rural study.

57 (53.77%) of women with gynaecological morbidity were housewives, 24 (22.64%) were unskilled workers, 16 (15.10%) were students, 7 (6.60%) were skilled workers and 2 (1.89%) were professionals. There was no significant association between occupation and gynaecological morbidity.

Ravindran T.K.S<sup>4</sup> in her study observed that 89.10% of women with gynaecological morbidity were labourers, 5.50% were owner-farmers, and 2.70% each were housewives and non-farm employees. The findings differ because her study was a rural based study.

Majority of women with gynaecological morbidity i.e. 47 (44.34%) belonged to socioeconomic class IV followed by 26 (24.53%) in class V, 21 (19.81%) in class III and 12 (11.32%) in class II. No significant association was observed between socioeconomic status and gynaecological morbidity.

Bhatia J.C and Cleland J<sup>11</sup> observed in their study that women from households of low socioeconomic status were more likely to report symptoms of gynaecological morbidity than other women. These findings are similar to the present study.

There were 109 (53.69%) parous women in the study group of 203 women. 45 (80.35%) women with gynaecological morbidity were multiparous, 8 (14.29%) were primiparous and 3 (5.36%) were nulliparous women. There was no significant association between parity and gynaecological morbidity.

The higher prevalence with two or more births could be due to the reason that obstetric problems or problems during delivery may be contributory causes to later gynaecological morbidity.

Ravindran T.K.S<sup>4</sup> in her study observed that reproductive morbidity increased from 11% for nulliparous women to 57% for women of parity above 6.

Table 5: Relation between anaemia and gynaecological morbidity

Anaemia	Gynaecological morbidity				Total	
	Yes		No		No.	%
	No.	%	No.	%		
Yes	56	52.83	65	67.01	121	59.61
No	50	47.17	32	32.99	82	40.39
Total	106	100.00	97	100.00	203	100.00

$\chi^2=4.25$ ;  $df=1$ ;  $p<0.05$

Table-5 shows that among women with gynaecological morbidity, 56 (52.83%) were anaemic while 50 (47.17%) were not anaemic. Statistically, a significant association between anaemia and gynaecological morbidity was noted ( $p < 0.05$ ).

### CONCLUSION

The prevalence of general morbidity in women of reproductive age group 15-44 years was 31.03%. General health problems included dental caries in 6.40%, body aches in 5.91% and respiratory tract infections in 5.42%. There was a significant association between education and general morbidity. General morbidity was more prevalent among lower socioeconomic classes. Association between anaemia and general morbidity was also found to be significant.

The prevalence of gynaecological morbidity was 52.22%. Common gynaecological problems included menstrual problems in 41.38% and white discharge in 12.81%. Majority of women with gynaecological morbidity belonged to lower socioeconomic classes.

59.61% of women were diagnosed to have anaemia. Association between anaemia and gynaecological morbidity was found to be significant.

The prevalence of gynaecological morbidity and anaemia are on the higher side which requires due attention and consideration. The importance of supplementation with iron and folic acid tablets should be emphasized in order to improve haemoglobin levels. Women should be made more aware regarding general morbidity and gynaecological morbidity so that they can look after their own health and consult medical personnel when necessary.

### ACKNOWLEDGEMENT

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**Conflict of Interest:** None

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# Risk Factors for Non Communicable Diseases among Industrial Workers of Coimbatore, India

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## ABSTRACT

**Background:** Workplace is one of the most important settings affecting the physical, mental, economical and social wellbeing of the workers and thereby, the health of their families, community and society. Recently, there are reports of high prevalence of cardiovascular risk factors among industrial populations in various parts of India.

**Aim:** To identify the risk factors of Non communicable diseases among employees of a foundry in Coimbatore.

**Setting and Design:** Industrial setting, Cross sectional study.

**Method:** A study was undertaken between November 2009 and January 2010 in a foundry of suburban Coimbatore with permanent employee strength of 136 with questionnaire capturing information on age, nature of work, and details on risk factors. Anthropometric measurements and fasting and post-prandial blood sugars were done.

**Statistical analysis:** Was done using SPSS-11.5 version and Chi-square test was used to look for an association between the risk factors and the non communicable diseases.

**Results and Conclusions:** The study population consisted of 132(97%) males. 35(25.7%) were current tobacco users and 55(40.4%) involved themselves in light physical activity. 21(15.4%) and 35(25.7%) had high Systolic and Diastolic Blood Pressure respectively; 33(24.3%) had high blood sugars. 54(39.7%) were overweight/obese and 46(33.8%) had their waist circumference above normal. There was a statistically significant association between increased waist circumference and Diabetes status ( $\chi^2=6.093$ ,  $p=0.014$ ). Similarly a person being overweight/ obese was significantly associated with he being diabetic ( $\chi^2=5.812$ ,  $p=0.016$ ). The results could help to motivate industries to initiate lifestyle modifications and health promotion programs for the prevention and control of non communicable diseases among their workers.

**Keywords:** Non Communicable Disease, Risk Factors, Obesity, Industrial Workers, Diabetes, Hypertension

## INTRODUCTION

Non communicable diseases (NCDs) especially cardiovascular diseases (CVDs), cancer and type 2 Diabetes Mellitus (DM) account for 53% of all the deaths and 44% of all DALYs in India<sup>[1]</sup>. Major causes for the increase in disease burden are the rising rates of hypertension, dyslipidaemia, diabetes, overweight, obesity, physical inactivity and tobacco use<sup>[2]</sup>.

Recently, there are reports of high prevalence of cardiovascular risk factors among industrial populations in various parts of India<sup>[3]</sup>. According to

the sentinel surveillance conducted in 10 industries across India, the industrial population has a high burden of CVD risk factors, which is a major cause of death in India<sup>[2]</sup>.

Therefore the present study was planned with the objective of identifying the risk factors of Non communicable diseases among employees of a foundry in sub urban Coimbatore. The results could help to motivate industries to initiate lifestyle modifications and health promotion programs for the prevention and control of CVDs.

## MATERIALS AND METHOD

Coimbatore is the third largest city in the South Indian state of Tamilnadu with a population of about 9.3 lakhs (2007-08). It is a heavily industrialized city with textile factories, engineering firms, automobile and motor parts manufacturers, etc. A cross sectional study was undertaken between November 2009 and January 2010 in one of the industries – of suburban Coimbatore with a permanent employee strength of 136 all of whom were included for the study. Ethical clearance was obtained from the Institutional Human Ethics Committee. Informed consent was obtained from the subjects.

### The study comprised of

Questionnaire capturing information on age, socio economic status and nature of work, details on risk factors like tobacco use, alcohol use, physical activity, family history of hypertension, diabetes, cardiac problems, stroke.

### Anthropometric measurements

Weight was measured to the nearest 0.5 kg using the bathroom scale. Height was calculated to the nearest 0.5 cm using a portable stadiometer. Body mass Index (BMI) was calculated by dividing observed weight by height in squared meter (kg/m<sup>2</sup>). Waist circumference was measured using a non stretchable measuring tape at the narrowest point between lower end of rib cage and iliac crest. Blood pressure was measured in the right upper arm in sitting posture.

### Biochemical analysis

Fasting and post-prandial blood sugars were checked using capillary glucose method. The subjects were requested to come after an overnight fasting of minimum 8 hours for measuring Fasting blood sugar. Post-prandial blood sugar was taken after one and a half hours of food intake.

### Definitions used in the study

**Diabetes mellitus:** The diagnosis of diabetes mellitus was based on the American Diabetes Association (ADA) definition, i.e. fasting blood glucose >126 mg/dl or post prandial blood glucose >200 mg/dl or subjects who reported that they had diabetes and were on treatment by a physician. Impaired fasting

glucose (IFG) was defined as fasting blood glucose 100-125 mg/dl and impaired glucose tolerance (IGT) as post prandial blood glucose 141-200 mg/dl<sup>[4]</sup>.

**Hypertension:** Hypertension was diagnosed based on drug treatment for hypertension or if the blood pressure was >140 mmHg systolic and/or 90 mm Hg diastolic (JNC-7 criteria) measured on two occasions 15 minutes apart<sup>[5]</sup>.

**Physical activity:** Physical activity was assessed using close-ended questions probing self-perceived, self-reported type (occupational, domestic, leisure time and transport related) during the past 5 years. The intensity of physical activity was classified as 'very light' (walking, job involving desk work, watching television), 'light' (standing all day working, housework such as cooking, cleaning in the house), 'moderate' (gardening, agricultural work, walking long distances up and down hills, climbing more than 20 steps in a day) and 'heavy' (lifting heavy weights, construction work, manual labor and running)<sup>[2]</sup>.

**Tobacco use:** Use of tobacco products in any form in previous 30 days is considered as current use of tobacco<sup>[6]</sup>.

**Alcohol use:** Current regular use - alcohol intake more than 3 times (average) a week Current occasional use - alcohol intake more than 3 times a month, but less than 3 times a week<sup>[6]</sup>.

**BMI classification:** WHO cut off values were used for classifying BMI<sup>[7]</sup>

**Waist circumference:** Defined as waist circumference > 90 cm for men and >80 cm for women<sup>[8]</sup>

### Statistical analysis

Statistical analyses was done using SPSS-11.5 version and Chi-square test was used to see the association between the risk factors and the non communicable diseases.

## RESULTS

The study population consisted of 132 (97%) males. Majority (78%) were educated up to higher secondary/ high school and 118 (87%) were employed in non-professional capacities.

**Table 1: Table showing the risk factors for Non communicable diseases among the Foundry workers (n=136)**

Risk factors	Number (Percentage)
Age>45 years	58 (42.6)
Family history of Diabetes Mellitus	31(22.8)
Family history of Hypertension	29(21.3)
Sedentary work	18(16.1)
Current tobacco use	35(25.7)
Overweight/Obese	54(39.7)
Waist Circumference (Central Obesity)	46(33.8)

**Table 2: Table showing the prevalence of Non-communicable diseases among the Foundry workers (n=136)**

Prevalence	Number (Percentage)
Diabetes Mellitus/Pre-Diabetes	33(24.3)
Hypertension	37(27.2)

**Table 3: Table showing the association between various risk factors and Diabetes Mellitus**

Risk factors	Proportion of Diabetes Mellitus/ Pre-Diabetes (Percentage)	$\chi^2$ value	p-value
<b>Age</b>			
<45 years	20.5	1.401	0.237
>45 years	29.3		
<b>Family history</b>			
Yes	32.2	1.4	0.237
No	21.9		
<b>Occupation</b>			
Sedentary	16.6	0.652	0.419
Non-sedentary	25.4		
<b>Body Mass Index</b>			
Normal	17.1	5.812	0.016
Overweight/ Obese	35.2		
<b>Waist Circumference</b>			
Normal	17.8	6.093	0.014
Increased	36.9		

**Table 4: Table showing the association between various risk factors and Hypertension**

Risk factors	Proportion of Hypertension (Percentage)	$\chi^2$ value	p-value
<b>Age</b>			
<45 years	26.9	0.007	0.932
>45 years	27.5		
<b>Family history</b>			
Yes	37.9	2.14	0.143
No	24.2		
<b>Occupation</b>			
Sedentary	38.8	1.43	0.232
Non-sedentary	25.4		
<b>Body Mass Index</b>			
Normal	25.6	0.266	0.606
Overweight/ Obese	29.6		
<b>Waist Circumference</b>			
Normal	27.8	0.044	0.83
Increased	26.1		



## DISCUSSION

The risk factors of today can manifest as diseases of tomorrow. Our study revealed a high prevalence of NCD risk factors among the foundry workers of Coimbatore which indicates the influence of epidemiological and nutritional transitions in the industrial settings.

Tobacco use among 25.7% of the employees is consistent with that of other studies in the industrial setting<sup>[1,2,3]</sup>. Obesity/overweight was seen among 39.7% of the employees and similar findings were found in other studies in the industrial settings<sup>[1,2,3]</sup>. Similar finding on Central obesity was seen in other studies<sup>[2,3]</sup>, whereas one study revealed a whopping figure of 70%<sup>[1]</sup>.

Prevalence of Hypertension was found to be 27.2% which is lesser than the finding of the study at Baroda<sup>[1]</sup>. Pre-hypertension and hypertension were prevalent in 39.8% and 27.2% subjects respectively in a study from Chennai<sup>[3]</sup>. The same study showed the prevalence of impaired fasting glucose and diabetes mellitus to be 16.1% and 16.3% respectively<sup>[3]</sup>. Similar findings were seen in our study.

Our study showed a statistically significant association between increased waist circumference and Diabetes status ( $\chi^2=6.093$ ,  $p=0.014$ ). Similarly a person being overweight/ obese was significantly associated with he being diabetic ( $\chi^2=5.812$ ,  $p=0.016$ ). However none of the other risk factors showed a statistical significance probably due to smaller sample size of the study.

Many studies<sup>[1,2,3,6]</sup> have observed the high prevalence of non communicable disease risk factors in Indian industrial settings and expressed it as a cause of concern as well as an opportunity for carrying out work place interventions. Our results reiterate the need for workplace interventions. We made recommendations to the management of the foundry that included health education programme to increase awareness about healthy lifestyle and to motivate sedentary employees to participate in sports and other physical fitness programmes. In addition, we recommended periodic follow-up of the employees

with hypertension and diabetes at the Rural Health Centre, which is attached to our institution.

## CONCLUSION

The results could help to motivate industries to initiate lifestyle modifications and health promotion programs for the prevention and control of non communicable diseases and reiterating some of the already known facts that could go in for policy recommendations in the industrial settings.

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# Awareness about Community Diagnosis among Health Care Professionals in South India: A Cross-Sectional Study

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## ABSTRACT

**Context:** Community diagnosis is the process of appraising the health status of a community and developing a consensus about priority health problems & strategies to address the identified issues. The information on awareness among health professionals is lacking.

**Aims:** To assess the level of awareness about community diagnosis among the health care professionals of various cadres.

**Settings and Design:** A cross sectional study was conducted among the participants of National Seminar on Evidence Based and Integrated Medicine at a Research Institute in Kasaragod, Kerala conducted in association with an International University.

**Method and Material:** Study was conducted among 181 health professionals including nursing students and faculty, medical students, practitioners and faculty and paramedical health workers. All the participants were taken as subjects for this study. They were invited to fill in a pre tested structured questionnaire

**The results:** The study population included 181 participants. The mean age was 23.5±9.2 years. The majority of them belonged to the nursing profession (87.8%) and 84.5% had heard of community diagnosis before. Among them, 64.6% felt that it can be used to study both Communicable (CD) and Non communicable diseases (NCDs), 76.2% had the correct information about the concept of spot mapping in community diagnosis, 87.3% felt that nursing care needs can be studied using community diagnosis and 87.3% of them were of the opinion that it could be a tool for integrated healthcare.

**Conclusions:** The level of awareness about community diagnosis in the study population was high. The areas like follow up of the population, following up of community, using Community Diagnosis for the study of both CD and NCDs and spot mapping about which subjects need more awareness.

**Keywords:** Community Diagnosis, Health Care Professionals, Awareness, Specific Diseases, Integrated Health Care

## INTRODUCTION

Community diagnosis is the process of appraising the health status of a community, including assembly of vital statistics and other health related statistics and of information pertaining to determinants of health, and the examinations of the relationships of these determinants to health in specified community.<sup>1</sup>

According to the definition of the World Health Organization (WHO), community diagnosis is “a quantitative and qualitative description of the health of citizens and the factors which influence their health. It identifies problems, proposes areas for improvement and stimulates action”. It forms a part of the Public Health Approach.<sup>2</sup>

This activity is designed to assist communities in developing a consensus about the priority health problems in their individual communities and developing strategies to address the issues identified.<sup>3</sup>

The practical relevance of community diagnosis includes acting as data reference for the district - to provide an overall picture of the local community and concerns, to suggest priority areas for intervention and the feasible solutions, to indicate the resource allocation and the direction of work plans, to create opportunities for inter sectoral collaboration and media involvement.<sup>4</sup>

It is important to realize that Community Diagnosis is not a one-off project, but is part of a dynamic process leading to health promotion in the community.<sup>[4]</sup> The information can be quantitative or qualitative. Community assessment is an important tool in community development because it helps local groups understand important background information before programs are undertaken. Each community is unique with its own set of goals, preferences, assets, issues, resources, past history, and potential for the future.<sup>5</sup>

Health care education should become more community oriented if today's students are to become effective health care providers. Learning to work effectively with communities is an essential part of graduate level health education.<sup>6</sup>

There is a paucity of information on the level of awareness about such an important aspect of health care among the health care professionals. Thus this study was conducted with the objective of assessing the level of awareness about community diagnosis among the health care professionals of various cadres.

## MATERIAL AND METHOD

A cross-sectional study was conducted among the participants of IV National Seminar on Evidence Based and Integrated Medicine on Lymphoedema, Chronic Dermatitis and HIV/AIDS in the month of November/December 2009. This was conducted by a Research Institute for Dermatology<sup>7</sup> a not for profit oriented, charitable Non Governmental Organization for health systems research in joint association with an International University. This was attended by 181 health care professionals of various cadres ranging from nursing students, nursing faculty, medical students, medical practitioners, medical college professors and paramedical health workers. All the participants were taken as subjects for this study.

The data were collected using a pretested (which was done in a different location for health care professionals), structured questionnaire. The questions included if they had heard of community diagnosis and about the applications like following up of a population, study of Communicable and Non communicable diseases, inclusion of specific health conditions, spot mapping, nursing care needs & demands and integrated approach in health care.<sup>7</sup>

The subjects were invited to fill in the questionnaire. The aim and objectives of the study were clearly explained by the investigators both in English and the vernacular languages and anonymity was assured. The investigators were available to clarify the questions to the participants. There were no non-responders among the participants. The collected data were coded and entered into SPSS (Statistical Software for Social Sciences) version 11.5. The results were expressed as proportions.

## FINDINGS

**Table 1 Description of the study population (n=181)**

Age group (years)	Gender		
	Males No (%)	Females No (%)	Total No (%)
<20	10 (13.3)	65 (86.7)	75 (41.4)
20-39	28 (30.4)	64 (69.6)	92 (50.8)
40-59	06 (54.5)	05 (45.5)	11 (06.1)
> 60	0 (0.0)	03 (100.0)	03 (01.7)
Total	44 (24.3)	137 (75.7)	181 (100.0)
<b>Profession</b>			
Nursing student	26 (18.4)	115 (81.6)	141 (77.9)
Nursing faculty	04 (22.2)	14 (77.8)	18 (09.9)
Medical student	06 (66.7)	03 (33.3)	09 (05.0)
Medical faculty	06 (66.7)	03 (33.3)	09 (05.0)
Paramedical	02 (50.0)	02 (50.0)	04 (02.2)
Total	44 (24.3)	137 (75.7)	181 (100.0)

The study population included 181 health care professionals who attended the National Seminar. Among them, more than half (50.8%) were in the age group of 20-39 years followed by less than 20 years (41.4%). (Table 1) The mean age of the subjects was 23.5 ( $\pm$  9.2 SD) years. Overall, female subjects were more than males (75.7% v/s 24.3%). Majority of them belonged to the nursing profession (87.8%) followed by Medical personnel (10.0%). Of the total 181 subjects,

84.5% had heard of community diagnosis before. Among those who had heard about community diagnosis, majority were from nursing field (88.9%). Among the participants, 64.6 % felt that it can be used to study both Communicable diseases (CD) and Non communicable diseases (NCD). Out of all those who felt community diagnosis could be used for the study of both CD and NCD, 82% were from nursing field.

**Table 2. Description of the awareness of the study subjects regarding various aspects of community diagnosis (n=181)**

Heard of community diagnosis	Profession					
	Nursing studentNo. (%)	Nursing faculty No. (%)	Medical student No. (%)	Medical faculty No. (%)	Paramedical No. (%)	Total No. (%)
Yes	123 (87.2)	13 (72.2)	6 (66.7)	9 (100.0)	2 (50.0)	153 (84.5)
No	18 (12.8)	5 (27.8)	3 (33.3)	0 (0.0)	2 (50.0)	28 (15.5)
<b>Diseases which could be studied</b>						
Only CD*	57 (40.4)	2 (11.1)	1(11.1)	0 (0.0)	0 (0.0)	60 (33.1)
Only NCD*	3 (02.2)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.2)
Deals with both with CD & NCD	81 (57.4)	15 (83.3)	8 (88.9)	9 (100.0)	4 (100.0)	117 (64.6)
<b>Follow up of communities</b>						
Yes	109 (77.3)	16 (88.9)	8 (88.9)	6 (66.7)	3 (75.0)	142 (78.5)
No	32 (22.7)	2 (11.1)	1 (11.1)	3 (33.3)	1 (25.0)	39 (21.5)
<b>Inclusion of specific health conditions</b>						
Yes	104 (73.8)	16 (88.9)	8 (88.9)	8 (88.9)	3 (75.0)	139 (76.8)
No	37 (26.2)	2 (11.1)	1 (11.1)	1 (11.1)	1 (25.0)	42 (23.2)
<b>Spot mapping</b>						
Pictorial & simplified representation of study area	107 (75.9)	12 (66.7)	9 (100.0)	7 (77.8)	3 (75.0)	138 (76.2)
Area to be avoided during the survey	25 (17.7)	3 (16.7)	0 (0.0)	1 (11.1)	0 (0.0)	29 (16.0)
Not a part of community diagnosis	9 (6.4)	3 (16.7)	0 (0.0)	1 (11.1)	1 (25.0)	14 (07.7)
Total	141 (100.0)	18 (100.0)	9(100.0)	9(100.0)	4 (100.0)	181 (100.0)

\* CD – Communicable Diseases , NCD- Non communicable diseases

Regarding the following up of the communities using community diagnosis techniques, 78.5% opined positive and 76.8% of the subjects felt that specific health conditions could be included in community diagnosis. The correct information about the concept of spot mapping in community diagnosis was present in 76.2% of the subjects. (Table 2)

Among the total subjects, 87.3% felt that nursing care needs and demands can be studied using community diagnosis techniques. Also 87.3% of them were of the opinion that it could be a tool for integrated healthcare. High number of subjects opined positive on the utility of community diagnosis in nursing care and integrated health care among medical, paramedical and nursing professionals. (Table 3)

**Table 3. Opinions of the subjects on utility of community diagnosis in nursing care and integrated health care (n=181)**

Heard of community diagnosis		Profession					
		Nursing studentNo. (%)	Nursing faculty No. (%)	Medical student No. (%)	Medical faculty No. (%)	Paramedical No. (%)	Total No. (%)
Nursing care demands included	Yes	126 (89.4)	17 (94.4)	07 (77.8)	05 (55.6)	03 (75.0)	158 (87.3)
	No	15 (10.6)	01 (05.6)	02 (22.2)	04 (44.4)	01 (25.0)	23 (12.7)

**Table 3. Opinions of the subjects on utility of community diagnosis in nursing care and integrated health care (n=181) (Contd.)**

Heard of community diagnosis		Profession					
		Nursing student No. (%)	Nursing faculty No. (%)	Medical student No. (%)	Medical faculty No. (%)	Paramedical No. (%)	Total No. (%)
Tool for integrated approach	Yes	122 (86.5)	17 (94.4)	08 (88.9)	07 (77.8)	04 (100.0)	158 (87.3)
	No	19 (13.5)	01 (05.6)	01 (11.1)	02 (22.2)	0 (0.0)	23 (12.7)
Total		141 (100.0)	18 (100.0)	09 (100.0)	09 (100.0)	04 (100.0)	181 (100.0)

## DISCUSSION

The present study included a heterogeneous population which was a mixture of medical, paramedical and nursing professionals, including both students and faculties in each field. The overall knowledge of the participants of this National Seminar about the applications of community diagnosis was high. In a study conducted in Malaysia by Narayan et al in 2008 in the baseline assessment also showed that the overall level of awareness of Medical professionals about community diagnosis was high.<sup>4</sup>

There were several studies on learning of community diagnosis for various groups of health care students in a session by session manner.<sup>5,6,8,9</sup> However there is a paucity of studies assessing the level of awareness and knowledge about the applications of community diagnosis among health care personnel. Therefore this study would be a curtain raiser to the health care professionals to study the level of awareness of community diagnosis. Thus it can throw light into the thrust areas to improve the current situation; such that field study, interventions and integrated health care to the community can be applied and evaluated effectively.

The study reported that the study population had a high level of awareness of utility of community diagnosis. But there were specific areas in the applications which could further be improved; like the usage of community diagnosis techniques in following up of a community, using Community Diagnosis for the study of both CD and NCDs, inclusion of specific health conditions and spot mapping. These could be achieved by the Continual of Medical Education with special emphasis on the Community Diagnosis and also by the regular training sessions.

Also, high level of awareness among the nurses makes the distribution of health care wider. In many developing countries where there is a shortage of doctors and health care workers, nurses with these

skills and knowledge would help the community diagnosis techniques to be used in a better way.

The integrated approach in health care for the management of various diseases is a relatively novel and a low cost concept which has been brought to practice at IAD (Institute of Applied Dermatology).<sup>7</sup> The findings of the current study may help in the future activities of the centers of excellence for integrative management using community diagnosis techniques.

The level of overall awareness about community diagnosis in the study population was high.

However, the majority of the subjects were from nursing field, the findings cannot be generalized to all health care personnel.

## CONCLUSION

The study population had a high level of awareness about community diagnosis, however knowledge about its applications need to be strengthened across all cadres of health care.

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**Conflict of Interest:** None

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# Diet and Lipid Profile of Menopausal Women as Risk Factors of Cardiovascular Disease

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## ABSTRACT

Cardiovascular disease has emerged out as a leading cause of death. Women after menopause are equally at risk of CVDs as men. Risk factors of CVD among the women (45 - 65 years) who have attained menopause were studied. Information on general background, nutritional risk factors like anthropometric measurements (height, weight, waist to hip ratio and BMI) and dietary intake as well as non nutritional risk factors like blood pressure, pulse rate, family history of cardiovascular disease, smoking habit, exercise pattern and stress level and lipid profile was taken. Results revealed that correct weight for height and normal BMI were found only in 28.33 and 33.33 percent subjects. Intake of fat, calcium and thiamin were higher while diets were low in energy, iron, riboflavin, niacin and vitamin C. Total cholesterol, LDL-C and VLDL-C were higher than normal values and found to be positively associated with fat intake.

**Keywords:** Cardiovascular, Cholesterol, Diet, Blood Pressure, Menopause

## INTRODUCTION

The word menopause (menopausie) was used for the first time in 1816 by Gardanne. It is a natural event in ageing process and signifies the end of reproductive years with cessation of cyclic ovarian function as manifested by cyclic menstruation that is, the ovaries no longer release eggs and no longer secrete estrogen and progesterone<sup>4</sup>. Cardiovascular disease has been emerged out as a leading cause of death among postmenopausal women. Until recently, CVD has been thought to be primarily associated with men. However, the emerging facts revealed that the disease equally affect women after menopause and is the chief cause of morbidity and mortality among postmenopausal women because estrogen withdrawal has a detrimental effect on cardiovascular function and metabolism<sup>5</sup>.

No single factor is an absolute cause either of atherosclerosis or of coronary heart disease, many factors are interrelated and the extent to they are present, increase that risk of the disease. The menopause compounds many traditional CVD risk factors, including changes in body fat distribution from a gynoid to an android pattern, reduced glucose tolerance, abnormal plasma lipids, increased blood pressure, increased sympathetic tone, endothelial

dysfunction and vascular inflammation. After menopause, the incidence of CVD increases, with each passing year posing a greater risk.

Menopause brings changes in the level of fats in a woman's blood. These fats, called lipids, are used as a source of fuel for all cells. There are two components of cholesterol: high density lipoprotein (HDL) cholesterol, which is associated with a beneficial, cleansing effect in the bloodstream, and low density lipoprotein (LDL) cholesterol, which encourages fat to accumulate on the walls of arteries and eventually clog them. LDL cholesterol appears to increase while HDL decreases in postmenopausal women as a direct result of estrogen deficiency. Elevated LDL and total cholesterol can lead to stroke, heart attack, and death. Women who exercise and follows a healthy diet cope better with menopausal changes and also help protect themselves against other diseases such as heart disease and osteoporosis.

The postulated risk factors predisposing the cardiovascular disease such as age, gender, race and genetics cannot be controlled or modified whereas the factors such as cholesterol level, obesity, hypertension, exercise habits, smoking, alcohol intake, dietary fat intake, stress etc. can be modified or controlled to



reduce the risk of cardiovascular disease<sup>3</sup>. In the present communication, various risk factors of cardiovascular diseases among post menopausal women have been assessed to prevent chances of CVDs in future among post menopausal women.

## MATERIAL AND METHOD

The population for study comprised of one hundred and twenty post menopausal women aged between 45-65 years selected from Udaipur city. An interview schedule was used to collect the information on general background, nutritional risk factors like anthropometric measurements (height, weight, waist to hip ratio and BMI) and dietary intake as well as non nutritional risk factors like blood pressure, pulse rate, family history of cardiovascular disease, smoking habit, exercise pattern and stress level. Lipid profile of 30 percent subjects who were willing to cooperate and available at the time of study was estimated. A 24 hours recall method for one day was used to collect the information regarding the dietary intake of women. Nutrients consumed by subjects were compared with the Recommended Dietary Allowances<sup>7</sup>, to assess the adequacy of diet.

### Collection and analysis of sample

Blood samples were drawn from patients. Five ml blood was collected in plain vials (without any anti coagulant) for estimation of serum lipids.

### Lipid Analysis

Lipid profile was estimated by commercially available kits. Estimation of total cholesterol, HDL-C and triglycerides was done by enzymatic method. VLDL-C and LDL-C were calculated by using the Friedwald's formula<sup>6</sup>. The obtained values of each of the lipid profile fractions were compared and justified low, normal or high on the basis of NCEP ATP III cut off points<sup>12</sup>.

## RESULTS

### Back ground information

Majority of subjects (85.84%) were Hindu and belonged to nuclear families with less than or equal to four family members. Majority of women (27.5%) were graduate and housewives (54.17%). The mean age of Postmenopausal women was 54 years.

### Information about risk factors

#### Nutritional risk factors-

- a) **Anthropometric measurements:** Table-1 clarifies that subjects were obese with mean weight of 64.47 kg and BMI 27.09 kg/m<sup>2</sup> while waist to hip ratio of the subjects was 0.83, which was normal. It has been estimated that 70% of CVD in obese women and 40% in all women is due to excess weight<sup>11</sup>. BMI and body fat percentage were positively correlated with total and LDL-C (P d''0.05). Obesity itself, however, is not an independent risk factor for CVD, but is related to CVD through other risk factors such as hypertension, elevated cholesterol, and diabetes. In contrast, centralized body fat, indicated by the waist-to-hip ratio, appear to be a strong predictor of incidence of CVD for both men and women, independent of other risk factors<sup>8</sup>.
- b) **Dietary intake:** Information on nutrient intake revealed that among the subjects intake of fat (57.64 g/d), calcium (469.68mg/d) and thiamin (0.97 mg/d) was higher whereas energy (1374.25 kcal/d), protein (37.54g/d), fiber (10.89 g/d), iron (16.06mg/d), beta carotene (2234.02 µg/d), riboflavin (0.84 mg/d), niacin (7.69 mg/d) and vitamin-C (33.90mg/d) consumption was lower compared to RDA (Table-2). Association (pd''0.05) of fat intake with total cholesterol was found positive. Numerous population studies confirm an inverse relationship between dietary protein, calcium intake and blood pressure, a lower intake of calcium and protein being associated with higher blood pressure. Anemia can cause high blood pressure and rapid heart rate and low intake of energy and thiamin leads to low functional capacity of heart and reduces cardiac output.

#### Non nutritional risk factors

- a) **Blood pressure:** systolic blood pressure of majority (44.17%) of subjects was normal. Among remaining subjects 24.17 percent had optimal (<120 mmHg), 25.83 percent had high normal (130-139 mmHg) and 5.83 percent had mild hypertensive (140-159 mmHg) systolic blood pressure.

Majority of subjects (38.33 mmHg) were having optimal (<80 mmHg), 20.84 percent had normal (<85 mmHg), 18.33 percent high normal (85-89 mmHg), 17.5 percent mild hypertensive and 5 percent had moderate diastolic blood pressure. As with blood pressure, there appears to be little

association between natural menopause and body weight per se <sup>2</sup>. The menopause transition may, however, be associated with a change in body composition, with an increased waist-to-hip ratio occurring at the time of the menopause <sup>10</sup>.

- b) **Pulse rate:** As evident from the table-3 pulse rate of 6.67 percent subjects was less than 70 per minute while it ranged between 70 and 80 per minute in 23.33 percent subjects. Majority of subjects (40.83%) had pulse rate ranging between 80 and 90 per minute and 29.17 percent subjects had pulse rate greater than 90 per minute as against the normal pulse rate of 72-75 per minute.
- c) **Family history of cardiovascular disease:** Half of the subjects (50.83%) had no familial predisposition to the disease whereas remaining 49.17 percent subjects had familial aggregation (Table-4).
- d) **Smoking:** all the subjects were exclusively non smokers.
- e) **Exercise :** Physical activity is strongly and inversely related to CVD risk. CVD risk is approximating twice as high in sedentary person compared with those who are physically active <sup>13</sup>. Table 5 reveals that half of the subjects were not performing any exercise. Among remaining subjects only 9.17 percent subject performed exercise for more than one hour, 21.67 percent subjects ½ hour and 18.33 percent subjects 2-3 times a week.
- f) **Stress:** Today’s fast running life has given rise to constant stress, an important and emerging risk factor of cardiovascular disease in both the genders. Majority of women (80%) reported that they remain under stress most of the time.

**Table 1: Anthropometric measurements of subjects**

Parameters	Mean ± SE values
Height (cm)	154.45± 0.7
Weight (kg.)	64.47±1.2
BMI kg/m <sup>2</sup>	27.09±0.5
WHR	0.83±4.7

**Table 2: Mean values of nutrient intake by subjects per day**

Nutrients	RDA	Values (N =120)	
		Mean ± S.E.	% of RDA
Energy (Kcal/d)	1875	1374.25±34.9	73.29
Protein (g/d)	50	37.54±1.0	75.08
Fat (g/d)	20	55.46±2.5	277.3
Carbohydrate (g/d)	-	168.6±4.3	-

**Table 2: Mean values of nutrient intake by subjects per day (Contd.)**

Nutrients	RDA	Values (N =120)	
		Mean ± S.E.	% of RDA
Fiber (g/d)	40	9.55±0.9	23.87
Calcium (mg/d)	400	469.67±19.5	117.41
Iron (mg/d)	30	16.05±0.7	53.5
â Carotene (µg/d)	2400	2234.02±160	93.08
Thiamine (mg/d)	0.9	0.97±3.1	107.78
Riboflavin (mg/d)	1.1	0.79±3.4	71.82
Niacin (mg/d)	12	7.69±0.2	64.08
Vitamin C (mg/d)	40	33.9±2.2	84.75

**Table 3: Percent distribution of subjects on the basis of blood pressure and pulse rate**

S. No.	Parameter	Subject(N=120)
1	Blood pressure	
	Systolic : (mm Hg)	
	Optimal (<120)	24.17
	Normal (<130)	44.17
	High normal (130-139)	25.83
	Mild hypertension (140-159)	5.83
	Moderate (160-179)	-
	Severe (180-209)	-
	Diastolic :	
	Optimal (<80)	38.33
	Normal (<85)	20.84
	High normal (85-89)	18.33
	Mild hypertension (90-99)	17.5
	Moderate (100-109)	5
Severe (110-119)	-	
2	Pulse rate (no/min.)	
	< 70	6.67
	70-80	23.33
	80-90	40.83
	> 90	29.17

**Table 4: Percent distribution of subjects on the basis of family history of cardiovascular disease**

S.No.	Family History	Subject(N=120)
1.	No Family History	50.83
2.	II Degree Relatives	14.17
3.	Single parent	26.67
4.	Both parent	8.33

**Table 5: Percent distribution of subjects on the basis of stress level, exercise and s moking habits**

S. No.	Habits	Subject(N=120)
1	<b>Smoking</b>	
	Non Smoker	100

**Table 5: Percent distribution of subjects on the basis of stress level, exercise and smoking habits (Contd.)**

S. No.	Habits	Subject(N=120)
<b>2</b>	<b>Exercise pattern</b>	
a)	More than 1 hour	9.17
b)	½ hour	21.67
c)	2-3 times a week	18.33
d)	No exercise	50.83
<b>3</b>	<b>Type of stress</b>	
a)	No stress	20
b)	Familial stress	57.5
c)	Educational stress	1.67
d)	Both familial and educational stress	20.83

**Table 6: Lipid profile of selected women**

Lipid profile fractions	Mean values (n=40)
Total Cholesterol (mg/dl)	211.01
Triglyceride (mg/dl)	148.96
HDL-C (mg/dl)	41.67
VLDL-C (mg/dl)	29.79
LDL-C (mg/dl)	140.81

**Lipid profile of selected subjects**

The mean levels of total cholesterol (211.01 mg/dl) and LDL-C (140.81mg/dl) was high while levels of HDL-C (41.67 mg/dl) were found to be less than desirable levels. Mean triglyceride level was 148.96 mg/dl, it was within the desirable limit (<150 mg/dl, Table-5).

The results revealed that with higher levels of mean cholesterol, LDL-C and lesser levels of HDL-C, postmenopausal women were at the elevated risk of developing CVD. Results are in accordance with the previous reports<sup>15</sup>. Longcope *et al*<sup>9</sup>( 1996) found no association between changes in endogenous estrogen levels and lipid levels. Estrogen appears to have a favorable impact on the circulation through direct effects on vessel wall physiology and on mechanisms controlling blood flow<sup>14</sup>. Natural menopause is associated with higher levels of total and low-density-lipoprotein cholesterol levels. Protective function of HDL is attributed to its active participation in reverse transport of cholesterol. Numerous cohort studies and clinical trials have confirmed the association between low HDL and increased risk of CVDs. Concentration of LDL correlates positively while HDL correlates inversely to the development of CVDs<sup>1</sup>.

**CONCLUSION**

The present study confirmed that various risk factors viz obesity, hypertension, physical inactivity, stress, family history of CVD and unhealthy dietary practices contributes towards the elevated levels of lipid profile (except HDL-C) which may in turn leads to the development of cardiovascular disease among postmenopausal women.

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# A Study of Patient Profile of Organophosphorous Poisoning Attending a Tertiary Hospital of Andhra Pradesh

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## ABSTRACT

**Background:** Organophosphate based pesticides are widely used and have emerged as the major contributor to ill health associated with pesticides & is a major global health problem. Despite improvements in intensive care and related disciplines & different modes of treatment, the mortality associated with Organo-Phosphorous insecticide poisoning has not decreased. Knowledge of the socio-demographic profile & the factors which led to poisoning as well as the clinical & biochemical profile, will help in the timely intervention for better prognosis & outcome as well as prevention of such hazards.

**Objectives:** 1. To study the sociodemographic & clinical profile of the patients of organo-phosphorous poisoning, 2. To assess the clinical & biochemical parameters useful in the prognosis of these patients.

**Materials And Method:** Around 240 patients of organophosphorus poisoning who were admitted in G.S.L Medical College & Hospital during January 2010 to January 2011 were examined, investigated & interviewed with the help of a semi structured proforma. Their socio- demographic, clinical & biochemical profiles were studied. Results: Most of the cases were in the young age group of less than 30 years group which is a sensitive age group. Most of them had history of suicide attempt. Majority of the cases were brought to the hospital with the history of consumption of an unknown pesticide. Most of the females presented with severe symptoms. Most of the patients recovered due to timely management. Though the mortality rate was less but the patients who left against medical advice were about 20% which is quite significant.

**Conclusions:** It is suggested to create awareness & educate the people regarding organophosphorus poisoning as it is a public health problem, launch programs to change their attitude towards life, train them regarding the safety profiles of pesticide use and implementation of legislative measures in order to prevent such hazards in future.

**Keywords:** Organophosphorous Poisoning, Social Factors, Clinical Symptoms, Biochemical Profile

## INTRODUCTION

Organophosphorus insecticide poisoning is a major global health problem with approximately 3 million

poisonings and 200,000 deaths annually.<sup>1</sup> Organophosphate based pesticides are widely used and have emerged as the

major contributor to ill health associated with pesticides. These are known to be the irreversible inhibitors of the enzyme acetyl cholinesterase & are a leading cause of death in agricultural countries globally.<sup>2</sup> Poisoning due to occupational exposure accounted for about one-fifth of the incidents, with a fatality rate of less than 1%. More than 90% of the non-occupational incidents were suicidal, with a fatality rate of more than 10%. Accidental exposure account

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for 8-10% of incidents and homicidal use (less than 1%) are other forms of poisoning.<sup>3</sup> The reported overall mortality following Organo Phosphorous insecticide poisoning varies from 4-30% in different countries and institutions.<sup>4</sup> There are well defined clinical phases in these poisonings. Apart from the neuromuscular system the poisoning has effects on the CNS, cardiovascular systems & reproductive system. Effects may appear as early as 10 minutes to as late as two hours post-exposure to 7-21 days depending on the amount absorbed and type of response. Despite improvements in intensive care and related disciplines & different modes of treatment, the mortality associated with Organo-Phosphorous insecticide poisoning has not decreased.

Our study is an attempt to know the socio-demographic profile & the factors which led to poisoning so that it can be prevented as well as the clinical profile which can be a prognostic indicator in the treatment of such patients. It is suggested to create awareness & educate the people regarding it as it is a public health problem, launch programs to change their attitude towards life, train them regarding the safety profiles of pesticide use and implementation of legislative measures in order to prevent such hazards in future.

## MATERIALS AND METHOD

**Study design:** Hospital based study

**Study area:** Intensive care unit & Medical units of G.S.L Medical College, Rajahmundry, Andhra Pradesh

**Study subjects:** All cases Organophosphorous poisoning admitted during the study period.

**Sample size:** 240

**Study period:** January 2010 to January 2011.

**Sampling technique:** Simple random sampling technique

**Study variables:** Age, sex, socioeconomic status, education, signs & symptoms, time since poisoning & initiation of treatment, mode of poisoning, duration of hospital stay, biochemical parameters, etc.

**Study instrument:** pre-tested questionnaire, equipments & materials required for examination.

**Statistical analysis:** percentages and proportions, mean & standard deviation, chi-square.

## METHODOLOGY

The study was carried out in the Intensive Care Unit & inpatients department of the medical wards of G.S.L Medical College & Hospital, Rajahmundry, Andhra Pradesh, during the period of January 2010 to January 2011. All the diagnosed cases of organo-phosphorous poisoning, through detailed history & thorough clinical examination, admitted during that period were considered for study. The patients or their attendants were interviewed with the help of a, semi structured proforma which included the required details such as their personal & social history, time & mode of poisoning etc. after obtaining their consent. They were also clinically examined daily & underwent biochemical & pathological tests as an when required till their stay in the hospital. The data collected was analyzed.

## RESULTS

Out of the 240 cases of organophosphorus poisoning, around 180 (75%) were males & 60 (25%) were females. Majority of them i.e. 65 out of 240 (27.08) were affected in between 21 to 25 years which is shown in Table 1. Around 139 cases out of 240 (57.92%) were either primary or illiterate. About 173 out of 240 cases (72.08%) were unskilled workers. Most of the cases i.e. 51 out of 240 (62.92%), belonged to upper lower class as per Modified Kuppuswamy classification<sup>5</sup>. The poisoning was seen more in upper lower & below class in males (158 out of 180 i.e. 87.78%) as compared to females which is 40 out of 60 cases accounting for 70% which is statistically significant ( $P < 0.05$ ). Around 150 out of 240 cases (66.67%) were Hindus followed by Muslims (20.83%). About half of them belonged to backward class (120 out of 240) followed by schedule caste (70 out of 240 i.e. 29.17%).

Majority of the cases were brought to the hospital with the history of consumption of an unknown pesticide. Around 184 out of 240 (76.67%) consumed unknown pesticide followed by 20 cases (8.33%) who consumed the insecticide chlorpyrifos.

192 (80%) of the cases had consumed the pesticide due to suicide attempt whereas 43(18%) of the cases had history of accidental ingestion. The remaining 2% did not reveal anything. The suicidal rate among males was found to be higher i.e. 144 out of 180 (80%) compared to 38 out of 60 females (63.33%).

Mean time arrival from home to hospital was 12 hrs (4 to 48 hrs).

Poisoning was seen more in cases less than 30 years i.e. 160 out of 240 however the male & female differences in this age group was insignificant statistically.

Around 120 out of 170 (70.58%) males who attempted to commit suicide, the reason was due to depression because of financial problems. The other causes were bad examination results, failure in love, feeling cheated by spouse etc. The most common cause among females was marital disputes or extramarital affair of husband ( in 15 out of 22 women i.e.68.18% who attempted suicide). The other causes were failure in love affair, abuse by parents etc.

There was no difference statistically between male & female poisoning in relation to education. The commonest symptom was altered sensorium in 148 (61.67%) cases followed by decreased pupil size in about 116 (48.33%) cases. Around 60 (25.00%) cases presented with increased salivation which is shown in Table 2. About 73 (30.42%) cases showed mild or only muscarinic symptoms whereas 53 (22.08%) cases showed moderate symptoms or both muscarinic & nicotinic symptoms. Around 114 (47.50%) cases showed severe symptoms which included both muscarinic & nicotinic symptoms along with central

nervous system symptoms which is shown in table 3. Females presented more with severe symptoms (66.67%) compared to males (41.11%), the difference being statistically significant. (P<0.001)

According to laboratory reports at the time of presentation, 36 out of 240 cases (15%) presented with altered renal parameters. Around 56.67% of cases had some sort of electrolyte disturbance in the form of hypo or hypernatremia or hyperkalemia.

Around 42 out of 60 (70%) of females were anaemic compared to males i.e.62 out of 180 (34.44%). The difference was statistically highly significant (P=0.0000).

Out of 240 patients, 95 patients (39.58 %) were having high Total Leucocyte Count (TLC) and 145 patients (60.42 %) showed normal TLC count. (Reference values out of 4000 to 11,000/cumm was considered as abnormal) it was also observed that the serum cholinesterase levels were less than the normal value of 4500 IU/L in 50 out of 60 female cases(83.33%) & 126 out of 180 (70%) among males, the difference is statistically significant (P<0.05). Table 4 shows the outcome of patients where 148 (82.22%) of male cases & 32 (53.33%) of female cases totaling to 180 (75.00%) recovered & were discharged whereas 12 (5.00%) of cases expired & 48 (20.00%) of cases left against medical advice.

**Table 1. Age & Gender distribution among cases of organophosphorus poisoning**

Age group (in years)	Male	Female	Total
Less than 14	-	-	-
15 – 20	30 (16.67%)	20 (33.33%)	50 (20.83%)
21 – 25	55 (30.56%)	10 (16.67%)	65 (27.08%)
26 – 30	35 (19.44%)	10 (16.67%)	45 (18.75%)
31 – 35	15 (8.33%)	8 (13.33%)	23 (9.58%)
36 – 40	25 (13.89%)	4 (6.67%)	29 (12.08%)
More than 40	20 (11.11%)	8 (13.33%)	28 (11.67%)
Total	180 (100.00%)	60 (100.00%)	240 (100.00%)

**Table 2. Clinical signs & symptoms observed among patients of OP poisoning**

Signs& symptoms	Male	Female	Total
Increased salivation	52 (28.89%)	8 (13.33%)	60 (25.00%)
Decreased pupil size	84 (46.67%)	32 (53.33%)	116 (48.33%)
Altered sensorium	116 (64.44%)	32 (53.33%)	148 (61.67%)
Fasciculations	32 (17.78%)	4 (6.67%)	36 (15.00%)
Pulmonary basal crepitations	8 (4.44%)	8 (13.33%)	16 (6.67%)
Bowel sounds	180 (100.00%)	60 (100.00%)	240 (100.00%)

**Table 3. Category according to severity of signs & symptoms**

Category	Male	Female	Total
Mild	65 (36.11%)	8 (13.33%)	73 (30.42%)
Moderate	41 (22.78%)	12 (20.00%)	53 (22.08%)
Severe	74 (41.11%)	40 (66.67%)	114 (47.50%)
Total	180 (100.00%)	60 (100.00%)	240 (100.00%)

**Table 4. Outcome observed in patients of organophosphorus poisoning**

Outcome	Male	Female	Total
Recovery	148 (82.22%)	32 (53.33%)	180 (75.00%)
LAMA	20 (11.11%)	28 (46.67%)	48 (20.00%)
Mortality	12 (6.67%)	-	12 (5.00%)
Total	180 (100.00%)	60 (100.00%)	240 (100.00)

## DISCUSSION

Most of the cases were males in the young age group of less than 30 years group particularly in the 21-25 years age group which is a sensitive age group. Majority of the cases were brought to the hospital with the history of consumption of an unknown pesticide. Pesticide poisoning whether suicidal or accidental is common in south Asia. Studies have revealed that pesticides are the commonest mode of suicide among these populations<sup>6,7,8</sup>. Most pesticide deaths recorded in hospital surveys are the result of self poisoning,<sup>9</sup> which is in support of our study.

In our study, 80% of the cases had consumed the pesticide due to suicide attempt which is similar to other studies<sup>10,11,12</sup>. The suicidal rate among males was found to be higher i.e. 144 out of 180 (80%) compared to 38 out of 60 females (63.33%).

Around 47.50% cases showed severe symptoms which included both muscarinic & nicotinic symptoms along with central nervous system symptoms & females presented with more severe symptoms which could be due to decreased acetyl cholinesterase & anaemia in them as these have been noted as prognostic factors. There were many number of studies correlate that abnormal TLC count is found in severe OP poisoning.<sup>14</sup> Organophosphate insecticides inhibit acetyl cholinesterase (AChE) and cholinesterase enzymes resulting in over stimulation at cholinergic synapses.<sup>15</sup>

Outcome of patients where 82.22% of male cases & 53.33% of female cases recovered & were discharged.

The outcome was good which could be due to prompt treatment or first aid treatment at local hospitals or centers before they were referred to our hospital. About 5.00% of cases expired which is similar to other studies<sup>16,17</sup>. The reason could be due to delay in coming to hospital or due to clinical severity at the time of presentation to the hospital. According to few studies mortality due to organophosphorus study varies from 3 to 25% & 20.00% of cases left against medical advice which could be due to their financial problems or their ignorance. The patients & their attendants need to be counseled regarding the gravity of the situation as well as change in their behavior.

## CONCLUSION AND RECOMMENDATIONS

Most of the cases were in the young age group of less than 30 years group which is a sensitive age group. Most of them came with suicide attempt. Majority of the cases were brought to the hospital with the history of consumption of an unknown pesticide. Most of the females presented with severe symptoms. Most of the patients recovered due to timely management. Though the mortality rate was less but the patients who left against medical advice were about 20% which is quite significant. They need to be counseled regarding the seriousness of their condition apart from attitude & behavior change.

It is suggested to create awareness & educate the people regarding it as it is a public health problem, launch programs to change their attitude towards life, train them regarding the safety profiles of pesticide use and implementation of legislative measures in order to prevent such hazards in future.



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# Acute Haematogenous Osteomyelitis of Pelvis in a Three Year Old Child-Case Report

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## ABSTRACT

Acute haematogenous osteomyelitis of pelvis is an uncommon disease and presents with variable clinical signs and symptoms, sometimes attributable to other diseases. Herein we describe a case of acute haematogenous osteomyelitis of Ilium in a child of 3 years of age. This case has been presented because of its clinical rarity.

**Keywords:** *Acute Haematogenous Osteomyelitis-Flat Bones-Pelvis-Ilium*

## INTRODUCTION

Acute haematogenous osteomyelitis is a common paediatric disease<sup>1</sup>. Classically occurs at metaphysis of long bones and usually diagnosed within 48 hours of onset of symptoms<sup>2</sup>. As compared to osteomyelitis of the long bones, involvement of the pelvis is uncommon, thereby making it difficult to diagnose. It may also produce variable signs and symptoms that are often attributed to another process.<sup>3,4,5</sup> Incidence of pelvic osteomyelitis peaks at an older age compared to other bones.<sup>6,7,8,9</sup> Morgan and Yates, Beaupre and Carroll classified the symptoms and signs based on anatomical location: abdominal syndrome, gluteal syndrome, sciatic or lumbar disc syndrome, hip joint syndrome<sup>11,14</sup>.

Herein we describe a case of acute haematogenous osteomyelitis of Ilium in a child of 3 years of age. Diagnosis was delayed due to varied presentation,

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eventually underwent surgical drainage and debridement. Consequently the child had a good recovery. Follow up was done for six months and the child was free from signs of infection.

## CASE REPORT

A 3 years old baby girl presented with pain in left gluteal region and limp. A past history of trivial fall 21days before had similar complaints of gluteal pain and limp, she was evaluated by radiographs of pelvis with both hips and complete blood counts. Radiograph was reported normal and Total WBC counts and ESR were within normal limits. She was managed symptomatically with analgesics with no recovery.

On examination child was afebrile. Tenderness was present at the gluteal and iliac region, passive movements of hip were normal except for restricted external rotation. Investigations showed Total WBC counts 12000/cmm, ESR 24. Radiographs of pelvis were taken and there was no obvious lesion noted. Ultrasound showed abscess at gluteal region and aspiration revealed pus. MRI showed pus formation in proximity to left iliac bone on both the sides with communicating abscess through iliac perforation. Retrospectively radiographs showed lesion at left Ilium which might have been confused as gas shadow.

Surgical drainage and debridement was done. Intravenous antibiotics started and within three days symptoms subsided. Cultures grew *Staphylococcus aureus*. Antibiotics continued for six weeks. At six month follow up child was asymptomatic with no signs of infection.



Fig 1. Radiograph of pelvis showing lesion at left Ilium adjacent to anterior superior iliac spine.

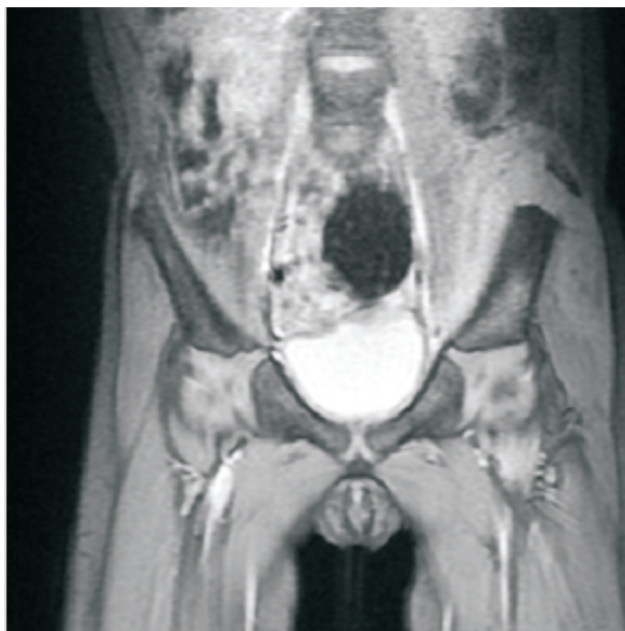


Fig. 2. MRI Pelvis showing pus collection on either side of Iliac wing, with communication through Ilium. Signal changes in iliac wing.

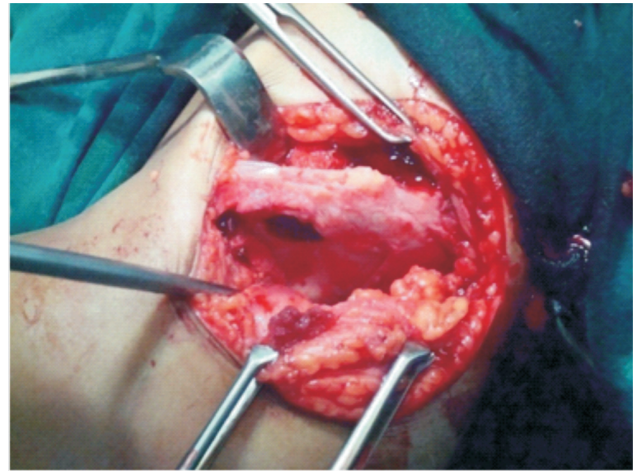


Fig. 3. Intra operative picture showing lesion at Ilium near anterior superior iliac spine with perforation of Iliac bone.

## DISCUSSION

Clinical diagnosis of pelvic Acute Haematogenous Osteomyelitis can be difficult. The disease is relatively uncommon, produces variable signs and symptoms that are often attributed to another process and peaks at an older age<sup>6, 7, 8, 9, 10</sup>. In our case study child is 3 years old in contrast with average age of presentation being 7 to 14 years according to literature<sup>7</sup>. It has been emphasised to consider pelvic acute haematogenous osteomyelitis in a febrile child with limitation of movements around the hip or altered gait<sup>8</sup>. In our study, child was afebrile with limitation of movements around hip and limp. Estimated incidence varies from 2-11% of all bone infections<sup>12,13,14,15</sup>. Pathophysiology is similar to Acute Haematogenous Osteomyelitis, which is commonly located at metaphyseal ends of long bones as described by Nixon. Similar to long bone metaphyseal ends, in pelvis foci of infections are described and they are termed as metaphyseal equivalents. Iliac bone is most commonly affected because it is largest bone with rich vascular blood supply. For iliac bone Nixon described four metaphyseal equivalents 1) adjacent to sacro iliac joint 2) adjacent to triradiate cartilage 3) acetabular roof and 4) anterior inferior iliac spine<sup>7</sup>. In our study, child developed infection adjacent to anterior superior iliac spine.

Laboratory investigations may be misleading as WBC counts and ESR may be little elevated or normal. Radiological studies may be normal in early stages<sup>6</sup>. MRI is highly sensitive to detect bone infections in localised symptoms on clinical examination. MRI is

preferred in case of pelvic bone osteomyelitis which gives additional information regarding intraosseous, subperiosteal collections and collections in proximity to bones. However varied clinical presentation, referred pains and multifocal disease puts MRI at disadvantage to miss a lesion. Even if the MRI is negative, strong clinical suspicion warrants bone scan. Hence gadolinium enhanced MRI scans is a choice in work up of pelvic osteomyelitis<sup>1</sup>.

### CONCLUSION

To conclude Acute Haematogenous Pelvic Osteomyelitis is an uncommon disease with varied clinical presentation, misleading laboratory investigations and early radiological studies may not give conclusive evidence which make it intriguing diagnostic challenge. Disease should be considered in evaluating limp and limitation of movements around hip even in young afebrile children. Rarely focus of infection may be located at non-metaphyseal equivalents. High degree of clinical suspicion and MRI studies are helpful in diagnosis. Early surgical drainage and antibiotics results in complete recovery.

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**Conflict of Interest:** Nil

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# A Cross-Sectional Study of Anemia and Body Mass Index in Student's Attending a Women's College in Bagalkot, North Karnataka

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## ABSTRACT

Body mass index in pre-pregnancy has been suggested as useful criteria for the assessment of risk of low birth weight in their offspring. Iron deficiency anemia is a major factor contributing to maternal morbidity and mortality. A significant fall in birth weight has been reported to occur with maternal Hemoglobin levels below 8-G%. It has been claimed that the damage to fetal brain arising from maternal anemia takes place early in pregnancy. In view of these considerations, this cross sectional study was conducted to know the anthropometric measurements, body mass index and iron deficiency anemia in students attending a women's college in Bagalkot city. Ethical clearance was obtained from Institutional ethical committee. Anthropometry is an important element in assessing the nutritional status of the subject. Each student's weight in Kilogram and height in centimeters was measured and body mass index (BMI) calculated using the formula- weight in Kg/height in m<sup>2</sup>. Hemoglobin was assessed by Acid Hematin method. After Informed consent from the participants, data was obtained and recorded on a pre-designed questionnaire and analyzed by percentages. Majority of the students (51.12%) were from rural areas of Bagalkot Taluka. Most of the students (54.50%) had mild anemia. When body mass index was calculated, majority of the students (52.47%) were underweight. Women with low pre-pregnancy body mass index are at increased risk for a number of adverse pregnancy outcomes including preterm birth and IUGR.

**Keywords:** Body Mass Index, Pre Pregnancy, Low Birth Weight

## INTRODUCTION

Traditionally women's health has addressed reproductive issues. More recently, women's health has evolved to address health issues across the life span<sup>1</sup>. This innovative change can make a huge difference to the issues on hand. On the basis of world wide data, WHO had proposed that women with heights less than 145 cm and pre-conceptual body weights less than 38 Kg may be considered to fall in the high risk category i.e. likely to suffer obstetric complications and give birth to offspring of low birth weights, which is a major cause of mortality especially in situations where antenatal care and obstetric services are below par.<sup>2</sup>

## MATERIAL AND METHOD

This cross sectional study was conducted in August 2010 in students attending Akkamahadevi women's degree college situated in B.V.V.Sangha campus, Bagalkot city. Ethical clearance was obtained from Institutional ethical committee. Anthropometry is an

important element in assessing the nutritional status of the subject.<sup>6</sup> Each student's weight in Kilogram and height in centimeters was measured and body mass index (BMI) calculated using the formula- weight in Kg/height in m<sup>2</sup> Hemoglobin was assessed by Acid Hematin method. After Informed consent from the participants, data was obtained and recorded on a pre-designed questionnaire and analyzed by percentages.

## RESULTS

A total of 269 students were admitted in Akkamahadevi women's degree college, Bagalkot city for the academic year 2010-2011. Out of the total, 223 students (82%) had consented for the study. Majority of the students (51.12%) were from rural areas of Bagalkot Taluka. The age of the students ranged from 18 to 24 years. It was observed that 55.16% students had sanitation facilities in their home. Majority (82.33%) of the students were vegetarian. Most of the students (54.50%) had mild anemia. (Table1) Maximum number (96.41%) were more than 145

centimeters and 86% were more than 38 Kg. When body mass index was calculated, majority of the students (52.47%) were underweight. (Table 2) Among the underweight, 49.57% had mild thinness. (Table 3)

## DISCUSSION

The problem of maternal malnutrition is of tremendous relevance and concern in our context as both acute and chronic malnutrition in pre-pregnant state are known to affect birth weight and gestational period of fetus.<sup>7-9</sup> In the present study, more than 50% of the students were from rural areas with ages ranging from 18 to 24 years. This indicates preference of women's college and also the growing demand of higher education in rural areas. In this study, only 55.16% students had sanitation facilities in their home and indicates the enormity of this problem with regard to hygiene and health in their home environment. Most of the students were vegetarians. In the present study, 96.41% were more than 145cm and 86% were more than 38kg. According to data collected by National nutrition monitoring Bureau in the country, 71-85% of adult Indian women in 10 states of India have body weight more than 38kg and 75-88% height's more than 145cm.<sup>10</sup> Among Asian countries, the Indian women have about the lowest values.<sup>11</sup> These data broadly indicate the magnitude of the unfinished tasks with respect to health and nutritional status of our women. Most of the students (52.47%) were under weight and is useful in predicting low birth weight babies in future.<sup>12</sup> A low pre-pregnancy body mass index is considered a marker for minimal tissue nutrient reserves.<sup>13</sup> Women with low pre-pregnancy body mass index are at increased risk for a number of adverse pregnancy outcomes including preterm birth and IUGR.<sup>14-16</sup>

More than 50% of the students had mild anemia. Substantial iron deficiency anemia (usually <8 G %) is associated with an increased incidence of low birth weight.<sup>12</sup>

## CONCLUSION

Indian women in the reproductive age group are in a dismal state of under nutrition in many parts of the country. One of the most vital areas in influencing nutrition in women of reproductive age lies in communication, not only what is communicated but how it is communicated. Paradoxically, nutrition education is often at its weakest and most ineffective level when it is being pursued by highly motivated

and very conscientious nutritionists lecturing to the community on the rights and wrongs of their dietary habits. It is highly surprising that nutrition education in its classical, traditional western style, scientifically based form has failed and fallen into disrepute. Not only must the content but also the method of communication be reviewed and evaluated continuously. The principles of nutrition education can be conveniently dealt with under seven I's. Identification, Involvement, Indigenous, Influences, Indoctrination, Integration and Individual.<sup>16</sup> Women must be empowered with both the knowledge and the means to have greater control over the choices that affect their health and their lives as they are the future Mothers of India.<sup>17</sup>

## ACKNOWLEDGEMENT

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**Table 1. Distribution of students according to grade of anemia \* n=189**

Grade of anemia	Number of students	Percentage
Normal >12G%	04	02.12
Mild anemia 10-12G%	103	54.50
Moderate anemia 8-10G%	74	39.15
Severe <8G%	08	4.23
Total	189	100.00

**Table 2. Distribution of students according to body mass index \* n=223**

BMI	Number of students	Percentage
Under weight <18.50	117	52.47
Normal 18.5-24.99	94	42.15
over weight >25	12	05.38
Total	223	100

**Table 3. Distribution of students according to under weight \* n=117**

Under weight	Number of students	Percentage
Severe thinness <16	34	29.06
Moderate thinness 16-16-99	25	21.37
Mild thinness 17-18.49	58	49.57
Total	117	100.00

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# Comparison of Lipid Profile in Smokers and Non Smokers in and around Nalgonda, Andhra Pradesh

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## ABSTRACT

A large number of risk factors which predispose to atherosclerosis and coronary artery diseases have been identified. These include modifiable ones like hypertension, dyslipidemia, smoking, diabetes mellitus, changing lifestyle and non-modifiable ones like age and sex. As the number of risk factors in an individual increases, so does the risk of developing atherosclerosis and its complications mainly as coronary artery diseases (CAD). In subject more than one of these risk factors the risk is more than additive.

Although smoking has been established as an independent risk factor for coronary heart disease, the mechanism by which it increases the risk of coronary heart disease is unclear. However, studies to date have revealed incomplete, inconclusive or conflicting results about the association of smoking on the plasma lipid and lipoprotein levels. In some studies, smokers had increased plasma cholesterol levels, in others plasma cholesterol level have actually been lower. Only a few studies have specifically examined the plasma lipoprotein according to smoking status or no. of cigarettes (dosage). Smokers are reported to have higher LDL and lower HDL cholesterol levels than non-smokers. A total number of 200 age and sex matched subjects comprising of 100 healthy non smokers as controls and 100 healthy smokers as cases were included in the study. Lipid profile was studied in both the groups. However in the present study, the levels total cholesterol, triglycerides, VLDL and LDL cholesterol very significantly increased and decrease in HDL cholesterol in smokers when compared to non smokers. This can be attributed to the risk of cardiovascular diseases and atherosclerotic changes in smokers.

**Keywords:** Lipid profile. Total cholesterol, HDL cholesterol, Triglycerides, VLDL, LDL cholesterol

## INTRODUCTION

A large number of risk factors which predispose to atherosclerosis and coronary artery diseases have been identified. These include modifiable ones like hypertension, dyslipidemia, smoking, diabetes mellitus, changing lifestyle and non-modifiable ones like age and sex. As the number of risk factors in an individual increases, so does the risk of developing atherosclerosis and its complications mainly as coronary artery diseases (CAD)<sup>1</sup>. In subject more than one of these risk factors the risk is more than additive.<sup>2</sup>

Although smoking has been established as an independent risk factor<sup>3</sup> for coronary heart disease, the mechanism by which it increases the risk of coronary

heart disease are unclear. Four explanations have been postulated.

- i. The increased carbonmonoxide<sup>4</sup> in the blood of cigarette smokers may damage the endothelium and accelerate the entry of cholesterol into the wall of the artery promoting the development of atherosclerosis, thrombosis<sup>5</sup>,
- ii. The formation of carboxyhemoglobin creates relative anoxemia in the tissue, including the myocardium, Smoking enhances the platelet aggregation<sup>6</sup>, and
- iii. The nicotine absorbed from cigarette smoke may induce cardiac arrhythmias through its



pharmacologic action.

- iv. An additional mechanism has been recently suggested that smoking adversely affects the concentration of the plasma lipids and lipoproteins.

However, studies to date have revealed incomplete, inconclusive or conflicting results about the association of smoking on the plasma lipid and lipoprotein levels. In some studies, smokers had increased plasma cholesterol levels, in others plasma cholesterol level have actually been lower<sup>7</sup>. Only a few studies have specifically examined the plasma lipoprotein according to smoking status or no. of cigarettes (dosage)<sup>8</sup>. Smokers are reported to have higher LDL and lower HDL cholesterol levels than non-smokers<sup>9</sup>.

There is inadequate data on the association of smoking and dyslipidemia in India. Also there is wide spread habit of smoking cigarette and beedis and also increased prevalence of coronary artery disease among rural population of Nalgonda district and surrounding area.

The present study provides a detailed profile of the plasma lipid and lipoprotein levels according to cigarette smoking status (smoker, ex-smoker and non-smoker) and dosage (number of cigarette smoked per day) in this part of India

### AIMS AND OBJECTIVES

**The present study is done to**

1. Compare lipid profile values of smokers with non smokers.
2. To know if smoking has dyslipidemic potential.

### MATERIALS AND METHOD

The study was carried out in 100 healthy male smokers and 100 healthy male non smokers from January 2007 to December 2008, selected from volunteers from general public, patient attendants and hospital staff of KIMS Narketpally, Nalgonda, Andhra Pradesh, India.

After obtaining written consent, detailed history and physical examination was done in all subjects.

### Inclusion criteria for smokers and non-smokers

1. The subjects were divided into 4 groups
  - a) Non- smokers : subjects who have never smoked or those who left smoking atleast 5 yrs before in the present study
  - b) Mild smokers: 1-10 cigarettes or 1-15 beedis / day for atleast 5 yrs or more
  - c) Moderate smokers: 11-20 cigarettes or 16- 30 beedis / day for atleast 5 yrs or more.
  - d) Heavy smokers: more than 20 cigarettes or 30 beedis / day for atleast 5 yrs or more.
2. The subject's were chosen in age groups of 20 – 50 yrs of age
3. The subject's BMI were less than 28
4. The subjects were taking average Indian diet.

### Exclusion criteria for smokers and non- smokers

1. Subjects having diseases mentioned below known to influence blood lipids were excluded from the study
  - Diabetes mellitus
  - Nephrotic syndrome
  - Alcoholism
  - Hypertension
2. Subjects who were on following drugs:
  - HMG Co A Reductase inhibitors
  - Nicotinic acid
  - Beta blockers
  - Diuretics
3. Subjects who were on diet restriction

### After overnight fasting following laboratory investigations were done in all subjects

- Serum total cholesterol
- Serum high density lipoprotein (HDL)

- Serum low density lipoprotein (LDL)
- Serum very low density lipoprotein (VLDL)
- Serum triglyceride (TGL)

Collection of blood sample for analysis:

5ml of fasting venous blood was drawn from the subjects after overnight fasting in to a sterile disposable syringe which was transferred into plain tubes. The samples were centrifuged at 3000 rotations per minute for 10 min and serum was collected. The serum was processed within one hour of collection.

**Investigations performed**

**1) Total Cholesterol and HDL cholesterol**

**Method:** CHOD-POD.

**Principle:** Cholesterol is determined after enzymatic hydrolysis and oxidation, Cholesterol esters are hydrolyzed by the enzyme cholesterol esterase to give free cholesterol and fatty acid molecules. The free cholesterol gets oxidized in the presence of cholesterol oxidase to liberate cholest-4-ene-3-one and peroxide. The indicator quinoneimine is formed from hydrogen peroxide and 4-aminoantipyrine in the presence of phenol and peroxidase.

The intensity of this colored complex is measured at 505nm and is directly proportional to the cholesterol concentration present in the sample.

Total cholesterol = Absorbance of T<sub>1</sub>/Absorbance of Standard x 200 mg/dl.

HDL cholesterol = Absorbance of T<sub>2</sub>/ Absorbance of Standard x 50 mg/dl.

2) Triglycerides:

**Method:** Glycerol phosphate oxidase (GPO) and peroxidase (POD)

**Principle:** Triglycerides are determined after enzymatic hydrolyzed with lipases, Serum triglycerides are hydrolyzed to glycerol and free fatty acid by lipases. In the presence of ATP and glycerol kinase. Glycerol is converted to glycerol 3 phosphate which is then oxidized by GPO to yield hydrogen peroxide. Peroxide catalyses the conversion of hydrogen peroxide, 4-aminoantipyrine and ESPAS to a colored quinoneimine complex measured at 546nm.

**3. LDL & VLDL** were calculated as follows: Friedwald formula (NCEP 2001)

(1) VLDL = TGL ÷ 5

(2) LDL = Total Cholesterol – (VLDL + HDL).

Concentration represented in mg/dl.

**4. Atherogenic index:** AIP was computed for each patient according to the following equation<sup>11</sup>:

$$AIP = \log (TGL/HDL)$$

With units for TGL and HDL in mmol/L.

**Statistical Analysis**

The results were statistically analyzed by the student’s t-test by using sigma stat software. P-value of < 0.05 was considered as statistically significant.

**RESULTS**

In the present study 100 smokers and 100 non-smoker subjects were studied for their lipid profile. The smokers were further divided into three groups based on number of cigarettes/beedis smoked per day which is shown in table 1.

**Table 1: Distribution of smokers based on no. of cigarettes/beedis smoked per day.**

Group	No. of subjects	Percentage
<b>Mild smokers:</b> 1-10 cigarettes or 1-15 beedis/day	42	42%
<b>Moderate smokers:</b> 11-20 cigarettes or 16-30 beedis/day	44	44%
<b>Heavy smokers:</b> >20 cigarettes or >30 beedis/day	14	14%
Total	100	100%

According to this table 1, in the present study the number of subjects in mild smokers group were 42 (42%), the number of subjects in moderate smokers

group were 44 (44%), the number of subjects in heavy smokers were 14 (14%) of the total 100 smokers.

**Table 2: Lipid profile in non-smokers and smokers.**

Lipid profile	Non-smokers n = 100	Smokers n = 100	P value
Total cholesterol	140.12 ± 28.58	175.63 ± 28.46	<0.05
Serum triglycerides	101.84 ± 24.23	129.76 ± 38.62	<0.05
Serum LDL	73.93 ± 28.35	118.11 ± 29.08	<0.05
Serum VLDL	20.36 ± 4.84	29.95 ± 7.72	<0.05
Serum HDL	45.82 ± 7.65	31.56 ± 5.91	< 0.05

According to table 2, smokers had higher total cholesterol levels compared to non-smokers (175.63 versus 140.12) this difference was statistically significant. Smokers had higher plasma triglyceride level compared to non-smokers (129.76 versus 101.8) this difference was statistically significant. Smokers had higher serum LDL levels compared to non-

smokers, (118.11 versus 73.93) this difference was statistically significant. Smokers had higher VLDL levels compared to non-smokers (29.95 versus 20.36) this difference was statistically significant. Smokers had lower levels of serum HDL compared to non-smokers (31.56 versus 45.82) and this difference was statistically significant.

**Table 3: Lipid profile in relation to number of cigarette/beedis smoked per day in smokers as compared to non-smokers.**

Lipid profile (mg/dl)	Non-smokers (n=100)	Mildsmokers (n=42)	PValue	Moderate smokers (n=44)	PValue	HeavySmokers (n=14)	PValue
Total cholesterol	140.12	149.85 ± 12.32	<0.05	187.79 ± 14.04	<0.05	214.71 ± 27.30	<0.05
Serum triglycerides	101.84	117.78 ± 28.71	<0.05	129.04 ± 37.77	<0.05	167.92 ± 44.77	<0.05
Serum LDL	73.93	91.60 ± 12.61	<0.05	131.39 ± 14.84	<0.05	155.91 ± 28.37	<0.05
Serum VLDL	20.36	23.55 ± 5.74	<0.05	25.80 ± 7.55	<0.05	33.58 ± 8.95	<0.05
Serum HDL	45.82	34.69 ± 4.40	<0.05	30.59 ± 5.29	<0.05	25.21 ± 5.87	<0.05

In table 3, smokers were further subdivided into mild, moderate, heavy group based on number of cigarette/beedis smoked and the values of each group were compared with non-smokers.

Total cholesterol value was highest in heavy smokers (214.71), less in moderate smokers (187.79) and least in mild smokers (149.85). The difference of these values with non-smokers was statistically significant.

The triglyceride levels were highest in heavy smokers (167.92), less in moderate smokers (129.04) and least in mild smokers (117.78). The difference of these values with non-smokers was statistically significant.

The serum LDL level were highest in heavy smokers (155.91), less in moderate smokers (131.39) and least in least in mild smokers (91.60).the difference of these values with non-smoker was statistically significant.

The serum VLDL level was highest in heavy smokers (33.58), less in moderate smokers (25.80) and least in mild smokers (23.55). The difference of these values with non-smokers was statistically significant.

The serum HDL level was lowest in heavy smoker group (25.21), higher in moderate smoker group (30.59) and highest in mild smoker group (34.69). The difference of these values compared to non-smoker group was statistically significant.

## DISCUSSION

Smoking in different forms is a major risk factor for atherosclerosis and coronary heart disease. In the present study 100 smokers and 100 nonsmokers were studied for their lipid profile. Age, sex, obesity, alcohol, diet-these parameters were matched in smokers and non smokers.

It is revealed that triglycerides, LDL, VLDL, HDL, and TC were significantly higher in smokers as

compared to non smokers. The mean serum total cholesterol in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum triglycerides were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum VLDL were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum LDL were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum HDL were higher in non smokers when compared to smokers, which was statistically significant ( $p < 0.05$ ).

In NS Neki et al<sup>10</sup> serum total cholesterol was significantly higher ( $p < 0.05$ ) when compared to non smokers. The mean triglycerides levels were higher in smokers than non smokers and this difference was statistically highly significant ( $p < 0.01$ ). The mean LDL levels were higher in smokers than non smokers and this difference was statistically significant ( $p < 0.05$ ). The mean VLDL levels were higher in smokers than non smokers and this difference was statistically significant ( $p < 0.05$ ). The mean HDL levels were higher in non smokers than smokers and this difference was statistically highly significant ( $p < 0.01$ ).

In OA Odedeji et al<sup>9</sup> serum total cholesterol was significantly higher ( $p < 0.05$ ) when compared to non smokers. The mean triglycerides levels difference between smokers and non smokers was not statistically significant ( $p > 0.05$ ). The mean LDL levels were higher in smokers than non smokers and this difference was statistically significant ( $p < 0.05$ ). The mean VLDL difference between smokers and non smokers was not statistically significant ( $p > 0.05$ ). The mean HDL levels were higher in non smokers than smokers and this difference was statistically highly significant ( $p < 0.01$ ).

In Mokoto et al<sup>11</sup> The mean triglycerides levels difference between smokers and non smokers was statistically significant ( $p < 0.05$ ). The mean total cholesterol levels difference between smokers and non smokers was not statistically significant ( $p > 0.05$ ). The mean VLDL difference between smokers and non smokers was not statistically significant ( $p > 0.05$ ). The mean LDL difference between smokers and non smokers was not statistically significant ( $p > 0.05$ ). The mean HDL levels were higher in non smokers than smokers and this difference was statistically significant ( $p < 0.05$ ).

In Aneela et al<sup>12</sup> the mean serum total cholesterol in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum triglycerides were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum VLDL were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum LDL were higher in smokers when compared to non smokers, which was statistically significant ( $p < 0.05$ ). The mean serum HDL were higher in non smokers when compared to smokers, which was statistically significant ( $p < 0.05$ ).

## CONCLUSION

The present study provides a detailed profile of the plasma lipid and lipoprotein level according to cigarette/beedis smoking status (smoker, ex-smoker and non-smoker) and dosage (number of cigarettes/beedis smoked per day)

Cigarette /beedi smoking is associated with significant higher levels of serum HDL and lower levels of serum cholesterol, serum triglycerides, serum LDL levels.

Further this association is dependent on number of cigarette/beedis smoked per day. The greater risk to smokers for the development of coronary heart disease resulting from this HDL lowering effect of smoking.

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# Study of Platelet Aggregability and Prothrombin Time in Auto Rickshaw Drivers

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## ABSTRACT

**Background:** Air pollution is a major environmental health problem affecting everyone in developed and developing countries, like urban India. In urban city like Pune, with the increase in population there is increase in vehicular traffic leading to increased air pollution mainly due to diesel exhaust. Increase in air pollution causes change in hemostatic function leading to increased incidence of coronary thrombosis which is the precipitating factor for myocardial infarction. Platelet aggregability is an important index of cardiovascular health. Therefore, platelet aggregability and prothrombin time were selected as parameters for the present study. Auto rickshaw drivers are chronically exposed to vehicular air pollution, so they were selected as study population.

**Objectives:** To study whether increase in platelet aggregability or alteration in prothrombin time in auto rickshaw drivers is due to air pollution.

**Method and Material:** 30 auto-rickshaw drivers chronically (more than 5 years) exposed to air pollution in Pune were selected as study group after applying inclusion and exclusion criteria. Also, control group of 30 who were exposed to air pollution for less than 30 min per day were selected after matching age, sex and BMI. Platelet aggregability and prothrombin time were measured for both the groups. Data was analysed statistically by using unpaired 't' test.

**Results and Conclusions:** It was observed that platelet aggregability was significantly increased in the study group as compared to the control group. However, no statistical significance was noted in the case of prothrombin time. This study concludes that probably exposure to air pollution alters haemostatic function as platelet aggregability altered significantly.

**Keywords:** Air Pollution, Platelet Aggregability, Prothrombin Time

## INTRODUCTION

Clean air is considered to be the basic requirement of human health and well being. However, air pollution is a major environmental health problem affecting everyone in developed and developing countries, like urban India.<sup>1</sup>

Ambient air pollution shows association with many diseases and one of them is ischaemic heart disease

which is due to alteration in haemostatic function in coronaries.<sup>2</sup> Animal studies indicated increase in platelet aggregability whereas, this was not evident in human volunteers.<sup>3</sup>

Air pollution is also said to increase procoagulant factors. There are reports stating that prothrombin level increases with air pollution. However, observation on prothrombin time is controversial.

It is said that inhaled air pollutants induce alveolar inflammation which causes de novo synthesis of tissue factor by leukocytes and endothelial cells.<sup>4,5</sup> Exposure of blood to this tissue factor triggers the extrinsic coagulation pathway whose function is monitored by prothrombin time.

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So the purpose of this study is to find out whether increase in platelet aggregability or alteration in prothrombin time is due to air pollution.

In urban city like Pune, with the increase in population there is increase in vehicular traffic leading to increased air pollution mainly due to diesel exhaust.<sup>6</sup> According to 1998 study Air Quality Index (AQI) for three different sites in Pune were 147, 159 and 246. Accordingly, the air quality of Pune can be graded as moderate to poor.<sup>7</sup> According Maharashtra pollution control board report levels of Respirable Suspended Particulate Matter (RSPM) in Pune city were 114µg/m<sup>3</sup>.<sup>8</sup> Air quality would have only worsened with massive increase in vehicular traffic over the last ten years as number of vehicles in Pune since 2001 (98,241) increased by nearly 50% till 2007(149,624). Diesel exhaust is known to cause maximal health hazards.<sup>9</sup>

Auto rickshaw drivers who are driving for more than 8 hours per day are maximally exposed to vehicular exhaust as auto rickshaws in Pune are not covered from all sides. On the top of it, they do not use any preventive measures like mask to avoid exposure to air pollution.

Therefore, the present work was planned to study the effect of air pollution on platelet aggregability and prothrombin time in rickshaw drivers in Pune city.

**MATERIALS AND METHOD**

This was a cross-sectional study. The study was conducted in 30 auto-rickshaw drivers chronically exposed to air pollution in Pune. Institutional ethical committee approval was obtained for the study. A detailed proforma was filled to facilitate selection of the subjects. A written informed consent was taken from all the participants in the study.

Study group comprised of male auto rickshaw drivers aged between 25 to 35 years, driving auto-rickshaw for more than 5 years and with daily exposure to vehicular exhaust on the roads for 7 to 8 hours in Pune city. Subjects having history of smoking, consumption of alcohol, presence of cardio respiratory disorders, diabetes mellitus, coagulation disorder,

bleeding disorder and liver diseases, which may affect blood coagulation adversely were excluded from the study. Also, those consuming medicines like NSAID's, dicoumaral, clopidogrel or any other that may reduce blood coagulation were excluded from the study.

Control group included, age, sex and BMI (Body Mass Index) matched males exposed to air pollution for less than 30 min per day. This group consisted of 30 individuals who used to travel by bike using closed helmet, hence less likely to be exposed to vehicular exhaust. Exclusion criteria were the same as those for the study group.

In order to avoid the effect of diurnal variations on platelet aggregation, the time for collection of blood was kept constant, in between 8 a.m – 10 a.m. Also as platelet aggregability is affected by seasonal variation, the proposed study was conducted in the months between October to March. Blood samples were collected from both the groups from antecubital vein under all aseptic and antiseptic precautions. Platelet aggregability was estimated by ADP induced platelet aggregation, as given by O'Brien.<sup>10</sup>

Prothrombin time was determined by using automated blood coagulation analyzer of Sysmex CA-50. This method was chosen as it is an accurate method. <sup>11</sup>PT is expressed in terms of International Normalized Ratio (INR). This gives a uniform standardized value and inter-laboratory and inter-operator variation is avoided. INR is calculated as <sup>12</sup>

$$INR = \left( \frac{PT_{test}}{PT_{normal}} \right)^{ISI}$$

Interpretation : If INR is less than 0.8 then PT is shortened and if INR is more than 1.2 PT is prolonged.

Results were analyzed statistically by applying unpaired 't' test. P <0.05 was considered significant.

**OBSERVATIONS AND RESULTS**

Control group & study group were age and sex matched.

**Table 1: Comparison of platelet aggregability between study group and control group**

Particular	Study Group	Control Group	t Value	P Value
	Mean ± SD (n=30)	Mean ± SD (n=30)		
Platelet Aggregability	0.05 ± 0.02	0.03 ± 0.02	4.90	<0.0001*

\*Statistically significant

Table 1 shows significantly increased platelet aggregability in the study group as compared to the control group.

**Table 2: Comparison of prothrombin time (INR) between study group and control group**

Prothrombin time	Study Group	Control Group	t Value	P Value
	Mean $\pm$ SD (n=30)	Mean $\pm$ SD (n=30)		
INR	0.99 $\pm$ 0.10	1.02 $\pm$ 0.12	1.08	>0.01

Table 2 shows decrease in the INR value in the study group as compared to the control group, but it was not statistically significant.

## DISCUSSION

It was observed that in the study group, platelet aggregability due to air pollution was significantly higher as compared to the control group (Table-1). Similar findings are observed in various experimental studies<sup>13,14,15,16</sup> in animals by intratracheal or intravenous administration of ultrafine particles. Ultrafine particles, on inhalation, pass rapidly into the blood circulation<sup>17</sup> and induce platelet aggregability due to the following effects as observed by different workers.

Platelet aggregation may be induced by increase in fibrinogen levels. In an experimental study,<sup>18</sup> when rats were exposed to particulate matter, there was a significant increase in the fibrinogen level. Similarly, when human volunteers were exposed to concentrated air particles, an increase in plasma fibrinogen level was observed.<sup>19</sup> Also, it has been suggested that, many ultrafine particles in urban air produce inflammatory reactions in the lungs which, cause increased concentration of acute phase proteins like fibrinogen.

<sup>20</sup>

Various studies showed that air pollution causes vascular endothelial damage.<sup>21,22</sup> Damaged endothelium produces less Nitric Oxide (NO) which is not only a vasodilator but also opposes platelet aggregability. One of the study indicates reduced nitric oxide synthesis by the endothelium in fifteen healthy men who were exposed to diesel exhaust for one hour. Hence, exposure to vehicular air pollution is suggestive of endothelial dysfunction.<sup>22</sup>

Also It was found that any inflammatory change in the body also contributes to increased platelet aggregability.<sup>15</sup> Comparative experimental study of healthy subjects exposed to diesel exhaust showed significant increase in IL-6, IL-8 levels.<sup>23</sup> Interleukin-6 from macrophages also stimulates hepatocyte to secrete fibrinogen which in turn further activates platelets as explained earlier.<sup>24</sup>

Experimental studies in rabbits and mice have indicated that, exposure to PM<sub>10</sub> leads to atherosclerosis.<sup>25,26</sup> This was reported to be due to vascular endothelial dysfunction as a result of lung and systemic inflammation.<sup>26,27</sup> Pre existing atherosclerosis was also found to increase in size due to exposure to small particles in experimental animals.<sup>28</sup>

Rupture of atherosclerotic plaque also results in increased platelet aggregability. For, rupture releases platelet adhesive matrix molecules in the blood. Phospholipids released from the ruptured plaque also activate endothelial cells which in turn attract platelets. Thus, platelet activation not only leads to atherosclerosis, but also, rupture of atherosclerosis results in increased platelet aggregability.<sup>29</sup> C- reactive protein levels (CRP) is an acute phase protein. Various studies have documented that exposure to particulate matter is associated with increased levels of CRP.<sup>30,31</sup> CRP acts on endothelium and leads to fall in the prostacyclin level.<sup>32</sup> Prostacyclin is a known inhibitor of platelet aggregation and a fall in its level may contribute to increase in platelet aggregability. Thus, increase in CRP may be linked to increase in platelet aggregability.

In the present study, prothrombin time (PT) was not significantly altered in the study group exposed to air pollution as compared to the control (Table-2). Similar finding was observed by Sarah Y Gardner<sup>16</sup> in an animal study. However, some studies showed air pollution linked decrease in PT.<sup>14,15,33</sup> These studies were based on direct inhalation of DEP.

Limitation in the present study is that the study group was exposed to air pollution in general and not to concentrated DEP. This perhaps explains difference in the result on PT between the present study and the studies that showed decreased PT. The other limitations in the present study are that the sample size was small and all the subjects in study group may not have had uniform exposure. However, changes in pollution level from day to day and hour to hour were not considered.



Thus though PT did not show appreciable change, platelet aggregability did show a statistically significant change in the auto rickshaw drivers despite the above mentioned limitations. Perhaps, this suggests that platelets are more sensitive to air pollution. As platelet aggregability is an indicator of haemostatic function, this study concludes that exposure to air pollution definitely alters haemostatic function.

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# Role of Anti-Cardiolipin Antibodies in Recurrent Spontaneous Abortions

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## ABSTRACT

**Introduction:** Anti-cardiolipin antibodies are autoantibodies which may be associated with unexplained recurrent abortions.

**Aims & Objectives:** To evaluate the role of anti-cardiolipin antibodies in unexplained, recurrent abortions.

**Materials & Method:** A cohort of 28 females with recurrent spontaneous abortions were studied for anti-cardiolipin antibodies by ELISA. 20 normal fertile age matched females served as controls.

**Result:** 25% cohorts were positive for anti-cardiolipin antibodies. They also had increased frequency of the antibody (35%) as compared to primary aborters (12.5%). All healthy controls were negative. All positive cases were either moderately or weakly positive for the antibody by ELISA.

**Conclusion:** Anti-cardiolipin antibodies may be associated with spontaneous recurrent abortion. It should be tested in all cases of recurrent miscarriages.

**Keywords:** APA (Anti-Phospholipid Antibodies), AC Lab (Anti-Cardiolipin Antibodies), ELISA (Enzyme Linked Immunosorbant Assay), APLS (Anti-Phospholipid Syndrome).

## INTRODUCTION

When Wasserman introduced a diagnostic test for syphilis in 1907, using a saline extract of liver from fetuses with congenital syphilis<sup>1</sup>, little did he know that this would mark a beginning of an era in immunology.

Anti-phospholipid antibodies (APA) are autoantibodies directed against plasma proteins bound to suitable anionic (not necessarily phospholipid) surfaces in the inner layer of biological membrane<sup>1a</sup>.

Anti-cardiolipin antibodies (AcL) are usually detected by enzyme linked immunosorbant assay (ELISA). Cardiolipin, a negatively charged

phospholipid found primarily in mitochondria, is used as the antigen in these tests.

During the 1980's several workers demonstrated that APA cross-react with negatively charged phospholipids other than cardiolipin but that these antibodies did not react with neutral phospholipids such as phosphatidyl choline<sup>2</sup>. Some reports have indicated that patients can be identified having antibodies that react with phosphatidyl ethanolamine, a zwitterionic phospholipid, and these patients have the same clinical manifestations as patients with lupus anticoagulant<sup>3,4</sup>.

Lupus anticoagulant and anti-cardiolipin antibody assays have now been standardized and the clinical associations of these two antibodies, has been clearly established<sup>5</sup>. Lupus anticoagulant and anti-cardiolipin antibodies are prevalent in 2-5% in the general obstetric population<sup>6,7</sup>. Although both antibodies are grouped together under APA, these two antibodies are different

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and are variably present<sup>7</sup>. APA has been implicated in the pathogenesis of thrombo-embolic phenomenon like stroke, transient ischemic attacks, pulmonary embolism and deep vein thrombosis<sup>8</sup>.

These antibodies are also associated with obstetric complications including still birth, recurrent miscarriage, intrauterine growth retardation and preeclampsia<sup>9</sup>. There is now substantial evidence that APA is associated with recurrent IVF implantation failure<sup>10, 11</sup>.

The incidence of APA in women with recurrent miscarriage or still birth is estimated to range between 20 and 40%.<sup>6, 7</sup> However, not all women positive for APA have complicated pregnancy. In a large study involving 933 pregnant women, only nine women had anti-cardiolipin antibodies and out of these four had normal pregnancies. In the same study, five of 11 women with lupus anticoagulants had normal pregnancies<sup>7</sup>. Therefore, it is not possible to distinguish with certainty which subset of patients is likely to have pregnancy complications and those who will not. Current research involves proteins (particularly B<sub>2</sub> glycoprotein I or prothrombin) which are more predictive of adverse pregnancy outcome than traditional APA assays but results have been inconsistent<sup>11, 12, and 13</sup>.

The term anti-phospholipid syndrome (APS) is used to describe venous & arterial thrombosis, thrombocytopenia and recurrent fetal loss<sup>14</sup> in association with AcLAb or the LAC<sup>15</sup>. The diagnosis of APS was based on a well-documented history of RPL (at least two spontaneous, consecutive miscarriages fathered by the same partner) and positive levels of immunoglobulin (IgG M or IgG) APA (e"20 phospholipid units) on two separate occasions at least 6 weeks apart.

AcLAb binds to cell membrane either independently, or they may require a cofactor beta 2 glycoprotein - I (B2GP)<sup>16</sup>.

Anti-cardiolipin antibody assay is more sensitive and specific for fetal loss in comparison to lupus anticoagulant<sup>17</sup>. In pregnancy, the antibodies may react against the trophoblast resulting in sub placental clots and interfere with implantation and subsequently causing defective placentation. Necrotizing decidual vascular lesions are seen in the placenta<sup>18</sup>. Thrombosis may occur in all the trimesters of pregnancy resulting in complications such as spontaneous abortions and

intrauterine growth retardation (IUGR).

## MATERIAL & METHOD

A prospective cohort study was conducted in Obstetrics and Pathology departments of our Hospital. A total of 28 patients visiting the fertility clinic at 6 to 8 week of gestation with 3 or more abortions between December 2010 and November 2011, were randomly selected. Each pregnancy was documented by transvaginal ultrasonography scheduled at 7 weeks of gestation for the determination of fetal heart motion. 20 patients of the same age, sex and gestational age served as controls. A miscarriage was defined as embryonic/fetal death occurring before the end of gestational week 28. Patients were divided into two groups:

**Group A:** Primary aborters (with no previous child births)

**Group B:** Secondary aborters (with one or more previous live births)

In both cases and controls, patients with compromised immune status such as HIV, tuberculosis, chronic liver disease, intestinal parasitic infestation, consumption of drugs such as steroids and chemotherapeutic agents were excluded from the study. A detailed history and physical examination was done in each patient. LE cell phenomenon was done by method described in Dacie & Lewis (2001). ANA was done by indirect fluorescent test described by Selgal<sup>19</sup>. VDRL and ELISA for anti-cardiolipin antibodies were done by kit supplied by Varelsa.

## RESULTS

Frequency of Acl Ab was compared in aborters and controls (Table 2). In healthy controls none of them were positive for AcLAb whereas cohorts were moderately positive (17.86%) and (7.14 %) weakly positive for AcLAb. Rheumatoid factor was positive in 12.5% women while it was negative in all controls. All were positive for AcLAb also.

Acl frequency was compared between primary and secondary aborters (Table 3). Secondary aborters had increased frequency of Acl (35%) as compared to primary (12.5%). Prevalence of AcLAb compared to other studies in literature (Table 4) varied from 7 to 23.3% whereas Indian studies had a frequency between 11.79 to 24 %.

**Table 1. Anti cardiolipin antibodies nomogram**

Level	units (IU/ml)
Highly positive	>100
Moderate Positive	21-100
Low Positive	10-20
Negative	<10

**Table 2. Anti-cardiolipin antibody levels in Cohort and controls**

Group	Acl levels (GPL units)							
	<10		11-20		21-100		>100	
	No	%	No	%	No	%	No	%
Aborters	21	75	2	7.14	5	17.86	0	0
Controls	20	100	0	0	0	0	0	0

**Table 3. Acl frequency between Primary and Secondary aborters**

Group	Acl levels (GPL units)							
	<10		11-20		21-100		>100	
	No	%	No	%	No	%	No	%
Primary aborters (n=8)	7	87.5	1	12.5	0	0	0	0
Secondary aborters (n=20)	13	65.0	2	10.0	5	25	0	0

**Table 4.**

Author (year)	No of Acl positive Cases	Total no of cases	% of Acl positive cases	Controls (no of Acl positives)	Total no of cases	% of Acl positive cases
Petri (1987)	5	44	11	1	40	2
Barbui (1988)	4	49	8	0	141	0
Parazini(1991)	11	99	11	4	157	3
Park (1991)	6	81	7	0	88	0
Out (1991)	8	102	8	2	102	2
Mc lean (1994)	20	243	8.4	-	-	-
Yetman (1996)	150	866	17.3	-	-	-
Kysova (1999)	7	30	23.3	0	30	0
Chakarbarti(1999)	12	50	24	-	-	-
Sheth (2001)	47	178	11.79	-	-	-
Present Study	7	28	25	0	20	0

## DISCUSSION

The exact etiology of recurrent abortion still remains unknown. Current evidence suggests that autoimmune mechanisms are involved in the pathophysiology and adverse pregnancies are common *events* in patients with autoimmune disease, such as systemic lupus erythematosus<sup>37, 38</sup>.

AcLab are associated with recurrent abortion and fetal wastage in more than 90% of untreated patients with APLS and in those with autoimmune disease<sup>20</sup>. Recurrent pregnancy loss is the cause of childlessness in 2-5% of couples trying to conceive<sup>21, 22</sup>. Even after conventional investigations, 40-60% of cases remain idiopathic. Accumulating evidence suggests that immunological mechanisms are responsible<sup>23</sup>.

Currently, increasing attention has been drawn to the association of antibodies with thrombo-embolic episodes such as arterial and venous thrombosis, fetal loss and thrombocytopenia, widely recognized as Anti-phospholipid syndrome<sup>6, 24</sup>. APS accounts for 5-20% of women with recurrent pregnancy loss.

Micro-infarction of the placenta, possibly related to interference in prostaglandin metabolism, may be responsible for the fetal loss, but the role of APA is not yet definitely ascertained<sup>25</sup>. In this study, the AcL (IgG) levels were raised in total 25% cases. In 17.86% cases, *value* was between 20-100IU/ml. None of the subjects in control group were positive for AcLab (p<0.05). None of the cases in aborters group were strongly positive for AcL Ab. Further analysis showed that

secondary aborters had more prevalence (35%) than primary aborters (12.5%) indicating that AcLAb develops as an acquired disorder.

VDRL tests were negative in all the cases. Reason for this could probably be that AcL Ab maybe in smaller amounts that could not be detected by ELISA methods. In our study, none of our cases were strongly positive for AcLAb. Although LE cell phenomenon and ANA was absent in all the cases of abortions and controls, rheumatoid factor (RF), was positive in 12.5% total cases. Majority of positive cases were secondary aborters although clinically, there was no evidence of rheumatoid arthritis.

Role of rheumatoid factor on fertility is not well established even now. Mc Wugh et al<sup>26</sup> conducted a study on pregnancy outcome in various Rheumatic diseases and revealed that aborters were highest in systemic sclerosis (44%). However, the incidence in SLE (18%) and Rheumatoid arthritis (17%) was similar to control population (16%).

Variable occurrence of AcL IgG Ab has been reported by various authors in other auto-immune disorders. In rheumatoid arthritis, there was correlation with AcLAb and history of repeated abortion. The distinguishing feature of LAC cases with associated pregnancy loss is the high incidence of early fetal deaths. An adequate explanation for this association is still lacking and the most striking clinical association is its association with systemic and placental vascular thrombosis with decidual vasculopathy *leading to placental infarction*<sup>28</sup>.

Based presumably, on reports of infarcted placentae from women with lupus anticoagulant and the evidence that APL cause systemic thrombosis<sup>2,29,30,31</sup>, it is probable that APA cause fetal death and other obstetric complications by inducing thrombosis in the utero-placental circulation, particularly *the spiral arteries*.

Thrombosis of the spiral artery then leads to infarction of the placenta and subsequent fetal demise. It now appears that APA causes first trimester miscarriages, indeed the most recent classification of APLS includes three consecutive spontaneous abortions prior to 10 weeks gestation<sup>5</sup>.

There is now substantial evidence that during early pregnancy the spiral arteries are occluded by trophoblast plugs and that significant blood flow into the intervillous space does not occur until the end of

the first trimester of pregnancy<sup>32</sup>. Thus, intuitively it seems unlikely that APL could cause in particular early miscarriages (or disrupt IVF implantation) by inducing thrombosis in these vessels. Additionally, the available histological evidence is not supportive of a thrombotic mechanism for APA inducing fetal demise. Out et al<sup>33</sup> in a survey of 17 placentas from women with APA found no evidence of thrombosis in 18% of cases.

Similarly, another study of 11 placentas with APA in untreated pregnancies terminating prior to 18 weeks of gestation found no evidence of thrombosis<sup>34</sup>. However, three of five placentae of pregnancies terminating between 18 to 22 weeks of gestation had evidence of thrombosis<sup>34</sup>. Thus based on the conflicting results of this study; it seems unlikely that APA caused fetal compromise by mechanism of thrombosis and infarction. Having said this, it is possible that thrombosis could contribute to APA mediated fetal deaths in later half of the gestational period.

Research is going on to evaluate mechanisms of first trimester loss in patients with APA. The clinical significance of different isotypes of AcL is currently under investigation as IgG-AcL has a greater clinical sequelae<sup>12</sup>.

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# Knowledge and Practice Regarding Menstruation among Adolescent Girls in Rural Field Practice Area Bijapur

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## ABSTRACT

Adolescence is a crucial period in woman's life. Menstruation is an important index of physical maturity, which in turn influences the health of offspring. The adolescent girls of today are the mothers of tomorrow in whose hands lie the future of her family, community and the nation.

**Objectives:** To study the knowledge and practice regarding menstruation among adolescent girls

**Method:** Community based cross-sectional study was done in rural field practice area of Shivangi, Department of Community Medicine, B.L.D.E.A.'s Sri B.M.Patil Medical College, Bijapur.

The study subjects calculated based on those who have attained menarche. Data were collected by questionnaire methods and analyzed.

**Results:** Knowledge regarding menstruation among adolescent girls is poor

**Keywords:** Adolescent, Prevalence of Anaemia

## INTRODUCTION

The term adolescence comes from Latin word meaning "to grow to maturity"<sup>1</sup>. WHO has defined adolescence as a period between 10-19 years<sup>2</sup>. This is the period of transition from childhood to adulthood which are formative years when maximum amount of physical, psychological and behavioural changes take place<sup>3</sup>

Healthy development of adolescents depends on several complex factors viz socio-economic circumstances, the environment in which they live and grow the quality of relationship with their families, communities, peer groups and the opportunities for education and employment<sup>2</sup>.

For girls, adolescence is a period of extreme stress and strain. Menarche and menstruation is bound to

elicit tremendous psychological response in them. In conservative society like ours, where these matters are hardly discussed freely, there bound to be some practices, customs and misbeliefs which are detrimental during adolescent period.

Bijapur being a backward district, studies on the health of adolescents are rare. Because of the scarcity of information regarding the problems of adolescent girls, particularly in rural area, the present study is undertaken to provide information about the knowledge and practice regarding menstruation among adolescent girls.

## OBJECTIVES OF THE STUDY

1. To study the knowledge and practices regarding menstruation among adolescent girls.

## MATERIALS AND METHOD

The present study was a community based descriptive cross-sectional study undertaken to find out knowledge and practices regarding menstruation. The present study was carried out in a rural area Shivangi, which is a rural field practice area of Department of Community Medicine, B.L.D.E.A.'s Shri

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B. M. Patil Medical College, Bijapur. As per national data, the adolescent population is about 22.5% and the population of boys and girls almost equal<sup>4</sup>. The population of shivangi being 7750 according 2001 census, the adolescent population accounts for 1743, in that the adolescent girl population was 871. The number of adolescent girls who have attained menarche was 470. In present study 440 adolescent girls were studied, remaining 30 girls could not be contacted during visits. The study was conducted during a period of one year from November 2005 to October 2006 and collected data twice in week. House to house visit was done. All adolescent girls who have attained menarche, their parents and community leaders were explained in detail about the purpose and methodology of the study. Only after taking consent, they were interviewed, examined and investigated. A pre-tested, pre-designed questionnaire was used to record information

### SELECTION OF STUDY SUBJECTS

Adolescent girls who have attained menarche were included in this study. Adolescent girls who did not give consent to the study and who are not mentally sound were excluded from the study.

### RESULTS

The distribution of total 440 adolescent school girls according to age showed that maximum number of girls 106 (24.1%) were of the age 14 years followed by 98 (22.3%) of 15 years and lowest numbers of girls were of 12 years of age. i.e. 4 (0.9%).

Majority 313 (71.1 %) were from lower socio economic class where as only 55 (12.5 %) from upper socio economic class

Out of 440 adolescent girls, only 158 (35.9%) had knowledge about menstruation and 282 (64.1%) didn't have knowledge regarding menstruation before attainment of menarche. Out of 158, 120 (75.7%) girls opined that normal age at menarche is between 13 to 14 years and majority 68 (43.00%) adolescent girls gained information from mother. Only 10 (6.3%) girls gained information from neighbors.

436 (99.1%) adolescent girls had negative reactions to menarche like scared, shy, sad and sin. In the present study majority (52.7%) girls were scared at onset of menstruation. This may be because they had no knowledge about menstruation prior to menarche.

Among 440 adolescent girls, 294 (66.8 %) girls want to abstain from their activities during menstruation

and taboos practiced during menstruation were 406 (92.3%) adolescent girls avoiding holy places, 40 (9%) were isolated and only 4 (0.9%) were not practicing any taboo.

In this study out of 440 girls, 430 (97.7%) used old cloth, 08 (1.8%) are used pad and only 02 (0.5%) used both. Majority of the adolescent girls i.e., 368 (83.6%) were reusing the cloth. 43 (9.8 %) of girls were disposing with general waste and 29 (6.6 %) resorted to indiscriminate disposal.

**Table 1. Distribution of adolescent girls according to their knowledge about menstruation before attainment of menarche (n=440)**

Knowledge	Number	Percentage
Yes	158	35.9
No	282	64.1
<b>Opined Normal Age at menarche: (n=158)</b>		
11	06	04
12	23	14.6
13	74	46.7
14	46	29.0
15	09	5.7

**Table 2. Distribution of adolescent girls according to main source of information about menstruation (n=158)**

Source	Number	Percentage
Mother	68	43.00
Friends	39	24.7
Sister	24	15.3
Relatives	17	10.7
Neighbors	10	6.3
<b>Reaction to first period: (n=440)</b>		
Scared	232	52.7
Shy	140	31.8
Sad	56	12.7
Sin	08	1.8
Happy	04	0.9

**Table 3. Distribution of adolescent girls who wants to abstain from activities during menstruation**

Abstain from activities	Number	Percentage
Yes	294	66.8
No	146	33.2
<b>Taboo's practiced *</b>		
Avoiding holy places	406	92.3
Not touching other people	108	24.5
No entry in kitchen	42	9.5
Isolated	40	9.0
No taboos practiced	04	0.9

\*Multiple answers

**Table 4. Distribution of adolescent girls according to material used during menstruation (n=440)**

Material Used	Number	Percentage
Pads	08	1.8
Old cloth	430	97.7
Both	02	0.5
Mode of disposal		
Wash & reuse of cloth	368	83.6
Disposal with general waste	43	9.8
Indiscriminate disposal	29	6.6

### DISCUSSION

A vast array of beliefs and emotions are involved with menstruation, especially menarche and adolescent menstruation. In recent years education about menstruation to girls is gaining importance in western countries. In India, especially in rural areas the mention of topic of menstruation causes embarrassment and very few parents enlighten their children about the normal function of reproductive organs. This is evident that in our study that only 35.8% of girls had knowledge about menstruation before attainment of menarche. Similar studies conducted by Rama Rao A, 33.4% of girls had the awareness about menarche<sup>5</sup> and Patnagar in his study revealed that 28% girls had prior knowledge regarding menstruation.<sup>6</sup>

Mother was the main source of information in the study group (43%). This suggested that it would be worthwhile to educate mothers on these aspects especially in the case of non school going girls because most of the girls' mothers were illiterate. Similar study by Padma Patnagar et al 47% of adolescent girls received information from mothers. Reactions at first menstruation, maximum number of girls (42.7%) were scared because they had no knowledge about menstruation prior to menarche. Rama Rao A had highlighted the fact that the girls with no previous knowledge about menstruation felt more scared at menarche.<sup>5</sup>

Myths and superstitions were high even among the educated girls. 66.8% girls want to abstain their activities during menstruation and 33.2% girls did not want to abstain from their activities. The original idea of these taboos might have been to give the girl some rest by isolating her. Desai P et al found that 80% of adolescent girls practiced some or other type of taboo<sup>7</sup>.

Use of sanitary napkin was less among rural girls it may be the cost factor but they are using old used cloth piece 97.7% and is more important that it should be clean. 83.6% of girls wash and reuse the clothes during menstruation. Srinivas D.K found that 84% girls

used cloth and only 4% used commercially available pads, 3% used cotton and 9% girls did not use anything<sup>8</sup>

### CONCLUSION

Lack of prior knowledge about menstruation is due to the taboos attached to reproductive health. For awareness and knowledge about menstruation, most of the adolescent girls were dependent upon their mothers, other family members and peers who themselves were poorly informed. They had no other way of getting scientific information. Separate awareness generating strategies would be required for rural adolescent girls and their mothers to help development of a healthy scientific attitude towards this developmental phenomenon and its management in life.

### Limitations

In this study the knowledge and practices of adolescent girls who have attained menarche have been evaluated. This may not be generalized to whole adolescent girl population as knowledge regarding menstruation in adolescent girls of premenarcheal age not taken.

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# A Study of Fetal Umbilical Artery Flows and Neonatal Outcome in Small for Gestational Age Fetus

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## ABSTRACT

This is a longitudinal study of 109 pregnant women over a period of 2 years who attended the antenatal clinics between 30-40 weeks of gestation with a clinical or sonological diagnosis of SGA fetuses without any clinical causes excluding preeclampsia. In the present study, fetal umbilical artery Systolic/Diastolic ratio (S/D), Pulsatility index (PI), resistance index (RI) were studied. Fetuses with elevated S/D ratios were associated with oligohydramnios ( $P < 0.05$ ). Umbilical artery S/D ratio had a sensitivity of 74% and a specificity of 78% in prediction of abnormal NSTs. Only 13% of fetuses with abnormal S/D ratios had birth weight less than 10th percentile. It was significantly associated with caesarean sections ( $P < 0.05$ ). Absent end diastolic flows were associated with poor prognosis and 100% mortality in this study. The resistive index is a sensitive predictor of antenatal factors such as oligohydramnios and non-reassuring fetal cardiac tracings. Fetuses with abnormal RI had abnormal CTG in 52% cases, with a sensitivity of 52% and specificity of 59%. RI is not a good predictor for neonatal outcome measures. Elevated PI with associated sensitivity for prediction of oligohydramnios was 65% and specificity was 76%. It was significantly associated with NICU stay  $> 48$  hours ( $p < 0.05$ ). Abnormal PI was associated with non-reassuring fetal heart tracings ( $p < 0.05$ ).

**Keywords:** Absent End Diastolic Flow, Cesarean Section, NICU, Small for Gestational Age, Pulsatility Index, Resistance Index

## INTRODUCTION

Doppler ultrasound is a non-invasive tool commonly used for the assessment of maternal and fetal hemodynamics. Application of Doppler velocimetry for the study of various aspects of fetal growth and development has been an area of extensive research. Several studies have suggested a correlation between abnormal umbilical artery flow profiles and the occurrence of small for gestational age fetuses. The positive predictive value of umbilical artery Doppler for detection of SGA fetuses has been estimated at 49%-56% in low risk patients<sup>1,2</sup>. These fetuses are said to have a higher risk of perinatal morbidity such as hypoglycemia, hypocalcaemia, hypothermia, respiratory distress requiring mechanical ventilation and long term neurological sequel. Although the growth lag may be corrected in early childhood, they may develop problems such as hypertension, diabetes mellitus and cardiovascular disease<sup>3</sup> in adulthood.

Various studies have reported a significant association of adverse perinatal outcomes in small for date fetuses with abnormal fetal vessel waveforms<sup>4,5</sup>. Umbilical artery velocimetry using Doppler ultrasound in those pregnant women with small for date fetuses may help in identifying this subset of fetuses with increased risk for morbidity<sup>6</sup> in contemporary obstetrics.

## AIM

This study is an attempt to correlate the association between fetal umbilical artery flows and neonatal outcome in small for gestational age (SGA) fetuses.

## OBJECTIVES

To study the pattern of umbilical blood flow by Doppler velocimetry in SGA fetuses and to correlate neonatal outcome with umbilical artery flow velocities in SGA fetuses.

**MATERIALS AND METHOD**

This study comprised of all the pregnant women suspected with small for gestational age fetuses who were attending antenatal clinic from March 2005 to May 2006. This was a longitudinal study of 109 patients who were diagnosed as pregnancy with SGA between 30 wks to 40 wks of gestation diagnosed either clinically or by ultrasound examination, and was followed up to delivery. SGA was defined as those infants with a birth weight of less than the 10th percentile in the distribution curve for the calculated gestational age. Those pregnancies excluded from this study were multiple pregnancies, intra uterine growth restriction due to causes other than PIH, like intra uterine infection, chronic renal disease and congenital anomalies. After identifying the group of patients diagnosed as SGA, a detailed history was taken to identify the problems in previous pregnancies with relevance to the present pregnancy. A clinical examination was conducted to find out any complication and to establish their gestational age to identify clinically SGA fetuses. Ultrasound examination was done and gestational age was estimated and any growth lag was identified. The patients who were having a difference of  $\geq 3$  wks between gestational age by dates and Ultrasound scan gestational age were identified. Amniotic Fluid Index (AFI) was measured for all the patients. Complete haemogram, urine routine, microscopy, VDRL, HIV, HbsAg & obstetric ultrasound was done followed by Doppler indices of fetal umbilical artery after obtaining the patient's informed consent. Color duplex Doppler was used to identify a free-floating loop of the umbilical cord. The angle of insonation was then optimized and the signals obtained. Systolic flow (S) and the diastolic flow (D) for umbilical artery were obtained. From these values, the following indices were calculated: Systolic / Diastolic ratio (S/D) = S/D, Resistance index (RI) =  $(S-D)/S$ , Pulsatility Index (PI) =  $(S-D)/\text{mean Umbilical artery S/D ratio}$   $>3$ ,  $PI >0.8$  and  $RI >0.5$  were considered abnormal. AFI recorded in the same setting. NST (non stress test) were done for all cases. All these patients were followed up to delivery and details of delivery, baby weight, Apgar score, and neonatal intensive care unit (NICU) stay for more than 48 hrs and fetal outcome were recorded.

**Statistical analysis**

In the present study the data collected is analyzed statistically by comparing the appropriate parameters like proportion, percentages, and the statistical inference is obtained by using Chi square test to compare the difference between two proportions. The

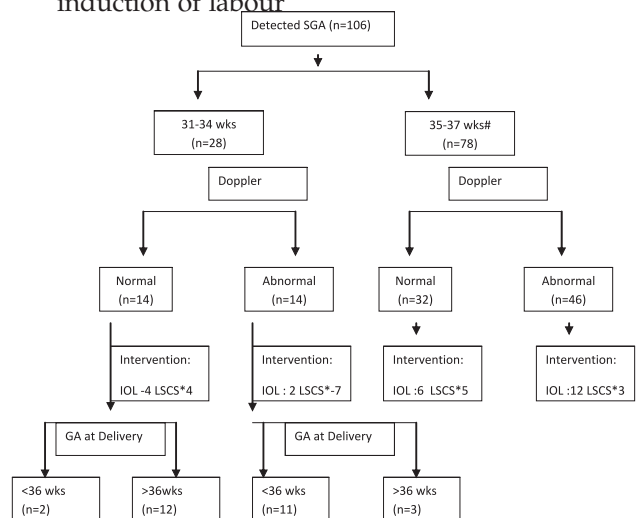
sensitivity and specificity of positive test is also computed wherever required for Doppler. The results are considered statistically significant if the p value is  $\leq 0.05$

**RESULTS**

In the present study a total of 109 patients were studied out of which, 3 delivered babies were appropriate for gestational age and therefore not included in the study.

**Flowchart 1**

\* - for foetal indication, GA – gestational age, IOL – induction of labour



# - all deliveries occurred above 36 wks of gestation.

**Table 1. Patient Data**

Patients mean age	24years
Primigravida/Multigravida	72%/28%
Mean gestational age	38weeks
AFI<5/AFI>5	40%/60%
Admission test	
Reactive	54%
Nonreactive	45%
Preeclampsia/Prior abortion/Other risk factors	23%/14%/3%

**Table 2. Mode of delivery**

Mode of Delivery	No of Patients	Percentage
Vaginal	60	57
Forceps	10	9
LSCS for fetal distress	26	25
LSCS (other indications)	10	9
Total	106	100

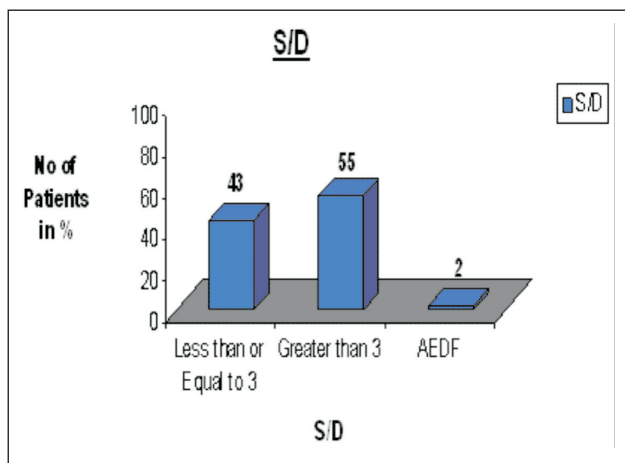
**Apgar score:** 103(97%) babies had APGAR score more than or equal to 7 at 5 min and 3 babies had a score of less than 7.

**Table 3. Analysis of the various parameters in % with the deduced P values of the various Doppler indices are described in the table**

Parameter	↑S/D(%)	Normal S/D	P value	↑PI (%)	Normal PI (%)	↑RI (%)	P value	Normal RI (%)	Pvalue
PNM(perinatal mortality)	0	0	NS	3	0	NS	0	0	NS
Mode of delivery									
Vaginal	61	53	NS	30	69	<0.05	49	67	NS
Forceps	13	7	NS	13	7	NS	10	9	NS
Em* LSCS	33	10	<0.05	33	14	<0.05	24	16	NS
EI # LSCS	4	5	NS	10	1	<0.05	6	2	NS
Apgar <7	02	01	NS	05	01	NS	03	02	NS
Abnormal NST	74	22	<0.05	68	30	<0.05	52	35	<0.05
Birthwt<10%	13	5	NS	23	03	<0.05	14	05	NS

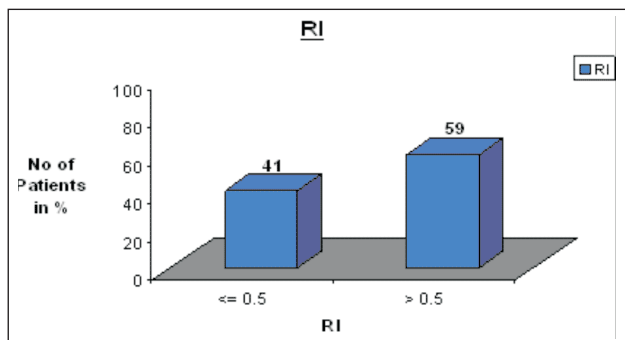
Abbreviation :\*-emergency. #-elective. NS-not significant.

**Bar Chart-1**



Umbilical Artery waveform analysis showed that there was no perinatal mortality in positive end diastolic flows or in the group with normal SD ratio. However, there were 2 (100%) deaths in the fetuses with absent end diastolic flows.

**Bar Chart-2 Umbilical artery RI index**

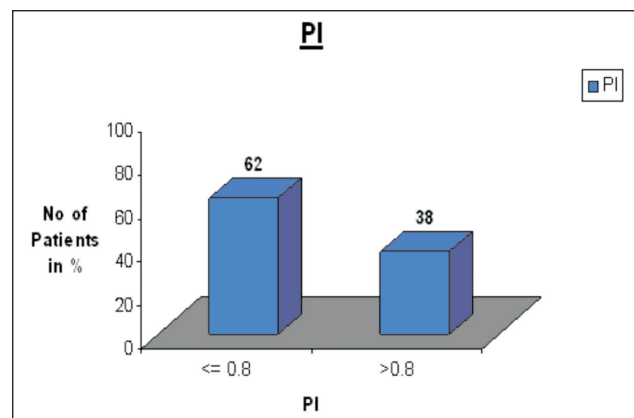


Umbilical artery RI ratio was found to be elevated in 63(59%) and normal in 43 (41%) patients. In this study, 2 babies with increased RI ratio died in the

neonatal period and there was no perinatal mortality in the normal RI ratio group. Seven (16%) in the normal group underwent emergency LSCS for fetal distress as against 15(24%) in the elevated RI group. Abnormal cardiac tracings were seen in 15(35%) in the group with normal RI ratios and 33 (52%) in elevated RI ratio group.

Abnormal umbilical artery RI has a statistically significant association with abnormal CTG and oligohydramnios.

**Bar Chart-3 Pulsatility Index (PI)**



Umbilical artery waveform analysis for pulsatility index revealed elevated values in 40(38%) fetuses and normal values in 66(62%) fetuses.

Statistical analysis of the study group revealed that there was 1(3%) neonatal death in the elevated PI group. Emergency LSCS was performed in 10(14%) cases in the normal PI group and 13(33%) in the elevated PI group. 13(19%) babies in the normal PI group were admitted in the NICU for more than 48

hours while admission in the elevated PI group was 21(53%). Oligohydramnios was seen in 16(23%) of the normal group versus 26(65%) in the abnormal PI

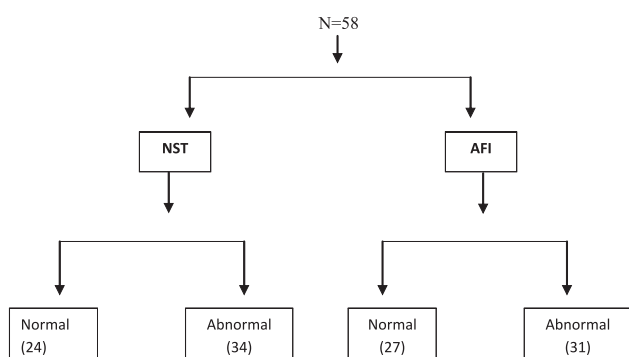
group. Abnormal admission tests were seen in 21(30%) in the normal PI group and 27(68%) in the abnormal PI group.

**Table 4. The comparison of the outcome measures in terms of % of sensitivity and specificity of the Doppler indices**

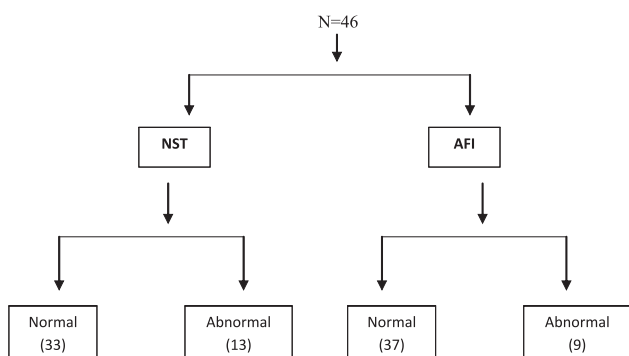
Outcome measures	↑S/D Sensitivity (%)	↑S/D Specificity (%)	PI Sensitivity (%)	PI Specificity (%)	RI Sensitivity (%)	RI Specificity (%)
LSCS for fetal distress	33	90	33	85	24	84
Abnormal NST	74	78	68	68	52	65
AFI<5	67	84	65	76	52	79
NICU>2 DAYS	50	83	53	80	38	77

**DISCUSSION**

**Flowchart 3 Abnormal Umbilical Doppler (S/D ratio)**



**Flowchart 4 Umbilical Doppler Normal (S/D ratio)**



Perinatal death in the present study was 03 % in comparison to 15 % in the Trudinger et.al study. In a study done by Adil Fleisher, abnormal SD ratio had a sensitivity of 78 % and specificity of 83 % in detecting babies with birth weight below 10<sup>th</sup> percentile, in comparison to 13 % and 95 % in the present study. In this study, abnormal NST were seen in 74% and oligohydramnios in 67% of patients who had increased umbilical S/D ratio.

In the present study, abnormal Doppler FVWs in umbilical artery are significantly associated with abnormal cardiac tracings. Rochelson et al, Satoh et al and Bruner et al found a strong correlation between abnormal Doppler indices and cardiac tracings<sup>7, 8, 9</sup>. Soregaroli M et al underline the existence of a strict correlation between umbilical Doppler velocimetry (PI) and an increased incidence of perinatal complications in IUGR fetuses<sup>10</sup>.

One study provides evidence to support that antenatal fetal surveillance is not required in fetuses diagnosed as IUGR by ultrasonography when AFI is normal<sup>11</sup>.

Abnormal Doppler indices have also been found to be associated with shorter diagnosis to delivery interval, early deliveries and decreased birth weight<sup>12</sup>. In the present study, there is a higher incidence of caesarean section in fetuses with compromised umbilical artery flows. Seyam and Rochelson noticed a similar trend, more so in the Absent or reversed end diastolic flow group and also an increased need for positive pressure ventilation<sup>7, 13, 14</sup>. All endangered SGA fetuses had abnormal flow measurements while SGA fetuses with a normal flow had no perinatal problems at all.

In the group with pathological flow indices, the dystrophy rate is 7.8 times and the morbidity rate 17 times higher. The association between abnormal umbilical artery Doppler and Apgar score at 5 minutes was not significant in this study. However, Trudinger found a significant association between the two<sup>14</sup>. These mothers were more frequently associated with PIH and more likely to undergo induction of labor, elective and emergency LSCS for fetal indications. Hecher<sup>15</sup> et al found that elevated pulsatility index in the umbilical artery was associated with an increased

LSCS rate. A significant correlation was noted in this study as well ( $p < 0.05$ ).

Table 5

	Arora	Alstrom <sup>16</sup>	Present Study
Induction-	10	10	20
Spontaneous	10	72	72
Emergency LSCS for Fetal Distress	20	11	26

In this study, it was observed that fetuses with decreased umbilical artery flows were twice as likely to be admitted to the NICU as compared to their normal counterparts. Average duration of NICU stay was 1.5 -2 times higher in the abnormal flow group. Respiratory distress and hypoglycemia were the common indications for admission to NICU. On the other hand, McCowan et al<sup>17</sup> found that the effect of abnormal umbilical artery Doppler was not important in terms of neonatal admission to the nursery.

Table 6.

	Arora	Almstrom	McCowan	Present Study
Delivery at <36wks	43.3	38.8	-	20%
Abnormal NST	20	-	-	74%
NICU	70%	35.5	74%	50%
Average NICU stay	17.5days	12.5days	15days	3days
APGAR <7 at	10%	3.7%	-	2%

In a study by Bhatt et al<sup>18</sup> positive predictive value of 52.6% for the detection of necrotizing enterocolitis [NEC]. However, in this study NEC occurred in only one fetus with normal umbilical artery flows. Kurkinen<sup>19</sup> and co-workers found a strong association between fetuses with ARED flows (8.9% and 35.7%) respectively and perinatal mortality, particularly in less than 34 wks gestational age group. In the present study perinatal mortality occurred in two fetuses with AEDF.

The study of long-term neurological sequel in fetuses with abnormal waveforms is beyond the scope of this study. Nevertheless, some studies have found an association between the two, though not significant<sup>12, 20, 21</sup>.

Of the three indices measured in this study, SD ratio and PI were significantly associated with oligohydramnios and three outcomes -abnormal NST, emergency LSCS for fetal distress and NICU stay. RI on the other hand was significant only for oligohydramnios and abnormal NSTs. SD ratio and PI are therefore better indicators of a compromised fetus in need of rigorous monitoring in the antepartum and intrapartum period. Doppler surveillance of fetuses at risk is therefore indicated for optimizing perinatal management of these fetuses.

## CONCLUSION

In the present study, abnormal fetal umbilical artery SD ratio, and PI showed a significant association with oligohydramnios, abnormal NST, emergency LSCS for

fetal distress and the need for NICU stay (all  $P < 0.05$ ). Umbilical artery SD ratio and PI were comparable in terms of sensitivity and specificity for the above measures. SD ratio is not a sensitive predictor of low birth weight; only 13% of fetuses with abnormal SD ratios had birth weight less than 10<sup>th</sup> percentile (1.68kgs). Absent end diastolic flows were associated with poor prognosis and 100% mortality in this study. Both SD ratio and PI are good indicators of neonatal outcome in small for gestational age fetuses. Analysis of the resistive indices shows that it is a sensitive predictor of antenatal factors such as oligohydramnios and non-reassuring fetal cardiac tracings. The association between RI and NICU stay and perinatal mortality was not significant. RI is not a good predictor for neonatal outcome measures.

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# Study on Prevalence of Risk Factors for Hypertension among Women in Rural Area of Andhra Pradesh

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## ABSTRACT

**Background:** Hypertension becoming common health problem worldwide because of increasing longevity and prevalence of contributing factors such as obesity, physical inactivity and an unhealthy diet.

**Objective:** To study the prevalence of risk factors for hypertension among women in rural area of South India

**Material and method:** A community based cross-sectional study was conducted among 837 women selected from rural area of Andhra Pradesh from January to June 2008

**Results:** Out of 837 women, 22.58 % were hypertensive. The age specific prevalence of hypertension was maximum (50.44%) in the age group > 60 yrs. Risk factors such as family h/o HTN, h/o DM, tobacco use, waist circumference and BMI were significantly associated with hypertension.

**Conclusion:** Problem of hypertension is increasing among rural women so health education strategies should be directed towards rural women also.

**Keywords:** Risk factors, Women, Rural Community, Hypertension

## INTRODUCTION

The developing countries are undergoing epidemiological transition <sup>(1)</sup>, resulting in a slow epidemic of all the life-style diseases. Cardiovascular disease is the leading cause of death worldwide <sup>(2)</sup>. The highly prevalent risk factor for CVD throughout the industrialized world is hypertension (HTN) and it is becoming an increasingly common health problem worldwide because of increasing longevity and prevalence of contributing factors such as obesity, physical inactivity and an unhealthy diet <sup>(3)</sup>. Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke

and other vascular complications. It is the commonest cardiovascular disorder, posing a major public health challenge to population in socioeconomic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20 – 50% of all deaths <sup>(4)</sup>. Epidemiological studies conducted in many parts of the world have consistently identified an important and independent link between high blood pressure and various disorders, especially coronary heart disease, stroke, congestive heart failure and impaired renal function. Many factors like alcohol consumption and smoking also increase the risk. High fatty diet and body mass index have a positive correlation and physical activity is negatively related with hypertension <sup>(5)</sup>. A study from Assam has shown that the prevalence of HTN in women from rural area was high <sup>(6)</sup>. Since there is very few data on prevalence of risk factors for HTN among women in this part of the country, this study was undertaken to determine the same amongst rural women of Andhra Pradesh.

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**MATERIAL AND METHOD**

The present community based cross-sectional study was undertaken from January to June 2008 in 3 randomly selected villages out of 9 villages from rural field practice area of Dept of Community Medicine, Katuri Medical College, Guntur, Andhra Pradesh. All women aged 30 yrs and above, available at the time of study were included after obtaining their consent. Women aged < 30 yrs, pregnant mothers and those who had not given consent were excluded from the study.

Anthropometric measurements viz. height, weight, waist circumference and hip circumference were recorded as per standard guidelines laid down by World Health Organization (WHO) (7). Using height and weight, Body Mass Index (BMI) was calculated and subjects were classified into categories of normal, overweight and obese, based on their BMI (4). Socio-economic status (SES) was calculated based on Prasad’s scale of social stratification for rural areas. It is based on per capita income per month in Indian Rupees (8). Blood pressure was measured as per standard guidelines by WHO (9). Hypertension was diagnosed based on drug treatment for hypertension or if the blood pressure was greater than 140 / 90 mm

Hg – Joint National Committee VII Criteria (10). Users of all types of tobacco products were included in the category of tobacco users.

A pre-tested close ended questionnaire was used to collect information on age, education and risk factors for hypertension such as family history, tobacco use and intake of salt. High salt intake (>5gms/day) was considered as high risk. Abdominal obesity was defined as WC ≥ 88cms as high risk. Statistical package SPSS 18 was used for analysis and proportions, chi square test was applied. P value less than 0.05 was considered significant.

**OBSERVATIONS**

**Study population characteristics**

A total of 837 women aged ≥ 30 years participated in the study, of which 438 (52.33%) were between the age group of 30-39 years. 46.48% of women were illiterate and rest (53.52%) were literate. Three fourth (77.45%) of the participants belonged to nuclear family. 47.43 % of women belonged to class V according to Modified Prasad’s classification, while only 1.31 % belongs to class I (Table 1).

**Table 1: Demographic profile of study participants**

Characteristics		Hypertensive (n=189)		Non-Hypertensive (n=648)		X <sup>2</sup> value
		No.	%	No	%	
Age	30-39	37	8.45	401	91.55	137.21S
	40-49	36	23.37	118	76.63	
	50-59	59	44.69	73	55.31	
	> 60	57	50.44	56	49.56	
Type of family	Nuclear	129	22.55	443	77.45	0.48NS
	Joint	60	22.64	205	77.36	
Education	Illiterate	107	27.51	282	72.49	10.08S
	Literate	82	18.30	366	81.70	
Income	Class I	01	9.10	10	90.90	3.66S
	Class II	05	14.71	29	85.29	
	Class III	19	20.65	73	79.35	
	Class IV	66	21.78	237	78.22	
	Class V	98	24.69	299	75.31	

S-Significant      NS-Not significant

**Table 2: Comparison of various risk factors among hypertensive and non-hypertensive**

Risk factors		Hypertensive (n=189)		Non-Hypertensive (n=648)		Total	X <sup>2</sup> value
		No.	%	No	%		
Family h/o HTN	Present	37	45.68	44	54.32	81	27.36S
	Absent	152	20.11	604	79.89	756	
H/o DM	Present	31	48.44	33	51.56	64	26.50S
	Absent	158	20.44	615	79.56	773	
Diet	Non veg	178	22.70	606	77.30	784	0.108NS
	Veg	11	20.75	42	79.25	53	
Tobacco use	Present	57	32.02	121	67.98	178	11.52S
	Absent	132	20.03	527	79.97	659	
Salt intake	> 5 gm	137	22.91	461	77.09	598	0.13NS
	< 5 gm	52	21.76	187	78.24	239	
Waist circumference	> 88cm	71	28.51	178	71.49	249	7.13S
	< 88 cm	118	20.07	470	79.93	588	
BMI	> 25	59	29.95	138	70.05	197	8.002S
	< 25	130	20.31	510	79.69	640	

S-Significant NS-Not significant

### Prevalence of hypertension

The overall prevalence of hypertension among the study participants was 22.58 %. The prevalence of hypertension was maximum (50.44%) among women  $\geq$  60years. The risk of hypertension was significantly ( $<0.001$ ) associated with increase in age. Demographic profile like education and income were found to be significantly associated with hypertension (Table 1).

### Risk factors among hypertensive

Risk factors like family h/o of HTN, h/0 diabetes, tobacco use, waist circumference and BMI were significantly associated with hypertension (Table 2).

## DISCUSSION

Hypertension is the major public health problem in India and it was observed in many Indian studies from both urban and rural areas. The various studies estimated a prevalence rate of hypertension among rural people from 1.99% in 1958 to 21.2% in 1994 and for urban population ranging from 1.24% in 1949 to 36.4% in 2003<sup>(11)</sup>. The prevalence of hypertension in rural areas of Tamil Nadu in the age group of 45 – 60 years was 33% using JNC V criteria <sup>(12)</sup>. While Gupta R et al <sup>(13)</sup> reported a prevalence of

24% in males and 17% in females in the age group of 20 years and above from rural Rajasthan. Gilberts EC et al <sup>(14)</sup> carried out a study in rural Tamil Nadu in

the age group of 20 years and above and found a prevalence of 12.5%.

In our study the prevalence of hypertension among women was found to be 22.58%, it was higher than the study done by AK Sharma et al <sup>(15)</sup> (16.9%), Thakur et al <sup>(16)</sup> (13.1%) and Goel et al <sup>(17)</sup> (8.8%) but it was lower than the study done by Yadav S et al <sup>(18)</sup> (34.2%). Our study showed that the age specific prevalence of hypertension significantly increased with increase in age. It was found to be maximum

(50.44 %) among age group  $\geq$  60yrs but it was least (8.45%) between the age group 30-39 yrs. Similar findings were observed by AK Sharma et al <sup>(15)</sup> in a study from Rajasthan and Yadav S et al <sup>(18)</sup> study from Lucknow. All the studies agree with the fact that prevalence of hypertension increased with age <sup>(12, 19)</sup>. Age probably represents an accumulation of environmental influences and the effect of genetically programmed sequence in body systems <sup>(20)</sup>.

In the present study, the risk of hypertension was significantly associated with low level of education similar to the study done by AK Sharma et al <sup>(15)</sup>. In our study self reported diabetes mellitus was associated with increase risk of hypertension. The association of hypertension with diabetes mellitus has been reported previously in a study done by Epstein M et al <sup>(21)</sup>. It was observed that females with waist circumference  $\geq$  88cms had more risk of developing hypertension.

Similar findings was reported by other author <sup>(22)</sup> In our study salt intake  $\geq 5$ gms was significantly associated with hypertension. Upper social class, tobacco use were significantly associated with hypertension in the study population. Similar finding was reported by Malhotra P et al <sup>(23)</sup>. Prevalence of hypertension was significantly high among diabetics which was also reported by Yadav S et al <sup>(18)</sup>.

### Conclusion and recommendations

We conclude from our study that the problem of hypertension which is supposed to be the problem of urban people is increasing among rural women. Various risk factors such as family h/o HTN, h/o diabetes mellitus, tobacco use, waist-circumference  $\geq 88$ cms and BMI  $\geq 25$  are contributing to the problem. In urban area IEC activities for prevention and control of hypertension has been started but has not reached the rural area, so health education strategies should be targeted towards rural women.

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# Hematological Profile of Malaria Cases: A Prospective Study at a Tertiary Care Centre

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## ABSTRACT

Malaria is one of the most prevalent infections worldwide, accounting for a major share of morbidity and mortality of parasitic diseases. Hematological changes in malaria patients include mainly anemia and thrombocytopenia. Detection of these alterations in patients presenting with classical symptoms, should prompt the laboratory physicians to search meticulously for the malaria parasite. The present study was undertaken to elucidate the hematological profiles of malaria patients in a tertiary care centre.

**Keywords:** Malaria, Anemia, Thrombocytopenia

## INTRODUCTION

Malaria is one of the most prevalent human infections worldwide resulting in 225 million cases each year (WHO, 2010)<sup>1</sup>. It remains a major public health problem in India, inspite of intensive efforts to reduce the transmission of infection. It is caused by protozoa parasite of the genus plasmodium which infects and destroys red blood cells. Four species of plasmodia (P.falciparum, P.malariae, P.ovale and P.vivax) cause malaria in humans of which P.falciparum is the most common cause of morbidity and mortality.

Plasmodium being a hemoparasite during major part of its life cycle expectedly induces hematological alterations. Hematologic changes are the most common complications encountered in malaria and play a major role in the fatality<sup>2</sup>. These changes involve the major cell lines such as red blood cells, leucocytes and platelets. Haematological changes in malaria, such as anemia, thrombocytopenia and leucocytosis or leucopenia are well recognized. The extent of these alterations varies with the level of malaria endemicity, background haemoglobinopathy, nutritional status, demographic factors, and malaria immunity.

The present study was undertaken to evaluate the hematological alterations occurring in malaria patients with particular reference to the species of plasmodium. Alterations in the haematological indices may strengthen the suspicion of malaria, prompting more meticulous search for malaria parasite, and timely institution of specific therapy.

## MATERIAL AND METHOD

The present study was conducted prospectively in the Department of Pathology, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India for a period of two years from June 2008 to May 2010. Clinically suspected cases of malaria referred to the hematology section were evaluated by giemsa stained thick and thin smears. Cases confirmed as positive for malaria were included in the study. The species of malaria parasite, parasite density and percent parasitemia were determined. Complete history was taken and a thorough physical examination was performed using a specifically designed proforma. Complete blood counts were performed for all the cases using Sysmex KX-21 autoanalyser. The parameters obtained from the autoanalyser were hemoglobin percentage, total leucocyte count, RBC count, hematocrit, red cell indices, red cell distribution width, platelet count and mean platelet volume. Differential leucocyte count and ESR were also estimated. Anaemia and thrombocytopenia were defined in accordance with normal reference values quoted by Dacie and

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Lewis<sup>3</sup>. The demographic, clinical and hematological parameters were analyzed in relation to the species of malaria. The data was analyzed descriptively using SPSS software.

## RESULTS

A total of 124 cases fulfilled the inclusion criteria in the present study. The mean age was 29.54±11.32 years, with a wide range of 11 months to 65 years. There was a male predominance with a male: female ratio of 2.17: 1. The most common type of malaria was P.

falciparum (61.2%) followed by P. vivax (36.4%). Mixed infections of vivax and falciparum were seen in 2.4% cases.

**Clinical profile:** Most cases presented with classical malarial symptoms like fever, rigors and sweating (78.2%), while 21.8% patients presented with other symptoms such as abdominal pain, jaundice, diarrhea and vomiting. Splenomegaly was seen in 31.4% cases whereas hepatomegaly was seen in 11.3% as shown in table 1.

**Table 1. Showing clinical profile of malaria patients.**

Clinical parameter	P. falciparum n=76	P. vivax n=45	Mixed n=03	Total n=124
Classical symptoms	56(73.6%)	38(84.4%)	03(100%)	97(78.2%)
Non- classical symptoms	20(26.4%)	07(15.6%)	0	27(21.8%)
Splenomegaly	25(32.8%)	13(28.8%)	1(33.3%)	39(31.4%)
Hepatomegaly	10(13.1%)	04(8.8%)	0	14(11.3%)

Hematological profile:

**Severity of anemia:** In our study 103 cases (83.1%) were anemic of which 66 cases were of falciparum

malaria, 36 cases of vivax malaria and one case of mixed infection as shown in table 2

**Table 2. Showing severity of anemia in malaria cases**

Severity of anemia (Hb %)	P. falciparum n=76	P. vivax n=45	Mixed n=3	Total n=124
Normal	10(13.2%)	09(20%)	02(66.7%)	21(16.9%)
Mild anemia(10-11.5gm %)	12(15.8%)	19(42.2%)	-	31(25%)
Moderate anemia (7-9.9gm %)	46(60.5%)	13(28.9%)	01(33.3%)	60(48.4%)
Severe anemia (<7gm %)	08(10.5%)	04(8.9%)	-	12(9.7%)
	76	45	03	124

**Peripheral blood picture:** Majority of the cases had Normocytic Hypochromic picture (42.7%) followed by Normocytic Normochromic (28.2%), Microcytic

Hypochromic(21.1%), Dimorphic(4.8%) and Macrocytic(3.2%) as shown in table 3

**Table 3 showing peripheral blood picture in malaria cases**

Morphological pattern	P. falciparum n=76	P. vivax n=45	Mixed n=3	Total n=124
Normocytic normochromic	22(28.9%)	11(24.5%)	02(66.7%)	35(28.2%)
Normocytic hypochromic	32(42.2%)	20(44.4%)	01(33.3%)	53(42.7%)
Microcytic hypochromic	15(19.8%)	11(24.5%)	-	26(21.1%)
Macrocytic	03(3.9%)	01(2.2%)	-	04(3.2%)
Dimorphic	04(5.2%)	02(4.4%)	-	06(4.8%)
Total	76	45	03	124

**Total leucocyte count and differential count:** Leucopenia was seen in 12.4% cases whereas leucocytosis was seen in 8.6% cases. Differential leukocyte count showed neutrophil counts in the

normal range in 93 (75.0%) cases, while 31 (25.0%) had neutrophilia. Lymphopenia was seen in 54 (43.5%) cases. Monocytes, eosinophils and basophils were in the normal range in the majority of the cases.



## Platelet count

In the present study thrombocytopenia was seen in 91(73.4%) cases. The incidence of thrombocytopenia was more in *P. vivax*(82.2%) than *P. falciparum*(68.4%). Cases with mixed infection showed thrombocytopenia in 66.7% cases.

## DISCUSSION

Hematological abnormalities are considered a hallmark of malaria, and reported to be most pronounced in *P. falciparum* infection, probably as a result of higher levels of parasitemia found in these patients.<sup>4</sup>

High levels of parasitaemia particularly with *P.falciparum*, cause more destruction of red blood cells hence reducing haemoglobin levels leading to anaemia. The pathogenesis of anemia in malaria is extremely complex, multifactorial and incompletely understood. It is thought to result from a combination of hemolysis of parasitized red blood cells, accelerated removal of both parasitized and unparasitized red blood cells, depressed as well as ineffective erythropoiesis with dyserythropoietic changes, and anemia of chronic disease. Other factors contributing to anemia in malaria include decreased red blood cell deformability, splenic phagocytosis and/or pooling, so they have an increased rate of clearance from the circulation.<sup>5, 6, 7</sup> Anemia in malaria patients may be multifactorial and associated with concurrent nutritional deficiency.

In the present study 83.1% cases were anemic, of which majority had moderate anemia. These results are comparable with those obtained by Biswas et al<sup>8</sup> (94.4%) and Sharma et al<sup>9</sup> (86.7%). Anemia was normocytic hypochromic in majority of cases, similar to the observations made by Bashawri et al<sup>4</sup> and Beales<sup>10</sup>.

Changes in the total leucocyte count in malaria are less definite and there is a wide variation in the results quoted by various studies. In our study, majority of patients (79.0%) had a normal total WBC count whereas leucopenia and leucocytosis was seen in 12.4% and 8.6% cases respectively, which is comparable to the results of Sharma et al<sup>9</sup>, Biswas et al<sup>8</sup>, Bashawri et al<sup>4</sup>, Ladhani et al<sup>11</sup>, Eichieveri et al<sup>12</sup> as shown in table 4

**Table 4. Showing comparison of WBC changes in various studies**

Studies	Leucocytosis(%)	Leucopenia (%)
Sharma et al	13.3	6.6
Biswas et al	12.2	6.7
Bashawri et al	7.2	13.3
Ladhani et al	20.1	10.2
Eichieveri et al	05	29
Present study	8.6	12.4

The mechanism of thrombocytopenia in malaria is due to peripheral destruction and consumption. Despite the presence of thrombocytopenia, the number of megakaryocytes in the bone marrow is adequate or increased. Immune complexes consisting of malaria antigens with IgG or IgM antibodies with or without complement attach to platelets and cause their sequestration by splenic macrophages. Hyperactivity of macrophages has also been implicated in the destruction of platelets.<sup>13</sup> In the present study thrombocytopenia was seen in 91(73.4%) cases, more in *P. vivax* cases(82.2%) than *P. falciparum*(66.7%). Similar results were observed by Jadhav et al<sup>14</sup> and Bashawri et al, whereas thrombocytopenia was seen more commonly associated with *P.falciparum* in the studies done by Horstmann et al<sup>15</sup> and Erhart et al<sup>16</sup> as shown in table 5

**Table 5 showing comparison of thrombocytopenia in various studies WBC changes in various studies**

Study	<i>P. vivax</i> (%)	<i>P.falciparum</i> (%)
Horstmann et al	72	85
Erhart et al	58.3	67.4
Bashawri et al	74.7	59.9
Jadhav et al	66.5	59
Present study	82.2	66.7

## CONCLUSION

Anemia and thrombocytopenia are well documented changes in malaria. Alterations in leucocytes are less dramatic and there have been conflicting reports by various authors. However, these changes in clinically suspected cases should prompt a diligent search for the malaria parasite to institute therapy at the earliest.

Conflict of Interest: The authors declare no conflicts of interest.

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# Socio-Demographic Correlates of Anaemia among Adolescents in Urban Slum

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## ABSTRACT

**Background:** Adolescence - a period of transition between childhood and adulthood is a significant period of human growth and maturation. Adolescents represent about a fifth of India's population. Iron needs are highest in males during peak pubertal development because of a greater increase in blood volume, muscle mass and myoglobin. Many studies in recent times have highlighted the high prevalence of anaemia among adolescent girls in India, however, there is limited published literature on prevalence of anaemia among adolescent boys.

### Aims:

1. To find out the prevalence of anaemia among adolescent (10-19 years) boys and girls in the urban slum of Meerut.
2. To study socio-demographic co-relates of anaemia.

**Material and Method:** A Community based cross sectional study was conducted in urban slum, Multan nagar, catchment area of Urban Health and Training Center, Department of Community Medicine, Subharti Medical College, Meerut. A total of 406 (216 females and 190 males) adolescents (10 -19 years of age) were included in this study. Haemoglobin estimation was done using Direct Cyanmethaemoglobin method. Statistical analysis were done using Microsoft excel 2007 and Epi info version 3.5.3.

**Results:** The prevalence of anaemia among adolescent males and females was found to be 31.6% and 52.8% respectively. Statistical significant association ( $p < 0.05$ ) of anaemia among boys were found with type of family, socio-economic status, educational status & academic performance. Among females, the statistical significant socio-demographic factors were socio-economic & educational status.

**Conclusions:** A high prevalence of anaemia was found among adolescent males and females. Considering the possible implications of anaemia on adolescent growth and development, the nutritional status of adolescents should not be overlooked and suggests the need for routine iron supplementation even among adolescent boys.

**Keywords:** Adolescent Boys, Anaemia, Urban, Slum, Cyanmethaemoglobin

## INTRODUCTION

Adolescence – a period of transition between childhood and adulthood is a significant period of human growth and maturation. The term “adolescence” has been defined by WHO as those including between 10 to 19 years.<sup>1</sup> There are 1.2 billion adolescents in the world, 85% of them live in developing countries.<sup>2</sup> The adolescent population constitutes about 18 to 25% of the total population of

the South East Asia Region.<sup>3</sup> Adolescents represent about a fifth of India's population.<sup>4</sup>

During this period, more than 20% of the total growth in stature and 50% of adult bone mass are achieved<sup>5</sup> and iron requirement increases dramatically in both adolescent boys and girls, from preadolescent level of 0.7-0.9 mg Fe/day to as much as 2.2 mg Fe/day. This increase in iron requirement is the result of expansion of total blood volume, increase in lean body

mass and the onset of menstruation in adolescent females.<sup>6</sup> Iron needs are highest in males during peak pubertal development because of a greater increase in blood volume, muscle mass and myoglobin.<sup>7</sup>

Globally, according to WHO, a total of 1.62 billion people are anaemic.<sup>8</sup> Every 9 out of 10 persons affected by anaemia live in developing world.<sup>9</sup> WHO also estimates the benefits of anaemia correction and suggests that timely treatment can restore personal health and raise national productivity levels by as much as 20%.<sup>10</sup>

Available literature from India confirms that anaemia is common among adolescent girls but there is a paucity of information on status of anaemia among adolescent boys and most of the studies are based on school – going population and are not from community. So the community based study was planned to highlight the problem of anaemia in adolescent males and females and to study socio-demographic co-relates of anaemia.

## MATERIAL AND METHOD

### Study population

Adolescents aged 10 to 19 years residing in the registered families in urban slum, Multan nagar, catchment area of urban health and training centre, department of Community Medicine, Subharti Medical College, Meerut were included for the study.

### Study period

The period of study was from September 2010 to September 2011 which was used for data collection, compilation and presentation of findings.

### Sample size

Since prevalence (p) of anaemia in adolescents (both males and females taken together) was not known, a prevalence of 50% was taken<sup>11</sup> to calculate the sample

size with 95% confidence interval and absolute precision of 5%. So minimum required sample size was 384 and adding 10% for incomplete responses to it, the total sample size came out to be 422. Finally, analysis were done on 406 adolescents (190 males and 216 females).

### Selection of study participants

From the 2112 registered families, 422 families were selected randomly by lottery method and if there were more than one adolescent in the selected family, one adolescent was randomly selected from each family.

## DATA COLLECTION

A pre designed semi structured schedule was used to elicit the necessary information from participants.

### Hemoglobin estimation

For hemoglobin estimation, Direct cyanmethaemoglobin method was used using Photochem-Micro digital 5 calorimeter.

### Ethical approval

First approval from the institutional ethical committee was obtained. Informed written consent was obtained from each participant after explaining about the study.

### Statistical analysis

Data was analyzed using Microsoft excel 2007 and Epi info version 3.5.3 software. Proportions were calculated and Chi square test was used as a test for significance. A p value of less than 0.05 was considered significant.

## RESULTS

The prevalence of anaemia in adolescent males and females aged 10 to 19 years was found to be 31.6% and 52.8% respectively.

**Table I: Prevalence of anaemia in males according to various socio-demographic determinants**

Determinants	No. of males (%)	Anaemic males	Prevalence	$\chi^2$ , df, p- value
<b>Age group (years)</b>				
10-13	63 (33.16)	22	34.92	5.69, 2, 0.06
14-15	57 (30.00)	23	40.35	
16-19	70 (36.84)	15	21.43	
<b>Type of family</b>				
Nuclear	159 (83.7)	56	35.22	4.99, 1, 0.02
Joint	31 (16.3)	04	12.90	

**Table I: Prevalence of anaemia in males according to various socio-demographic determinants (Contd.)**

Determinants	No. of males (%)	Anaemic males	Prevalence	$\chi^2$ , df, p- value
<b>Socio-economic Status</b>				
Upper (I)/ Upper middle (II)	42 (22.1)	05	11.90	10.36, 2, 0.005
Lower middle (III)	79 (41.6)	27	34.18	
Upper lower (IV)/ Lower (V)	69 (36.3)	28	40.58	
<b>Educational Status</b>				
Illiterate/ Just literate	06 (3.2)	03	50.0	9.70, 4, 0.046
Primary	47 (24.7)	15	31.91	
Middle	80 (42.1)	32	40.0	
High school	43 (22.6)	09	20.93	
Intermediate	14 (7.4)	01	7.14	
<b>Academic performance*</b>				
Below average (d" 40%)	13 (7.8)	06	46.15	8.95, 3, 0.03
Average (> 40 to 60%)	82 (49.1)	31	37.80	
Above average (> 60 to 80%)	65 (38.9)	12	18.46	
Topper (>80%)	07 (4.2)	01	14.29	

\* The denominator for calculation of percentage was the number of male students studying.

**Table II: Prevalence of anaemia in females according to various socio-demographic determinants**

Determinants	No. of females (%)	Anaemic females	Prevalence	$\chi^2$ , df, p- value
<b>Age group (years)</b>				
10-13	62 (28.70)	35	56.45	0.66, 2, 0.72
14-15	54 (25.00)	29	53.70	
16-19	100 (46.29)	50	50.00	
<b>Type of family</b>				
Nuclear	181 (83.79)	97	53.59	0.13, 1, 0.72
Joint	35 (16.20)	17	48.57	
<b>Socio-economic Status</b>				
Upper (I)/Upper middle (II)	32 (14.9)	07	21.90	15.09, 2, 0.001
Lower middle (III)	96 (44.4)	53	55.21	
Upper lower (IV)/Lower (V)	88 (40.7)	54	61.36	
<b>Educational Status</b>				
Illiterate/ Just literate	08 (3.8)	05	62.50	9.80, 4, 0.044
Primary	50 (23.1)	30	60.00	
Middle	84 (38.9)	48	57.14	
High school	42 (19.4)	22	52.38	
Intermediate	32 (14.8)	09	23.68	
<b>Academic performance*</b>				
Below average (d" 40%)	7 (3.24)	05	71.42	4.55, 3, 0.21
Average (> 40 to 60%)	106 (49.07)	58	54.71	
Above average (> 60 to 80%)	62 (28.70)	25	40.32	
Topper (>80%)	2 (0.92)	01	0.5	

\* The denominator for calculation of percentage was the number of female students studying.

Table I and II shows that the determinants which were found to be statistically significant in both males and females includes socio-economic status (the prevalence of anaemia decreased with increase in

socio-economic status) & adolescents educational status (prevalence of anaemia was maximum in those who were illiterate/just literate and minimum in those who had completed intermediate class)

The determinants which were found to be statistically significant only in males but not in females include type of family (prevalence of anaemia was more (35.22%) in those belonging to nuclear families in comparison to 12.90% in joint families) & their academic performance.

Age was not found to be statistically significant among both boys and girls.

## DISCUSSION

The present study yielded relatively low prevalence (31.6%) of anaemia among adolescent boys when compared to studies conducted by Jain et al<sup>12</sup> in Urban Meerut, Hyder et al<sup>13</sup> in Bangladesh and Hettiarachi et al<sup>14</sup> in Sri Lanka who found prevalence of anaemia to be 42.8%, 69%, and 49.5% respectively. Basu et al<sup>15</sup>, however, reported the prevalence of anaemia among school going adolescent boys of Chandigarh to be 7.7%.

The prevalence of anaemia (52.8%) among adolescent girls in the present study was higher as compared to that reported by Rawat et al<sup>16</sup> (34.5%) in rural Meerut and Singh<sup>17</sup> in urban Meerut (36.5%). On the contrary, other studies reported a higher prevalence in adolescent females as that by Chandrasekhar et al<sup>18</sup> (68.95%) and Kakkar et al<sup>19</sup> (58.4%). These differences may be due to difference in age groups studied, different study settings and difference in cut-off values for diagnosis of anaemia.

No significant association was found between anaemic status of adolescents and age in present study. This finding was consistent with the findings by Choudhary et al<sup>20</sup>, Goel et al<sup>21</sup> and Chandrasekhar et al<sup>18</sup>. On the contrary, Kakkar et al<sup>19</sup> reported significant association between anaemic status of adolescents and age.

The study revealed that prevalence of anaemic females belonging to nuclear families was comparable to the anaemic females belonging to joint families. The result was consistent with the findings of Chaudhary et al<sup>22</sup> while Rawat et al<sup>16</sup> in his study reported that type of family is significantly related to anaemia.

Significant trend was observed between socio-economic status and anaemia as prevalence of anaemia was maximum in upper lower (IV) / lower (V) class and decreased with rise in socio-economic status. Similar results were reported by other researchers

also<sup>16,17</sup>. However Kaur et al<sup>23</sup> and Sinha et al<sup>24</sup> didn't find any significant association between socio-economic status and anaemia.

Significant association was observed between anaemia and educational status of adolescents in the present study which is similar to that reported by others<sup>16, 19</sup>. However, Kaur et al<sup>23</sup> and Choudhary et al<sup>20</sup> found no significant association of anaemia with the education of the girl.

This study revealed that adolescents academic performance is significantly related to their anaemic status. The finding was consistent with the findings of Abalkhail et al<sup>24</sup> and Sen et al<sup>25</sup> who showed that anaemics scored lower rank significantly than non-anaemics.

## CONCLUSIONS AND RECOMMENDATIONS

The present study highlights the high prevalence of anaemia among adolescent boys in the urban slum population of Uttar Pradesh, thus indicating that the problem of anaemia was related to a wider population than the traditional groups of the adolescent, pregnant and lactating females and children. We suggest that there is a need for well planned, systematic and large-scale studies by using standardized methodologies to estimate the prevalence of anaemia as well as the causes of anaemia at the community level among males in all the age groups, with the representation of the different regions of India.

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# Utilization of Antenatal Care by Pregnant Women Residing in the Kakati Sub Center - A Cross Sectional Center

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## ABSTRACT

Ante natal care is the care of women during pregnancy. Aim is to achieve at the end of pregnancy a healthy mother and healthy baby<sup>1</sup>. "Pregnancy is special, let's keep it safe" was the theme for World Health Day in 1998. Pregnancy is physiological process but it is associated with certain risks to the health and life of both the mother and baby. Hence special attention and care should be taken for every pregnancy to make it safe<sup>2</sup>. Purpose of antenatal care is to identify "high risk" cases and arrange for them skilled care and provide appropriate care for all mothers. Hence the present study was undertaken in a sub centre to assess the quality of antenatal care received and the utilization of health care services by pregnant women.

**Research question:** What is the pattern of utilization of antenatal care by pregnant women residing in rural area?

**Objectives:** To know about utilization of antenatal care by pregnant women. To know the quality of antenatal care received by them.

**Study design:** Cross sectional study.

**Study period:** March to December 2009.

**Study area:** Kakati sub centre of Vantamuri PHC.

**Materials and method:** Universal sample i.e. all pregnant women belonging to Kakati sub centre. We could contact about 150 pregnant women during the study period. The data was collected by using predesigned and pretested questionnaire after obtaining informed consent from the pregnant women.

**Statistical Analysis:** Percentage and chi square test.

**Results:** In the present study, registration of pregnant women was 96.6%. More than 50% of pregnant women were in the age group 21-25 years. 61% had completed secondary education. 48.4% of pregnant women in their 2nd trimester had received 30-60 tablets of IFA. More than 50% had completed either 2 doses or booster dose of inj.T.T. But still 29.6% had not received single dose of T.T. The association between gravidity and quality of antenatal care was found to be statistically significant ( $P < 0.05$ ). No association was found between quality of antenatal care and type of family, religion, education status of pregnant women and their husbands and socio economic status.

**Conclusion:** Our study concludes that overall average quality of ANC care was good. But small group of pregnant women did not received average quality of ANC. Home visits were not provided by the female health worker and the frequency of health visits to the sub centre area was very less.

**Keywords:** Antenatal Care, Quality of Care, Utilization, Pregnant Women, Rural Area

## INTRODUCTION

Ante natal care is the care of women during pregnancy. Aim is to achieve at the end of pregnancy

a healthy mother and healthy baby<sup>1</sup>. "Pregnancy is special, let's keep it safe" was the theme for World Health Day in 1998.



Some of the objectives of antenatal care are to promote, protect and maintain the health of mother during pregnancy. Early identification of “high risk” cases and giving them special attention, to prevent complications, reduce maternal and infant mortality and morbidity, teach mother how to take care of child and give advice on nutrition, personal hygiene and family planning<sup>1</sup>. The MCH services are delivered mainly by government run community health centre, PHCs and sub centers, government hospitals and private hospital/ clinic/ nursing home. Government of India has launched the National Rural Health Mission in the year 2005 to improve the availability and access of quality health care throughout the country, especially for poor women and children residing in rural areas<sup>4</sup>.

Some of the programs are developed by the Government to improve quality of antenatal intranatal and post natal care and institutional delivery. They are Janani suraksha yojana (JSY) which is a safe motherhood initiative under NRHM, being implemented with objective of reducing maternal and neonatal mortality by promoting the institutional delivery for the poor pregnant women. It is 100% centrally sponsored scheme. National maternity benefit scheme (NMBS) is renamed by JSY. The Karnataka state government has introduced many schemes such as prasooti araike (care of pregnant women). These all schemes aim is to improve the quality of ANC and increase the institutional delivery and reduce the MMR and IMR.

A change in the demographic scenario is being witnessed in developing countries like India. There are indications that family size is declining. Accordingly, the profile of pregnant women also seems to be changing. It is important to document such changes in order to give feedback to the planners. One of its main focus is on quality of antenatal care (ANC). It is

also vital to document the existing quality of ANC in various parts of India. Such information helps in indirectly gauging the progress and impact of the program<sup>5</sup>.

Hence the present study was undertaken in a sub centre to assess the quality of antenatal care received and the utilization of health care services by pregnant women and to find the association between socio-demographic factors and utilization of ante natal care services. Above mentioned factors how they are influencing the quality of ante natal care.

### MATERIALS AND METHOD

The present study is done in Kakati sub centre of vantamuri PHC. This study is cross sectional study. The study period is 10 months from 1<sup>st</sup> March to 31<sup>st</sup> December 2009. The study participants are pregnant women belonging to Kakati sub centre. In this study pregnant women staying in the Kakati area at least one year are included in this study. The pregnant women who not belong to Kakati sub centre and unwilling to participate in this study are excluded. Universal sample was taken. All the pregnant women during the period of study that is 10 months from March to December were included in the study. Some of the pregnant women had been to their mother’s place for delivery and 30 pregnant women refused to take part in the study. We could contact about 150 pregnant women during the study period. Hence the sample taken was 150 pregnant women. Ethical clearance was obtained from institutional ethical committee to conduct the study.

The pre tested questionnaire was used. A scoring system was used to calculate the quality of ante natal care

**Table 1. Antenatal scoring for 3<sup>rd</sup> trimesters**

S.No	Serviced received	Coverage quality score			
		3	2	1	0
1	Antenatal Registration	<12 weeks	12-16 weeks	16-28 weeks	>28weeks
2	No. of antenatal check up	>5	4-5	3	<3
3	No. of home visit for ANC	>2	2	1	Nil
4	No. of IFA tablet consumed	>100	50-99	<50	Nil
5	Completion of TT-2/B	<28weeks	28-32 weeks	32-36weeks	>36weeks
6	No. of antenatal check up after completion of TT-2/B	>2	2	1	Nil
7	Weight measurement	Always	More often	Sometimes	Never
8	B.P measurement	Always	More often	Sometimes	Never
9	Abdominal examination	Always	More often	Sometimes	Never

Table :1 Antenatal scoring for 3<sup>rd</sup> trimesters (Contd.)

S.No	Serviced received	Coverage quality score			
		3	2	1	0
10	Advice given on Diet	Always	More often	Sometimes	Never
11	Advice given on rest	Always	More often	Sometimes	Never
12	Advice given on Warning sign	Always	More often	Sometimes	Never
13	Advice given Follow up	Always	More often	Sometimes	Never
14	Hb%	3 or more	2	1	Never
15	Urine examination	3 or more	2	1	Never

**Statistical test used:** After collecting the information data was compiled and analyzed. For pregnant women in each trimester maximum score and minimum score was calculated, mean score and S.D. was calculated. Mean score within 1 S.D. was

considered as Good score antenatal care, mean score with less than +1S.D and more than -1S.D was considered as adequate antenatal care and mean score with less than -1S.D was considered as poor antenatal care.

Table 2: Trimester wise scoring table

Trimester	Good score	Average score	Poor score
1 <sup>st</sup> Trimester	≥ 9	3-8	≤ 2
2 <sup>nd</sup> Trimester	≥ 22	10-21	≤ 9
3 <sup>rd</sup> Trimester	≥ 37	22-36	≤ 21

Chi square test was used to calculate association between quality of antenatal care and socio demographic factors.

### FINDINGS

In this study majority of the pregnant women 50.67% were in the age group of of 21-25 years and 0.66% were in 36-40 years. About 60.67% of the pregnant women had completed secondary education, 9.33% were illiterate. About 50% of the pregnant women were primigravida followed by gravida 2 i.e. 28% and 22% were gravid 3 and above. In this study 97% of pregnant women had registered their pregnancy. 51% pregnant women were registered in private hospital, followed by district hospital 21%. 51%

had taken regular ANC in private hospital followed by 23.44% from district hospital. The pregnant women who are in 1<sup>st</sup> trimester the antenatal care quality score was as follows 86% of pregnant women had registered at one or other health centre, weight was recorded in 63.64%, blood pressure was recorded in 72.73% of pregnant women. The pregnant women who are in 1<sup>st</sup> trimester the antenatal care quality score was as follows 96.87% of pregnant women had received 2 or more than 2 antenatal checkups. In majority of them i.e. 70.31% abdominal examination was done and B.P. was recorded in 68.75%. 68.75% did not receive any advice on rest and warning signs. No home visit by female health worker in 65.62% of pregnant women. Only 3.13% of pregnant women had not registered and no antenatal checkup was done.

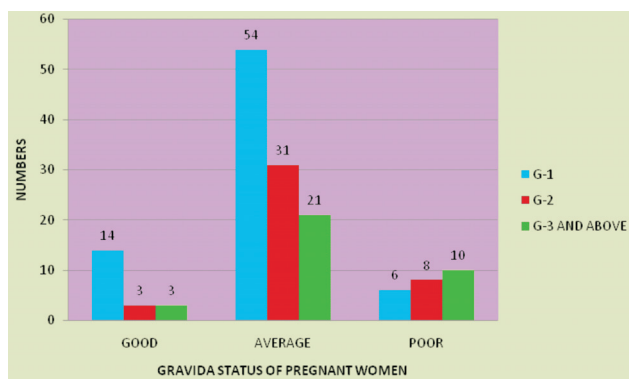
Table 3. Distribution of pregnant women who are in 3<sup>rd</sup> trimester according to antenatal care quality score

S. No	Service received	Coverage quality score				Total
		3	2	1	0	
1	Ante natal Registration	42 (65.63%)	20 (31.25%)	2 (3.13%)	-	64
2	No. of antenatal check up	36 (56.25%)	21 (32.81%)	4 (6.30%)	3 (4.68%)	64
3	No. of home visit for ANC	1 (1.56%)	5 (7.81%)	33 (51.56%)	25 (39.06%)	64
4	No. of IFA tablet consumed	37 (57.81%)	18 (28.13%)	8 (12.5%)	1 (1.56%)	64
5	Completion of TT-2/B	31 (48.44%)	22 (34.38%)	7 (10.94%)	1 (1.56%)	64
6	No. of antenatal check up after completion of TT-2/B	11 (17.19%)	12 (18.75%)	25 (39.06%)	13 (20.31%)	64
7	Weight measurement	41 (64.06%)	13 (20.31%)	8 (12.5%)	2 (3.13%)	64

**Table 3. Distribution of pregnant women who are in 3<sup>rd</sup> trimester according to antenatal care quality score (Contd.)**

S. No	Service received	Coverage quality score				Total
		3	2	1	0	
8	B.P measurement	50 (78.13%)	11 (17.19%)	2 (3.13%)	1 (1.56%)	64
9	Abdominal examination	50 (78.13%)	11 (17.19%)	2 (3.13%)	1 (1.56%)	64
10	Advice given on Diet	7 (10.93%)	19 (29.68%)	19 (29.68%)	19 (29.68%)	64
11	Advice given on rest	6 (9.37%)	18 (28.13%)	23	17 (26.56%)	64
12	Advice given on Warning sign	7 (10.93%)	10 (15.63%)	21(32.81%)	26 (40.63%)	64
13	Advice given Follow up	32 (50%)	18 (28.13%)	13 (20.31%)	1 (1.56%)	64
14	Hb%	12 (18.75%)	21 (32.81%)	29 (45.31%)	2 (3.13%)	64
15	Urine examination	4 (4.68%)	14 (21.87%)	41 (64.06%)	5 (7.81%)	64

In this study 77% of pregnant women had undergone additional tests like HIV, followed by 76% Bl, Gr and Rh factor, 69% HbsAg, 64% USG. The study showed that there was association between gravid status and quality of antenatal care. In primigravida 70% of the pregnant women had good score. About 51% had average score there is statistically significance between gravid and quality of antenatal care  $\chi^2 = 10.900$  df= 4 P=0.028.



**Graph 1. Association between gravid status of pregnant women and quality of antenatal care**

### DISCUSSION

Many studies done on quality of antenatal care covered few aspects like time of registration, regularity of antenatal checkup, status of immunization and consumption of IFA tablets etc. such studies fail to establish overall quality of antenatal care including the examination, investigation and advice which play an important role determining the quality of antenatal care.

In our study to assess the quality of antenatal care among pregnant women belonging to one sub centre under PHC. It included all the information of the pregnant women like socio demographic factor, place of registration, time of registration, place of regular

antenatal care received, number of visits and examination, investigation and advice given to them on each visit etc.

150 pregnant women interviewed during the study period. Our study revealed that inspite of many Government scheme to improve quality of maternal care 50% had registered and took regular antenatal care also from the private hospital. More than 60% of them did not get advice on diet, rest and warning sign. Hb% was estimated hardly among 50% of pregnant women.

Quality of ANC among pregnant women in 2<sup>nd</sup> trimester showed that antenatal registration in 1<sup>st</sup> trimester was 54%. About 96.87% had more than 2 visits. Till 65% did not get home visit by health worker female and anganwadi worker. 48.4% people had received 30-60 tablets. 10% still had not started taking IFA. More 50% had completed taken either 2 doses or booster dose of T.T.inj. But still 29.6% had not received single dose of T.T. More than 51% said that weight measurement was done every time and more 68%, 70% said that B.P, abdominal examination done. Around 47% received followed up advice. 25% had done repeat Hb, urine examination. More than 71.8%, 68.7% received advised on rest, diet.

Quality of antenatal care among pregnant women in 3<sup>rd</sup> trimester showed that antenatal registration in 1<sup>st</sup> trimester was 65.6%. 2<sup>nd</sup> trimester was 31.25%. About 56.25% had more than 3 visits. 1 time home visit by the female health worker was about 51%. More than 57% women had consumed the IFA tablets. More of them 90% had taken either 2 doses or booster dose of inj.T.T. 20% of the pregnant women had not visited the health centre after the completion of the T.T. More than 78% of them said that B.P and abdominal examination was done. About 29%, 27.56% did not received advice on diet, rest respectively. 41% did not received information on warning signs.

Our study showed that irrespective of Gravida status all pregnant women received Average antenatal care. But among primigavida 18.92% received good antenatal care, followed by 72.97% average ANC. There was statistically significance between gravid and quality of antenatal care. i.e.  $\chi^2 = 10.900$ ,  $P = 0.028$ .

The study showed that 145(96.6%) of pregnant women had registered either at Government or private Health care facility and only 3.34% women had not yet registred. But in Lal S et al<sup>7</sup> registration was 100%. Most of pregnancy were diagnosed 145(96.6%) by urine test, followed by 4(2.66%) by ultra sonography.. In a study done at Kolkata antenatal registration was 100%<sup>3</sup>. The our study showed that 86.36% of pregnant women had registered in 1<sup>st</sup>trimester.13.64% had not yet registered. 63.64% women weight was measured.68% women did not get advice on diet and rest. 18.18% got health education on danger signs during pregnancy. Hb estimation was done in 45.45% and urine examination in 40.91% of pregnant women. No home visit was given by the female health worker or AWW. In a study conducted in rural and urban primary care health facilities of Lucknow district. 33.3% had received advice regarding nutrition and rest. 2.2% got health education on danger signs during pregnancy. About 31% underwent investigations like VDRL/Blood grouping/Rh typing<sup>8</sup>. In a study was conducted in 2004 in four purposively selected villages (population - 13733) by (PGIMER), Chandigarh, showed that in most of cases i.e. 88.3% there was no home visit given by the health worker during pregnancy. In rest of cases home visit was given by the health workers<sup>5</sup>.

In our study there was an association between gravidity and quality of ANC. It was statistically significant with  $\chi^2 = 10.900$  ( $p = 0.028$ ). Among primigavida 18.92% received good antenatal care, followed by 72.97% average and 8.11% poor ANC was received. In gravid-2, 7.14% of pregnant women were received good ANC, followed by 73.81% pregnant women were received average ANC and 19.04% were received poor ANC. In gravid 3 or more 8.82% were received good ANC, followed by 61.76% average and 29, 41% received poor quality of ANC.

A study conducted by ICMR task force showed that there was reduction in proportion of women obtained antenatal care with increasing parity which was statistically significant with  $p=0.0026$ <sup>6</sup>.

## CONCLUSION

Our study concludes that overall quality of ANC was good. But small group of pregnant women did

not receive even average ANC. Home visits were not provided by the female health worker and Regular ANC was taken from district hospital, the frequency of the health visits to the sub centre area was very less. The food intake of pregnant women was significantly less as compared to RDA. The diet of pregnant women was found to be deficient in both calorie and protein.

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# Comparison of Hair Follicle and Skin for Ante Mortem Detection of Rabies: A Molecular Approach

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## ABSTRACT

**Background:** Rabies is an enzootic, fatal disease and early detection of this disease is necessary. Till now a reliable diagnosis is possible only after death of animal.

**Objectives:** So the present study was undertaken to use the molecular approaches like nested RT-PCR and SYBR Green real time PCR for early diagnosis of rabies in suspected animals using less invasive non neural tissues like skin biopsy and hair follicles.

**Method:** 12 cases of rabies suspected live animals were presented to the Veterinary Clinics, GADVASU, Ludhiana, India.

**Results:** The sensitivity of nested RT-PCR for hair follicles and skin samples was 50% and 57.1% respectively. A sensitivity of 62.5% and 71.4% was observed with real time PCR in hair follicles and skin samples.

**Conclusion:** We suggest that non-invasive molecular approaches may be used for the early and accurate diagnosis of rabies in animals.

**Keywords:** *Diagnosis, Hair Follicle, Skin, Rabies*

## INTRODUCTION

The rabies virus (RV) and the rabies-related viruses belong to the genus of *Lyssavirus*, the member of the *Mononegavirales* order, *Rhabdoviridae* family. Lyssaviruses have an unsegmented negative-stranded RNA genome, coding five structural proteins<sup>1</sup>: N (nucleoprotein), G (glycoprotein), M1 (phosphoprotein), M2 (matrix protein), and L (polymerase). Rabies viruses cause acute encephalomyelitis. The disease affects all mammalian species including humans. Three methods are used for routine diagnosis viz. the direct fluorescent antibody test (FAT), mouse inoculation test (MIT), and rabies tissue culture inoculation test (RTCIT). But the sensitivity of these methods is reduced, especially when the brain tissues are in a decomposed state<sup>2</sup>. Thus, traditional methods of rabies virus detection need to be confirmed by the alternative methods.

Recently, a great improvement in molecular biology methods has been achieved. Therefore the traditional methods can be replaced by molecular approaches like polymerase chain reaction (PCR). Nested RT-PCR and real-time PCR seem to be more reliable and more sensitive than traditional methods used for rabies diagnosis. They are widely used as confirmatory methods in many microbiological and virological laboratories including those for rabies diagnosis as well<sup>3-6</sup>.

These techniques allow the detection of viral genetic material in a relatively short time. The real time PCR is especially useful for that purpose as it does not require visualisation of the amplification product in agarose gel and the results are observed during the run of the test. This makes the method more rapid than the nested RT-PCR. Beside of the pathogen detection, real-time PCR allows also for its quantification<sup>1</sup>. Due

to the fatal course of the disease, the infection with rabies viruses needs accurate and rapid virus detection. So the present study was directed for the ante mortem diagnosis of rabies in animals using less invasive non neural tissue by using nested RT-PCR and SYBR Green real time PCR.

## METHODOLOGY

### Clinical specimens

The skin samples and hair follicles were collected from 12 animals suspected of rabies, which were presented to the Veterinary Clinics, GADVASU, Ludhiana, India. The skin samples were collected with the help of biopsy punch from the nape of neck and stored at -20°C. Hair follicles were extracted from the muzzle, pole and nape of neck. Minimum of 20 hairs were extracted. Care was taken while extraction of hairs as virus resides in the small sensory nerves adjacent to the hair follicles.

### RNA extraction and cDNA synthesis

Total RNA in the specimens, positive and negative controls was extracted using Qiazol (Qiagen, USA) according to the manufacturer's instructions. The RNA was subjected to cDNA synthesis using a primer RabN1 (Table 1) and subjected to 65°C for 10 min, followed by 37°C for 15 min, chilled on ice and briefly spun down. Reverse transcriptase (Qiagen, USA) mix was prepared and subjected to conditions 37°C for 2 h, 95°C for 5 min and chilling on ice for 5 min in a thermal cycler (Eppendorf). This cDNA was used for amplification in both the nested and the real time PCR assays in this study. Considering that the N gene is the most conserved in the Lyssa viruses (except some domains of the L protein gene) and that the sequence data concerning this gene are the most exhaustive, we used primers in the N gene that were shown to allow amplification of a wide range of genetically diverse lyssa viruses<sup>7</sup>.

Table 1. Details of primers used in the study

Primer name	Nucleotide sequence 5'-3'	Position	Sense
RabN1	gctctagAACACCTCTACAATGGATGCCGACAA	59-84	+
RabN5	GGATTGAC(AG)AAGATCTTGCTCAT	1514-1536	-
RabNF	TTGT(AG)GA(TC)CAATATGAGTACAA	135-156	+
RabNR	CCGGCTCAAACATTCTTCTTA	876-896	-
O1	CTACAATGGATGCCGAC	66-82	+
R6	CCTAGAGTTATACAGGGCT	201-183	-

### Nested RT-PCR assay

The procedure used for the nested PCR was essentially that described earlier<sup>7-8</sup> with minor modifications. Briefly, 10 µl of cDNA was subjected to a first round amplification using RabN1 and RabN5 primers (30 pmol/µl) (Table 1), DNTP's and Taq polymerase for 95°C for 2 min followed by 35 cycles of 95°C for 1 min, 55°C for 1 min, 72°C for 1 min 30 s and a final extension step at 72°C for 5 min. For the second round, 5 µl of first round PCR product was used and subjected to initial denaturation at 95°C for 2 mins, followed by 35 cycles of 95°C for 1 min, 50°C for 1 min, 72°C for 1 min and a final extension step at 72°C for 5 min. The nested PCR product had a size of 762 bp.

### SYBR Green real time PCR assay

A real time SYBR Green PCR assay was carried out in 25 µl PCR mixture volume consisting of 12.5 µl of SYBR Green I master mix (Qiagen, USA) with 1 µl

of primers O1 and R6 (3 pmol/ µl) (Table 1) and 5 µl of the cDNA prepared using RabN1 primer. Amplification was carried out at 55°C for 2 min, 95°C for 10 min, followed by 40 cycles in two steps: 95°C for 15 s, 60°C for 1 min. Amplification, data acquisition and analysis were carried out by using ABI 7500 instrument and ABI prism SDS software. This software coupled to the ABI system determines the cycle threshold (Ct) that represents the number of cycles in which the fluorescence intensity is significantly above the background fluorescence.

## RESULTS

### Nested RT-PCR

Amplification with primers RabN1 and RabN5 yielded a 1477 bp first round product while amplification with RabNF and RabNR yielded a 762 bp second round product. Amongst the 12 hair follicle samples, 4 (33.3%) samples were positive and 4

samples were true negative confirmed with post mortem results of immunofluorescence and RT-PCR on brain biopsy samples. The sensitivity of nested RT-PCR for hair follicles in our test was 50%. Skin samples were obtained from 11 animals, out of which 4 (36.36%) were positive. Sensitivity with skin samples was 57.1%. Specificity in both cases was 100%.

### SYBR Green real time

For amplification in real time PCR oligonucleotides O1 and R6 (Table 1) were used and the PCR product was 135 bp in length. A typical amplification plot and melting curve analysis for the determination of the specificity. The cycle threshold (Ct) of the positive control was at the 26th cycle while most of the clinical samples had Ct values ranging from 26 to 29 cycles. In order to determine whether they were signals obtained from genuine PCR products or spurious signals we used melting curve analysis. A sharp peak was noted at 78°C for the positive control as well as all samples that were positive on or before the 29th cycle. On the contrary, samples that yielded a positive result beyond the 35<sup>th</sup> cycle showed diffuse shallow peaks obtained over 70–75°C temperature range represent primer dimers. With this technique, 5 out of 12, hair follicle samples (41.6%) and 5 out of 11 skin samples (45.45%) were positive. The sensitivity of this test was 62.5% and 71.4% for hair follicle and skin respectively. In this case specificity was again 100%.

## DISCUSSION

Conventional techniques used for postmortem diagnosis of rabies are of limited value to support the ante mortem diagnosis of the disease<sup>9-10</sup>. Conventional diagnostic methods such as the FAT cannot be applied with clinical samples such as saliva, milk, urine and hair follicle for laboratory confirmation. Molecular diagnosis has been adopted to detect viral nucleic acid in ante mortem or post mortem specimens. RT-PCR has been used successfully for detecting the viral nucleic acid of rabies virus in ante mortem specimens. Molecular detection by RT-PCR technique has the highest sensitivity, but it requires standardization and very stringent quality control in order to avoid false results<sup>11</sup>. The RNA of rabies virus can be detected in several biological fluids and samples e.g. saliva, CSF, tears, urine, skin biopsy and brain samples. Saliva and neck skin biopsy samples are the most widely studied specimens for attempting antemortem diagnosis<sup>11-12</sup>.

The aim of the present study was to establish a rapid and sensitive molecular diagnostic method for ante mortem diagnosis of rabies. Accordingly, we evaluated two molecular techniques nested RT-PCR and SYBR Green Real time PCR, for the detection of rabies viral RNA in animal skin samples and extracted hair follicles. To avoid major mismatches due to rabies virus genetic diversity, we designed oligonucleotides (Table 1) that recognize specific and highly conserved sequences on the N protein. None of the skin samples obtained from healthy controls were positive in either the nested or the Real time PCR indicating that the primers were indeed specific to rabies virus. Skin samples from 51 patients were tested<sup>13</sup> by heminested RT-PCR that confirmed the presence of rabies virus nucleic acid in 43 cases and observed a sensitivity >98% and specificity as 100% with skin biopsy specimens. RT-PCR assay along with direct immunofluorescence test on skin biopsy specimens has been recommended<sup>11</sup> as a simple testing protocol for intravital diagnosis of rabies.

We were able to detect rabies virus RNA in 5/11 skin samples that we tested. In the present study most of the skin samples were collected 3-4 days after manifestation of clinical symptoms. Perhaps the diagnosis could have been confirmed by nested RT-PCR in the remaining 3 animals had a second and third sample of skin and hair follicles collected later in the course of the disease been available for testing. Conventional RT-PCR has been reported to be a reliable test for ante mortem diagnosis in two other separate case reports<sup>12,14</sup>. They observed that detection of rabies specific antigen in skin biopsies from nape of the neck and hand generated a positive result with RT-PCR. The probability of successful antemortem detection of rabies virus using neck skin samples is high<sup>15</sup>.

In our study, a sensitivity of 50% and specificity of 100% was obtained with nested RT-PCR while with SYBR Green it was 62.5%. A very less number of workers have worked diagnosis of rabies from hair follicles in human beings and there is no such report in animals till now. Rabies RNA was demonstrated<sup>16</sup> in the ends of the hair follicles. Fifty hair samples were extracted from one patient instead of excising skin with hair follicles from the nape of the neck, obtained 4 days after onset of symptoms. Rabies was diagnosed with a sensitivity of 50% from hair follicles in 26 patients during a study<sup>17</sup> conducted on 56 patients from 1998-2009. Nucleic acid sequence-based amplification has

been used<sup>18</sup> for detection of rabies virus RNA in saliva, urine and extracted hair follicles in 21 of 23 confirmed rabies patients on the first day of hospitalization.

In summary, real time PCR and nested RT-PCR targeting the N nucleoprotein gene can be useful, specific, and sensitive if applied to skin biopsy samples, from animals suspected to have rabies. Results correlate well with those of the fluorescent antibody test performed on brain biopsy specimens of same animals after their death. As skin sample is a superficial tissue sample which is easy to collect, we urge that skin biopsy samples be obtained from animals with risk factors for rabies and neurological symptoms that are consistent with rabies. Hair follicles are even less invasive than skin biopsy samples. The diagnosis should not be relied on only on test and one sample. Confirmation of the disease should be obtained by series of tests on various samples.

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# Molecular Detection of Rabies from Milk

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## ABSTRACT

**Background:** Outward spread of rabies virus from the CNS leads to infection of almost all organs and have been reported in various secretions and excretions viz. saliva, urine, CSF, tears (corneal smear). Although transmission of rabies virus from consuming unpasteurized milk from an infected animal is theoretically possible, no human or animal has ever been reported to develop rabies via this route. Neither there had been any practical proof of making claim about shedding of rabies virus in milk. This work aimed to identify the presence of rabies virus in unpasteurized raw milk from naturally-infected animals that were confirmed positive for rabies by FAT on brain tissue.

**Method:** Out of total 25 animals showing clinical signs of rabies, milk sample was obtained from 17 lactating animals. Brief history was recorded and an attempt was made by employing advanced molecular approach TaqMan real time PCR on milk samples with an aim to detect the presence of rabies viral RNA. Confirmatory diagnosis of rabies was made by applying immunofluorescence techniques on brain tissue after death of an animal.

**Results:** The present finding depicts the presence of rabies viral RNA in 4/17(23.52%) milk sample with a sensitivity of 60% when compared with FAT applied on brain tissue.

**Conclusion:** A complete perusal of literature revealed that there had not been a single reported study to detect the presence of rabies viral RNA in milk samples. Although with this study it is now proved practically that rabies viral RNA can be found in milk samples from lactating animals however the infectivity of unpasteurized raw milk needs to be evaluated.

**Keywords:** Milk, TaqMan Real Time PCR, Intravitam, Rabies

## INTRODUCTION

Rabies is a viral, zoonotic and fatal disease, which causes encephalomyelitis in humans and animals. The annual number of deaths worldwide caused by rabies is estimated to be 55 000 and about 10 million people receive post-exposure treatments each year after being exposed to rabies-suspect animals<sup>1</sup>. Considering rabies as serious public health threat, huge expenditure on vaccines and most painful and horrible death, rabies needs to be monitored at every step for effective prevention and control.

## METHODOLOGY

Milk samples were collected from 17 animals (14 buffaloes, 3 cows) suspected to be rabid and were presented to the Veterinary Clinics, GADVASU,

Ludhiana, Punjab and Civil Veterinary Hospital from different districts of Punjab. Soon after the clinical diagnosis was made, the milk samples were collected from the rabies suspected lactating animals in sterilized vials by strip milking of teats. The vials were closed tightly to avoid any contamination and stored at -80°C until further processing of samples. Milk samples obtained from two healthy animals served as negative controls. Rabies positive brain homogenate was used as positive control.

Total RNA from milk samples, positive and negative controls was extracted using Qiazol (Qiagen, USA) according to the manufacturer's instructions. The RNA was subjected to cDNA synthesis using a primer RabN1 (30 pmol/μl) and subjected to 65°C for 10 min and was later snap cooled on ice and briefly

spun down. cDNA synthesis was done using high-capacity cDNA reverse transcription kit (Applied Biosystems, USA).

Reverse transcriptase (Applied Biosystems, USA) mix was prepared and subjected to conditions 25°C for 10 min, 37°C for 2 h, 85°C for 5 min and chilling on ice for 5 min in a thermal cycler (Eppendorf). RNA and cDNA concentration was measured using Nano Drop Spectrophotometer (Nanodrop Technologies, CA) in ng/µl and quality was checked as a ratio of OD 260/280.

**TaqMan real time PCR assay:** Considering the N gene that is most conserved in *Lyssavirus* and sequence data concerned with gene are most exhaustive<sup>2</sup>. All TaqMan primers and probes were newly designed at School of Animal Biotechnology, GADVASU by the Primer Express 3.0 computer program (Applied Biosystems, Foster City, Calif.). Sequences were obtained by using the default settings of the program. From this alignment, areas of relative conservation were selected as target regions for placement of the TaqMan primers and probes. These regions were used as input for Primer Express to generate the optimal primer and probe sequences according to the default settings. TaqMan primer and probe details are shown in (Table 1). TaqMan probe was labeled at the 5' end with a fluorescent reporter dye (FAM) and at the 3' end with a quencher dye (TAMRA). Primer and probe concentrations were optimized according to the manufacturer's recommendations.

The TaqMan real time assay was standardized with 20 µl PCR mixture volume consisting of 12.5 µl of TaqMan master mix (Applied Biosystem, USA) with 1 µl of primers Rab-8F and Rab-8R (400nm/ µl) and 1 µl probe Rab-8Pr. (250nm/ µl) (Table 1), 2.5 µl of the cDNA prepared using RabN1 primer and 2 µl of RNase free water was added to make a final volume. Amplification was carried out at 50°C for 2 min, 95°C for 10 min, followed by 40 cycles in two steps: 95°C for 15 s, 44°C for 1 min. Amplification, data acquisition and analysis were carried out by using ABI 7500 instrument and ABI prism SDS software which determines the cycle threshold (Ct) that represents the number of cycles in which the fluorescence intensity is significantly arose above the background fluorescence.

Since, FAT is recommended worldwide as a gold standard for diagnosis of rabies on neural tissue, after death of animal by World Health Organization<sup>3</sup>. So, results obtained in TaqMan real time PCR on milk samples were compared with FAT for detecting the sensitivity of this molecular technique.

## RESULTS

An attempt made to detect rabies viral RNA from milk samples by TaqMan real time PCR assay has successfully confirmed rabies in 4 cases (Table: 2). A sensitivity of 60% was obtained when compared with FAT applied on brain tissue.

**Table 1: Details of newly designed primers and probe for TaqMan real time PCR**

Primers and Probe Name	Sequence	Gene	Length	Positions (nucleotides)	T max (°c)	Remarks
PrimerRab-8F	5'-TTG ACG GGAGGA ATG GAA CT-3'	N	20	434-453	62	Newly designed
PrimerRab-8R	5'-GAC CGA CTA AAG ACG CAT GCT-3'	N	21	477-497	64	Newly designed
ProbeRab-8Pr	5'-FAM- AGG GAC CCC ACT GTT-TAMRA-3'	N	15	458-472	48	Newly designed

**Table 2: Detection of rabies from milk samples**

Sr No.	Species	Age	Sex	Ct values (cycle threshold)	TaqMan real time PCR
1.	Buffalo	6 years	F	39.657	-
2.	Buffalo	5.5 years	F	26.554	+
3.	Buffalo	6 years	F	39.035	-
4.	Buffalo	5 years	F	38.319	-
5.	Buffalo	3.5 years	F	25.425	+
6.	Buffalo	5 years	F	31.023	+
7.	Buffalo	6 years	F	35.93	-
8.	Cow	7 years	F	39.035	-
9.	Buffalo	7 years	F	36.362	-
10.	Buffalo	5.5 years	F	36.053	-

**Table 2: Detection of rabies from milk samples (Contd.)**

Sr No.	Species	Age	Sex	Ct values (cycle threshold)	TaqMan real time PCR
11.	Buffalo	7 years	F	39.867	-
12.	Buffalo	6 years	F	39.546	-
13.	Cow	4 years	F	37.194	-
14.	Buffalo	4.5 years	F	32.023	+
15.	Cow	6.5 years	F	36.053	-
16.	Buffalo	5 years	F	38.765	-
17.	Buffalo	6 years	F	39.567	-
	Total				4/17

**Table 3: Sensitivity comparison of TaqMan real time PCR on milk with FAT.**

Test	FAT on brain smears(Positive)	FAT on brain smears(Negative)	Total
TaqMan real time PCRMilk (Positive)	4	0	4
TaqMan real time PCR Milk (Negative)	8	5	13
Total	12	5	17

$$\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}} \times 100 = \frac{12}{12 + 8} = 60.0\%$$

## DISCUSSION

Raw unpasteurized milk is consumed directly by much larger segment of the population. Many of outbreaks of disease in humans have been traced to the consumption of raw unpasteurized milk<sup>4,5</sup>.

Infection of salivary glands (and thus viral excretion) depends on centrifugal neural spread of virus from the central nervous system (CNS) and transfer of virus from axons to glandular epithelial cells. In addition to the salivary glands, the adrenal medulla, nasal mucosa, cornea and epidermis are frequently infected via spread in peripheral nerves<sup>6</sup>.

Rabies virus RNA can be detected in a variety of biological fluids and samples (e.g. saliva, CSF, tears, skin biopsy sample and urine)<sup>7</sup>.

The possibility of transfer of virus from axons to glandular epithelial cells of the mammary gland cannot be ruled out. Though lots of unreported studies deny the presence of rabies virus in unpasteurized raw milk, this is the first ever made successful attempt at global level for intravital rabies diagnosis from milk samples.

It was concluded that rabies virus may be present in the unpasteurized raw milk samples from the rabies positive lactating animals and such milk should not be used in human consumption or can be used after pasteurization.

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# Drug Inventory Control and Management: A Case Study in Rural Health Training Center (RHTC), Tasgaon

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## ABSTRACT

**Background:** Public image of a Health Center improves when essential items are made available. Inventory control is the part of material management, which is a modern technical tool to minimize and economize expenditure on material.

**Objectives:** 1. To study existing drug inventory pattern of RHTC, Tasgaon., 2. To develop a system for effective inventory control and cost containment.

**Method:** A cross-sectional survey was carried out in central drug store, RHTC, Tasgaon. Drug inventory data was collected by a trained investigator for the financial year 2003-2004 through a pre-tested schedule.

**Results:** The annual drug expenditure was found to be 5.13 % of the total budget. The economic picture of each drug should be calculated by cyclic & 2-bin system to decide Economic Order Quantity (EOQ) and time of order placement. The combination of ABC-VED gives a concise view on cost and necessity of drugs. It was observed that 25% cost could be saved by effective drug inventory.

**Conclusion:** Record register needs updating. There exists a wide scope to save expenditure on drugs by Inventory Control Methods.

**Keywords:** Drug Inventory Control, Drug, EOQ, ABC-VED Analysis

## INTRODUCTION

Public image of a Health center improves when essential items are made available. Managerial skill of health personnel is one of the requirements of provision of Primary Health Care. Material Management is a modern technical tool to minimize and economize expenditure on material. Inventory control is a part of material management.

Inventory can be identified for those goods that are procured, stored and used for daily requirements of health center. The basic objective for any supply management system is to ensure the right supplies, in the right quantities made available to the right locations at the right time where those are required<sup>1</sup>. It is the responsibility of consumer / consumer department to come and collect the material from the store.

Inventory Management is the process of deciding what and how much of various items are to be kept in stock at optimum overall costs to the health care system. Inventory Control is the tool of modern management technique to decide the level of inventory, that can be economically maintained and to balance the ensuing cost, which will keep the total cost down.

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Some factors are in mutual conflicts, which require a scientific approach to get an optimal solution. This can be done by EOQ model. Also Re-order Level (ROL) is essential to intimate the purchase department for fresh supply of the material, which depends on Lead Time (LT), consumption rate and buffer stock (BS).

Various Inventory Control Techniques are used for finding EOQ, ROL, BS and optimum number of orders. Among them EOQ has been commonly used to balance the carrying cost of inventory with the cost of running out of an item. The combination of systems like ABC-EOQ, ABC-VED-EOQ has to be effective and efficient.

**MATERIAL & METHOD**

The present study was carried out in central drug store, RHTC, Tasgaon of PSM department attached to Govt. Medical College, Miraj. Drug inventory data was collected by a trained investigator for the financial year 2003-04 through a pre-tested schedule. Annual total expenditure of RHTC, Tasgaon was obtained from office records and the annual expenditure of 44 drugs was calculated from the records of central drug store. Data was analysed by inventory control techniques<sup>2</sup> i.e. EOQ, ABC and VED. EOQ was used for finding order size. For ABC analysis, the cumulative cost was

calculated from annual expenditure of each drug arranged in descending order. The list of drugs was divided into three groups based on cumulative cost. Generally, in category 'A', 10% of drugs consume 70% of the cost of drugs, in category 'B', 20% of drugs consume 20% of the cost of drugs, and in category 'C', 70% of drugs consume 10% of the cost of drugs<sup>3</sup>. The VED analysis was done on critical value of the entire drugs inventory into Vital (V), Essential (E) and Desirable (D) categories<sup>4</sup>. Vital drugs should always be available in sufficient quantity and sufficient buffer stock should be maintained to ensure 100% availability at all times. Essential drugs are those without which an institution can function but which may affect the quality of service to some extent. Desirable drugs are those items without which an institution's functioning will not suffer. Thus list of all drugs in the medical stores were included in VED category. Then a matrix was formulated by combining the ABC and VED analysis, which helped to differentiate important from unimportant group. These combinations were divided into three categories. Category I comprising AV, AE, AD, BV, CV groups of drugs should be tightly controlled. Category II comprising BE, BD, CE groups of drugs should be moderately controlled. Category III comprising CD group of drugs should be loosely controlled.

**FINDINGS**

**Table I: Inventory Control Analysis of Anti-Rabies vaccine (ARV)**

Predictor Variables		Outcome variables	
Quantity demand	400 Vials	Lead time	27 Days
Quantity consume	366 Vials	Buffer stock	30 Vials
Cost consume (Rs.)	45907.10	Re-order level	55 Vials
Unit cost (Rs.)	125.43	EOQ	65 Vials
No. of orders	4	Optimum No. of orders	6
Holding cost (Rs.)	25.09	Optimum period of supply	2 Months
Ordering Cost (Rs.)	150	Excess cost (%)	7.02

Note: Outcome variables are derived by applying EOQ model

**Table II: ABC and VED analysis of drugs.**

Drug category	V		E		D		Total	
	No. of drugs	Annual exp.	No. of drugs	Annual exp.	No. of drugs	Annual exp.	No. of drugs	Annual exp.
A	1(2.27)	45907.10(32.07)	5(11.36)	46872.93(32.75)	0	0	6(13.64)	92780.03(64.82)
B	1(2.27)	3727.24(2.6)	11(25)	32590.28(22.77)	3(6.82)	6811.20(4.76)	15(34.09)	43128.72(30.13)
C	7(15.91)	2185.96(1.53)	14(31.82)	4729.50(3.3)	2(4.55)	306.34(0.22)	23(52.27)	7221.80(5.05)
Total	9(20.46)	51820.30(36.2)	30(68.18)	84192.71(58.82)	5(11.36)	7117.54(4.97)	44(100)	143130.55(100)

Figures in the parenthesis are percentage of the total

**Table III: Potential drugs cost saved by effective Inventory Control.**

Excess exp. (%)	No. of drugs	Actual excess cost incurred
< 10	2	3622.90 (1.90)
10 – 20	2	3780.11 (1.99)
20 – 30	3	9030.25 (4.75)
30 – 40	1	134.99 (0.07)
40 – 50	7	5490.82 (2.89)
> 50	11	25015.46 (13.15)
Total	26	47074.53 (24.75)

Figures in the parenthesis is the percentages of annual total expenditure

The annual total expenditure of RHTC, Tasgaon during the year 2003-04 was Rs.37, 07,000 with OPD attendance of 13,426 and indoor admission 230. The total drug purchase cost on 44 drugs was Rs.1, 90,205, which is about 5.13% of the annual total expenditure and actual cost of drugs consumed was Rs.1, 43,131, which is about 4.25% of the annual total expenditure.

The detailed analysis of Anti-Rabies Vaccine (ARV) is presented in Table I. As per the records available the unit cost of ARV vial was Rs.125.43 and holding and ordering costs was Rs.25.09 & Rs.150 respectively and number of orders was 4. By applying EOQ model, the predicted outcome for EOQ, BS & ROL was 65, 30 & 55 vials. Also the optimum number of orders increased to 6 and the overall cost saved by applying EOQ model was 7.02%.

The distribution of drugs as per ABC, VED and combination of ABC-VED are presented in Table II. This table shows split up of the total expenditure incurred on ABC-VED categories of all drugs.

In ABC analysis, 13.64% of the total drugs consumed about 64.82% of the total expenditure in category 'A', 34.09% of the total drugs consumed about 30.13% of the total expenditure in category 'B' and 52.27% of the total drugs consumed about 5.05% of the total expenditure in category 'C'.

In VED analysis, 20.46% of the total drugs consumed about 36.2% of the total expenditure in category 'V', 68.18% of the total drugs consumed about 58.82% of the total expenditure in category 'E' and 11.36% of the total drugs consumed about 4.97% of the total expenditure in category 'D'.

The potential drugs cost saved by effective Inventory Control is presented in Table III. 11 drugs incurred more than 50% excess expenditure, which

accounted for 13.15% of annual expenditure. 4.75% of annual expenditure was incurred on account of 20-30% excess expenditure for 3 drugs and 30-40% excess expenditure of 1 drug contributed to 0.07% of annual expenditure.

## DISCUSSION

We found that the annual drug expenditure was 5.13% and annual drugs consumed expenditure was 4.25% of the annual total expenditure. The findings are very less than the reported range of 12 to 45% in other studies.<sup>5,6</sup>

Currently the drug demand is based on past experience. For purchase of drugs, inventory techniques are not followed. This practice may increase the drug cost and also it leads to either excess or deficient drug quantity. Most of the drugs used have to be purchased on rate contract basis with the Government of Maharashtra for a specified period of supply or from the Governmental firms producing these drugs and by local purchase. Buffer Stock was adequately maintained. Lead Time was accurate. The materials are properly stored and free from damage and possibility of pilferage. Drugs should be made readily available when required for issue against the authorised requisition to indentors. Indent based distribution of drugs should be followed along with responsibility of consumer department to collect the drugs personally from the store. Drug record was not found properly maintained which may lead to wrong predicting. It can be improved by periodic stock verification, which is necessary to ensure the correctness of the stock shown in registers. Excess drug quantity was found in about 18 per cent drugs. If too much stock is stored, then lot of capital is locked, space is unnecessarily occupied, carrying cost is increased, the material may deteriorate and there is greater danger of pilferage and the drug may become obsolete expiry date. Also it was observed that in few drugs, the stock was always found inadequate. If the stock is too little, drug will have to be purchased at higher cost, leading to more procurement cost. To decide the EOQ and the time of order placement the economic picture of each drug can be calculated by Cyclic and 2 Bin System. As per EOQ model applied to ARV, the EOQ per order is 65 vials; at this point the holding & ordering cost are equal and the number of orders increased up to 6. ROL is 55 vials; whenever the stock level touches ROL, place another order of 65 vials. BS is 30 vials, it is the additional stock needed for delay



in delivery of drugs, so as to avoid no stock position. By this method, you can save 7.02% cost of the drug.

If we consider ABC analysis done, category 'A' needs to be tightly controlled because it has fewer drugs i.e. 6 consuming most of the drug budget, category 'B' needs to be moderately controlled and category 'C' needs to be loosely controlled. Similarly only VED analysis, gave information on the nature of drugs that were to be maintained in the stock at any given point of time and the category V & E items require to be tightly controlled as compared to category D drugs. The combinations of ABC-VED give a concise overall view on cost and necessity of drugs. The expensive drugs such as AV, AE, AD, BV and CV have to be under regular supervision, so as to avoid a no stock position. At the same time AV, AE and BV drugs have to be frequently procured in lesser quantities, so that the money is not blocked<sup>7</sup>. The CV group with 7 drugs consumed 1.53% of the total expenditure. This contains drugs of low cost but high criticality, these can be procured once a year and to save management efforts, ensure year round availability and avoid stockouts, without locking substantial capital in the stock, carrying cost and this mean less loss to the government even if these drugs expire.

Reduction of excess purchased 26 drugs is one of the essential requirements of effective inventory control and whose cost is 25% of the annual expenditure incurred<sup>8</sup>.

### CONCLUSION

Hence it is concluded that actual drug cost consumed in relation to annual budget is very less. There is a wide scope to save drug expenditure, which can be further utilized to purchase more drugs. The recommendations that can be suggested are training of concerned persons in drug inventory. Requirement of drugs should be based on scientific method and

drug cost consumed should be appropriate. Also drug records need updating.

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**Conflict of Interest:** Nil

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# Enhancing the Education and Understanding of Research in Community Health Workers in an Intervention Field Site in South India

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## ABSTRACT

**Background:** Community-level public health research engages a wide range of staff cadres. Community level workers with limited formal education are usually in first contact with the community and require training so that research interventions are carried out to high standards.

**Method:** In a community-based TB study in South India, a Professional Development Programme (PDP) was developed to optimize the quality of the research, and to make involvement in research more meaningful for all members of the research team. The programme started with a set of modules that were considered relevant for a community-based epidemiological study. Subsequently, new modules were developed based on the expressed needs of the study staff. Pre and post-tests were conducted for all modules. A qualitative assessment was conducted after 3 years.

**Results:** While initial 'pre-test' knowledge across modules was lower amongst community level field workers than staff of higher cadres, they achieved passing grade scores (>75%) with the programme. Longer term retention of knowledge over 6 months for the basic modules, was in excess of 75% for all staff. Focus groups discussions revealed that while many in the research team began work with an incomplete understanding of research methods and community health principles, investing time and resources in education beyond protocol training via the PDP realized long-term benefits to the research study and the individual staff, particularly the community level workers.

**Conclusions:** There is a need to enhance the capabilities of community health workers to be part of a research team in field settings, so as to optimize their performance while utilizing their existing skill sets.

**Keywords:** Community Health Workers, Education, Clinical Research

## INTRODUCTION

Recognition of the need for greater understanding of the societal determinants of health has increased community-level behavioral, policy and research interventions <sup>1</sup>, all of which need to be appropriately

conducted, documented and disseminated for wider use. Many of these interventions are conducted in developing countries which face the dual burden of infectious and non communicable diseases <sup>2</sup> and may be linked to new therapies, vaccines and diagnostics. Studies should be conducted appropriately, with fully informed community participation and individual informed consent, and to high standards of quality that meet the scrutiny of peer-review and independent audit <sup>3,4</sup>.

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Emphasis is often placed on identifying research investigators and higher level research personnel <sup>5</sup>, but

less thought may be given to the education, skills and training needed by those who are most likely to interact directly with the community. Community level workers are often hired locally as field research workers, change agents<sup>6</sup>, or peer educators<sup>7</sup>, because of their understanding of the local context and language, as well as cost and logistical reasons. Data collection and community education are among the jobs that these workers can perform effectively<sup>8</sup>. These varied roles of community level workers emphasise the need to enhance the professional knowledge of grass root workers in the area of research and optimal data collection.

### Method

Figure 1 indicates the relative numbers and education profiles of different categories of staff employed in on-going epidemiological studies aimed at preparing a field site for future vaccine trials and other community-level interventions; there are large numbers of field staff (community level workers and their supervisors) with relatively low levels of formal education as compared to other categories of staff (clinical; doctors, nurses and nursing orderlies – laboratory; laboratory research technicians and supervisory staff – others; administrative, quality assurance etc.).

We developed a Professional Development Programme (PDP), known locally as *Gnana Jyothi* (Light of Knowledge) which comprised various modules (Table 1) as interactive 2 to 3 hour sessions with Power Point presentations, interspersed with activities to enhance understanding and application. Modules had specified learning outcomes and were linked to a 'pre-test' and 'post-test'. Individuals who did not score at least 75% on the post-test had sessions in smaller groups or individually until they passed. All study staff went through the programme as it was felt that this would promote the idea of continuous adult learning as a concept among all staff. All staff were required to pass Level 1 (basic) modules within their first year of employment. Level 2 modules were offered as part of further education and training (Table 1). Unlike protocol training which focused on the operationalisation of the specific protocols, PDP modules focused on the "why" of the processes linked to the specific protocols and to clinical research in general. New modules were created to address specific articulated needs of the study team and included informed consent, growth monitoring of infants, and explaining blood collection. The PDP team also

developed teaching aids such as flash cards for the study team to use in the field.

## RESULTS

### Quantitative assessment of the programme

Across the categories of study staff, pre-test pass scores (Table 2) for the clinical research related level 1 modules (CRP and CROM) was low; between 14.7 % of field staff to 53% of clinical staff passed. The highest pre-test pass percentage for any Level 1 module listed above among the field staff was 59.9% (CID). In general, clinical and laboratory staff, who had higher levels of formal education, performed better at the level 1 modules with a pass percentage of between 50 (CROM) to 100% (CID). Pre-test scores for all Level 2 modules for the field staff were particularly low; ranging from a pass rate of just 5.8% (CRP) to 34.8% (CROM). Across all other categories of staff, pre-test scores for level 2 modules related to CRP and CROM were low (11.8 to 60.7%), indicating the need for education in these areas.

Available staff who underwent the modules were again reassessed 6 months later. Retention was generally high for clinical and laboratory staff (98 to 100% pass); in other staff, however, pass percentages dropped off to between 78 (other staff) to 83% (field staff). Retention with individual level 2 modules was lower than with Level 1 modules (46 to 74 Vs. 80 to 97 %). This suggested that refresher modules may be needed for certain categories of staff and for the higher level modules.

Qualitative assessment of the acceptability and value of the PDP

After approximately 3 years of the programme, focus group discussions (5-10 per group) were held with different cadres of study staff to understand their perceptions of the PDP.

Relevance and utility of programme for the job needs

The majority of the staff felt that the programme helped them do their job better and to better understand the specific study and the broader research context. The field staff were most appreciative, saying that they had received information about research and study procedures that was essential to communicate with the community and enroll study participants. They had also learned how to establish rapport with

community members and of the importance of obtaining truly voluntary, informed consent. The cadres who did not find the training particularly useful for performing their daily job were the data management centre staff, laboratory staff and a housekeeping staff member. All cadres of staff felt that the PDP successfully communicated the different roles and responsibilities of research team members and how integral each of them were to the success of the study; this helped to give more meaning to their jobs and to bring about a sense of cohesion as a research team.

#### Staff felt that the PDP could be improved with

1. More input from other departmental staff (non - PDP) in developing and delivering specific modules, such as laboratory techniques, quality assurance, data management, and research design.
2. A better response to the felt needs of the research team that were identified on an ongoing basis.
3. The PDP team spending more time in the field to understand and address the daily challenges faced by the study team.

#### Satisfaction with delivery

Cadres of staff hired at lower levels in the project organogram indicated that they were happy with the delivery of the PDP; the sessions were interactive and at the right level. Participants found the PDP team friendly, easily approachable, and ready to schedule sessions at their convenience. A few felt that the sessions were too long, and that there was some variability in the amount of interaction by module.

#### Career development and attitudes towards continuing adult education

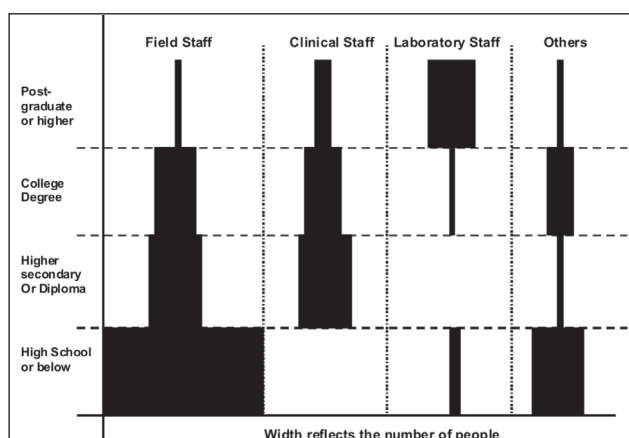
All the cadres felt that the PDP added value to their career development. They felt that the knowledge they acquired and the certificate issued would improve their future job prospects. All staff enjoyed the process of learning, and found it useful not only for their work and career development, but also in terms of personal satisfaction. Many staff mentioned that they had been able to communicate the contents of the modules to their families and in their communities, thereby spreading health literacy. Most cadres mentioned that they would have liked to attend further modules about broader health issues as they found this personally useful and interesting.

**Table 1. Content of the Basic and Advanced modules of the Professional Development programme offered to the study staff**

Module	Level of the Module	
	Basic (Level 1)	Advanced (Level 2)
<b>Clinical Infectious Disease(CID)</b>	Difference between infectious and non infectious disease, Types of microbes, Types of transmission, Defenses against infection	Routes of transmission for TB, HIV, Malaria, disease cycles, Active and Passive immunity, Need for new Tb vaccines, Public health measures to control HIV, TB and Malaria
<b>Clinical Research Practice (CRP)</b>	Explain GCP, GLP, Types of Clinical Research, Define protocol, Protection of human volunteers, Rules for informed consent	Basic guidelines of GCP, GCP related to QA, QC, adverse event reporting, time, specimen and document management, Role of Community Advisory Boards, Phases of clinical Trials
<b>Clinical Research Organization and Management (CROM)</b>	Life cycle of clinical research, Clinical Research and other research, Clinical Research team: roles and responsibilities	Research budget, Trial implementation process, Regulatory processes, Management systems, Study close out
<b>Epidemiology and Biostatistics</b>	Define epidemiology, Basic terms, Differentiate between types of studies, Advantages of a randomized controlled trial	Sources of bias, active and passive surveillance, Sample size, Goals of an epidemiological study
<b>Good Laboratory Practice (GLP)</b>	Define GLP, Areas of clinical research governed by GLP, Responsibilities related to GLP, Define SOP, Purpose of QA and QC	

**Table 2. Percentage of study staff who achieved the 75% correct response for 'pass' in the pre test of the various study modules, stratified by study staff category**

	Field Staff (Coordinators, Field Supervisors, Field officers, ORW)		Clinical Staff (PI, Co PI, Medical officers, Nurses)		Lab Staff (Supervisors, manager, technicians)		Others (QA, PDP, GA, Drivers, IT, Data entry)	
	N	%	N	%	N	%	N	%
<b>LEVEL 1</b>								
Clinical Infectious Disease	73	58.9	33	90.9	18	100	31	48.4
Clinical Research Practice	75	37.3	32	62.5	18	88.9	28	57.1
Clinical Research Organisation and Management	72	14.7	32	53.12	18	50	28	53.6
Epidemiology and Biostatistics	70	25.7	31	64.5	18	72.2	30	26.7
HIV	68	76.5	31	83.9	18	100	32	78.1
Good Laboratory Practice	68	52.9	32	90.6	18	88.9	30	56.7
<b>LEVEL 2</b>								
Clinical Infectious Disease	70	20	33	78.8	18	94.4	18	55.6
Clinical Research Practice – Session 1	70	12.85	31	48.4	17	52.9	16	37.5
Clinical Research Practice – Session 2	69	5.8	28	25	17	11.8	18	22.2
Clinical Research Organisation and Management	66	34.8	28	60.7	16	12.5	17	35.3
Epidemiology and Biostatistics	16	12.5	13	69.2	16	31.2	12	58.3



**Fig. 1. Distribution of education profiles of different categories of staff involved in the conduct of the studies. The majority of the community health workers (Field Staff) had an education of "high school or less".**

**DISCUSSION**

**The program had a positive learning outcome and return on the money and time invested**

- 1) There were gains in a) knowledge that was retained over time and b) perceived ability of the staff to perform their jobs and c) job satisfaction.
- 2) Despite their low pre-test scores, community level workers were able to achieve pass grade scores with the programme.

- 3) The PDP curriculum is a model that is applicable to a wide-range of community-based health research activities.
- 4) Providing broader education to community-level workers has the potential to develop a cadre of community health research workers that increases the national capacity to public health research to high standards.

In the long term, a certification of community health research workers would allow community level workers the opportunity to work in the broad area of community based research with recognition and dignity. The PDP we employed provides lessons on the development, acceptability, utility and support for such a certification programme. Health workers who could benefit from such additional training could include auxiliary nurse midwives, multipurpose workers, and nurses, among others, in the health sector. This programme would allow for better data collection linked to the concurrent evaluation of health programmes. In the health research area, the recognition of certified community health research workers by national funding agencies involved in health-related research would allow for some common criteria for recruitment of this cadre of workers into research project staff, with the ultimate benefit of improving the quality of research. The options

available for the creation of certified study programmes in this area are multiple including providing courses through open universities; these typically have a broad learner base, and are often low cost and flexible. Alternatives include skill-based initiatives through Ministries of Labour aimed at enhancing employability through common certification processes<sup>9</sup>.

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# Tobacco Epidemic in India

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## ABSTRACT

Health and education is an important mainstay for all individual in today's world and serves as the basis of economic productivity. The state of the epidemic of tobacco use in India was comprehensively described in the recently completed Global Adult Tobacco Survey (GATS). Tobacco use in India is more varied than in most countries. India is the world's third largest tobacco-growing country. Anti tobacco counseling is best suited for Indian scenario because it is inexpensive and effective. Dental practice in the 21st century should ideally move from a restorative orientation to one of broader promotion of health and well being and it would be unconscionable not to include aggressive tobacco intervention in that paradigm.

**Keywords:** Epidemic, Tobacco use, Tobacco Control, India

## INTRODUCTION

Tobacco use is a major preventable cause of premature death and disease. The vast majority of these deaths are projected to occur in developing countries wherein, India is no exception. In the Indian context, tobacco use implies a varied range of chewing and smoking forms of tobacco available at different price point reflecting the varying socio-economic and demographic patterns of consumption. The high magnitude of tobacco consumption takes a shape of epidemic that has not spared India. India's tobacco consumption in the form of smoked and smokeless product is the second largest in the world, surpassed only by China. An estimated one million Indians die annually from tobacco-related diseases and projections forecast that by 2020, tobacco will account for 13% of deaths in India.<sup>1</sup> Availability of irrefutable scientific evidence on its health hazards from well-conducted cohort and case-control studies during 1950s supported the pleas for tobacco control.<sup>2</sup> The World Health Organization (WHO) predicts that India will have the fastest rate of rise in deaths attributable to tobacco in the first two decades of the twenty first century.<sup>3</sup>

### History of Tobacco use in India

Tobacco introduced in India by Portuguese traders during AD 1600 was first available in the kingdom of

Adil Shahi, presently in Karnataka in South India. Asad Beg, ambassador of the Mughal Emperor Akbar, visited Bijapur during 1604-1605 and took back large quantities of tobacco from Bijapur to the Mughal Kingdom in the north and presented some to Akbar along with jewel-encrusted European-style pipes, where it was appreciated by everyone.<sup>3</sup>

Two hundred years later the British introduced commercially produced cigarettes to India and established tobacco production in the country.<sup>4</sup> In the late nineteenth century, the bidi industry began to grow in India.<sup>5</sup> Tobacco consumption continues to grow in India at 2-3% per annum.<sup>6</sup>

### Epidemic of Tobacco Use

Petersen RB, Gupta PC, Pindborg JJ, Singh B (1972) analysed the association between oral leukoplakia and possible etiological factors at a Bombay Hospital and found that bidi smoking and age were the most common etiological factors. They concluded that the most frequent site in smoking habit group was the commissures (47.1%) and in the chewing habit group was the buccal mucosa (71.7%). They also found that the labial commissures were the region most often involved (42.8%) followed by buccal mucosa (41.9%) with a tendency of leukoplakias to involve the right side more often.<sup>7</sup>

**Table 1: Distribution of 325 patients with leukoplakias of the commissures and buccal mucosa according to symmetry of lesions<sup>7</sup>**

Location	Single lesion left	Single lesion right	Symmetrical lesion	Total
Commissures	56 (35.4%)	36 (22.8%)	66 (41.8%)	158
Buccal mucosa	76 (45.5%)	39 (23.4%)	52 (31.1%)	167
Total	132	75	118	325

Mehta Fali S, Pindborg JJ (1974) conducted a study on spontaneous regression of oral leukoplakias among Indian villagers. In Ernakulum, leukoplakias appear to regress more often than chewers than among smokers. They concluded that although 23.2% of the patients with regressed leukoplakias had changed their chewing or smoking habits, none had stopped either chewing or smoking.<sup>8</sup>

P.C. Gupta (1996) conducted a study on survey of sociodemographic characteristics of tobacco use among 99,598 individuals in Bombay and stated that most common smokeless tobacco practice among women was mishri (44.5% of smokeless users) and among men betel quid with tobacco (27.1%). Chewing areca nut without tobacco was rare (<0.5%).<sup>9</sup>

S.K. Jindal, A.N. Aggarwal, K. Chaudhry, S.K. Chhabra, G.A. D'Souza, D. Gupta et al. (2006) conducted a study on "Tobacco Smoking in India: Prevalence, Quit-rates and Respiratory Morbidity". There were 11496 (15.6%) ever smokers in the study sample of 73605 subjects. Among 10756 males (28.5%) were ever smokers and 740 females (2.1%) were ever smokers. The mean number of cigarettes/bidis smoked per day was 14 ( $\pm$  11.5) and the mean age of starting smoking was 20.5 ( $\pm$  20.0) years. Authors concluded that trial proportion of population in India has current or past smoking habit with higher prevalence among males than females.<sup>10</sup>

The epidemic of tobacco use in India was described in the Global Adult Tobacco Survey (GATS).<sup>11</sup> The GATS data show over 35% of adults in India use tobacco, primarily smokeless, but there are 42 million

users of both smokeless and smoked products and an additional 69 million who only smoke.<sup>11</sup>

Only 20% of total tobacco consumption is in the form of cigarettes. A common alternative to traditional cigarettes is the bidi accounting for the largest proportion of tobacco consumption in India, at about 40%. Tobacco is also used in the hookah, pan masala or gutkha, chutta and mishri. An estimated 65% of men and 33% of women use some form of tobacco. While the prevalence of smoking among men and women differs substantially—35% & 3% respectively — both use smokeless tobacco products to approximately the same extent.<sup>12</sup>

A survey in Mumbai city showed the prevalence of tobacco use to be 69.3% among men over 35 years of age and 57.5% among women above 35 years.<sup>2</sup> A larger survey in 2001 showed that the prevalence of current tobacco use above 10 years of age in Uttar Pradesh was 50% among men & 9.1% among women; whereas, the prevalence in Karnataka was 41% among men & 14.9% among women.<sup>2</sup>

A review of the Global Youth Tobacco Survey (GYTS) data throws up an extremely wide range of variation regarding tobacco use. India has the highest and lowest rates for current use of any tobacco product in the world: 62.8% in Nagaland to 3.3% in Goa respectively.<sup>13</sup> Many studies conducted during 1989-2004 have shown that tobacco use among girls students in schools<sup>14</sup> colleges<sup>15</sup> and medical and dental colleges<sup>16</sup> was low relative to boys and adults in the general population.

**Table 2: State level prevalence of tobacco consumption in India by gender<sup>17</sup>**

Region/state	Smoking		Chewing	
	Men (%)	Women (%)	Men (%)	Women (%)
<b>North</b>				
New Delhi	23.9	1.8	13.1	2.5
Haryana	40.4	3.5	8.1	0.9
Himachal Pradesh	38.6	2.4	7.8	0.5
Jammu & Kashmir	44.3	8.3	7.3	0.9
Punjab	13.9	0.3	9.3	0.2
Rajasthan	37.8	4.1	19.0	3.8



**Table 2: State level prevalence of tobacco consumption in India by gender<sup>17</sup> (Contd.)**

Region/state	Smoking		Chewing	
	Men (%)	Women (%)	Men (%)	Women (%)
<b>Central</b>				
Madhya Pradesh	29.4	0.9	40.3	14.4
Uttar Pradesh	33.8	3.0	36.3	10.9
<b>East</b>				
Bihar	26.3	6.2	51.8	6.7
Orissa	25.2	0.9	49.0	34.3
West Bengal	39.4	2.5	23.2	15.1
<b>North-East</b>				
Assam	31.5	2.6	47.8	24.3
Arunachal Pradesh	25.6	5.6	51.6	33.1
Manipur	35.0	12.0	34.1	19.2
Meghalaya	52.2	6.7	16.9	27.6
Mizoram	59.4	22.0	60.2	60.7
Nagaland	38.0	2.4	45.0	16.5
Sikkim	19.4	8.2	39.5	18.6
Tripura	48.5	9.7	10.8	5.2
<b>West</b>				
Goa	17.8	2.0	7.7	8.0
Gujarat	25.3	1.4	24.6	8.0
Maharashtra	13.3	0.2	34.1	18.0
<b>South</b>				
Andhra Pradesh	35.4	4.2	10.7	9.9
Karnataka	25.7	0.3	13.8	14.1
Kerala	28.2	0.4	9.4	10.1
Tamil Nadu	27.0	0.3	12.9	10.7

### Health Consequences of Tobacco Consumption in India

Tobacco-related cancers account for approximately half of all cancers among men and one-fourth among women and accounts for 8.3 million cases of coronary artery disease and chronic obstructive airway diseases.<sup>12</sup> Annual oral cancer (cancers of the mouth, lip, tongue and pharynx) incidences in the Indian subcontinent have been estimated to be as high as 10 per 100,000 among males.<sup>18</sup>

The WHO predicts that tobacco deaths in India may exceed 1.5 – 10 million annually by 2020 -2030s.<sup>9</sup>

### India's Tobacco Industry and Market

Approximately 3.5 million people are employed in tobacco cultivation in India, representing less than 0.5% of the agricultural labour force and 0.31% of the total labour force which uses aggressive marketing and advertisements and has successfully secured a large market.<sup>8</sup> Four Indian companies, Indian Tobacco

Company (ITC), Godfrey Phillips Limited, Golden Tobacco and National Tobacco, control the cigarette market.<sup>19</sup> Interestingly, these cigarette companies face significant competition from the unorganized bidi manufacturers which are largely protected from high taxes. Marketing of tobacco products has grown substantially in recent years with greater concentration on advertising strategies such as event sponsorships, point of sale and brand-stretching.<sup>12</sup>

### Major Efforts for Tobacco Control in India

Government, non-government, NGOs, Dentists and other health professionals should discourage tobacco users to use tobacco products and this is made effective at individual as well as community level with 3 well-known approaches:<sup>20</sup>

#### Regulatory approach:

**Warning on cigarette packages/advertisements:** The Government of India promulgated The Cigarette (Regulation of Production, Supply and Distribution)

Act 1975 and The Cigarettes and Other Tobacco Products (COTPA) (Prohibition of Advertisement & Regulation of Trade & Commerce, Production, and Supply & Distribution) Act, 2003 which advocates a statutory warning on tobacco products, "Cigarette smoking is injurious to health".<sup>2</sup>

**Warning on smokeless tobacco products:** The Prevention of Food Adulteration Rules (1955) applied in 1990, necessitates that every package and advertisement of smokeless tobacco product should have a warning stating that "chewing of tobacco/supari is injurious to health".<sup>2</sup>

The current health warning appearing on tobacco products consist of a drawing of scorpion on smokeless form of tobacco. These pictorial representations are collectively known as 'shock effect'. The recent statutory warning for smoking and smokeless tobacco is "Tobacco kills".



Fig 1: Current Health warning on tobacco products

**Cabinet guidelines for smoking in public places:** Cabinet secretariat and State Governments have prohibited and advised smoking in public places such as hospitals, dispensaries, educational institutions, around educational and health related institutions.<sup>2</sup>

On October 2<sup>nd</sup> 2008, to commemorate Mahatma Gandhi's birthday, the Government imposed a ban on smoking in public places, offices, restaurants, bars and open streets. A fine of 200 rupees was imposed for contravening this regulation.<sup>21</sup>

**Comprehensive legislation on tobacco control:** In November 2001, the Supreme Court of India delivered a judgment that prohibited smoking in public places throughout the country, thereby, protecting the risk of becoming passive smokers.<sup>21</sup>

**Tobacco control by increasing taxes:** The World Bank estimates that a 10% price increase reduces demand by 8% in low or middle-income countries.<sup>21</sup>

### Service approach

Initiatives Taken by the Central and State Government

Under the Ministry of Health and Family Welfare (MOHFW), the Government of India has set up the Central Health Education Bureau (CHEB) and its state chapters called the State Health Education Bureaus.

The CHEB conducts an activity of 4.6 weeks averagely per year about the 'World No Tobacco Day' on 31 May. The Directorate of Advertising and Visual Publicity (DAVP) and the Song and Drama Division, under the Ministry of Information and Broadcasting (I&B) are creating awareness among the masses on various public and social health issues.<sup>22</sup>

### National tobacco control cell (NTC)<sup>22</sup>

NTC cell is supported by India Office of WHO and located in New Delhi which has streamlined and intensified the health education and mass media efforts related to tobacco control in India in the past few years focusing on protecting vulnerable segments such as the youth and passive smokers.

### Efforts undertaken by the NTC<sup>22</sup>

A. *Developing an India-specific anti-tobacco logo* - In 2001, the NTC cell developed an India-specific logo and slogan-"Choose Life, Not Tobacco" that has been translated into Hindi and other regional languages as well.



Fig 2: Logo developed by NTC

- B. Television and audio advertisements - During 2001-02, the NTC cell developed 13 anti-tobacco television advertisements and anti-tobacco radio programmes.
- C. Production of information, education and communication (IEC) materials – DAVP has designed and produced IEC materials which include posters, flip charts, brochures, bus panels, mobile exhibition kits and stickers with the logo of the Indian Tobacco Control Programme.
- 4. Counter-advertisements in the print media - The print media for examples magazines like India Today, Outlook have been selectively utilized for specific campaigns against passive smoking.
- 5. Felicitation of role models - The WHO recently awarded Vivek Oberoi, a well-known film star in India, with the 'World No Tobacco Award' for the year 2004 who has been felicitated with this award for his efforts in and commitment to fighting the tobacco menace.

#### **Role of non-governmental agencies/bodies in educating/cessation of tobacco use**

Non-government institutions involved in tobacco control in India have expertise in advocacy, judicial intervention, youth intervention, community intervention, tobacco related consumer movement, material development for advocacy, media advocacy.<sup>23</sup> Mechanisms include increased use of collective and individual approaches by the NGOs themselves, capacity building by mutual training in their respective weak areas, outside support to NGOs by the WHO or other institutions and sensitizing of other institutions having the potential to work in tobacco control.<sup>23</sup>

#### **EDUCATIONAL APPROACH:**

##### **Role of medical professionals**

Physicians and dentists have an important role in helping patients quit tobacco and to promote tobacco prevention and control strategies. Health education being most cost effective can induce behavioral modification.<sup>27</sup>

##### **Role of dentist**

- Counsel tobacco users to promote healthy lifestyle among their patients
- Influence people to adopt a tobacco-free lifestyle

- Treat women and inform them of the dangers of tobacco use during pregnancy
- Can reinforce messages given to patients by physicians about the dangers of tobacco use and need to quit
- Can educate children and adults about the ill effects tobacco use

#### **Tobacco Control Cell**

A Tobacco Control Cell has been established in the Department of Health, New Delhi, since August 2000, under Deputy Secretary (Public Health), with the aim of coordinating the activities related to tobacco control. Its activities include educational programmes through mass media and schools, strategy papers for alternate crops and bidi workers, advocacy workshops for non-health sectors and establishment of tobacco cessation clinics. Presently there are 13 tobacco control cells in India.<sup>2</sup>

#### **CONCLUSION**

Tobacco usage has many ill effects of tobacco use on human health, which led to restrictions of its use. The recent enactment of various legislative measures for tobacco control by India should only be regarded as steps which mark the beginning of a major national effort to deal effectively with an active and increasing menacing threat to health and development. Anti tobacco counseling is best suited for Indian scenario because it is inexpensive and effective. Dental practice in the 21<sup>st</sup> century should ideally move from a restorative orientation to one of broader promotion of health and well being and it would be unconscionable not to include aggressive tobacco intervention in that paradigm. Dental colleges need to incorporate "Anti-tobacco counseling & programme" into their curriculum, not just instruction on the oral health impact of tobacco use, but practical training in clinical intervention.

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# Affordable Quality Oral Health Care

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## ABSTRACT

This paper attempts to elaborate oral health disparities persisting in the Indian population because of web of influences that include complex cultural and social processes. This will affect both oral health & access to effective dental health care. It discusses oral health care services to the general population and how some sections of the population are systematically excluded from oral health care services. This paper gives overview of six strategic areas which will have significant role in making oral health care affordable for all sections of society. Strategies should be made according to unique needs of people & resources that exist in India.

*Keywords:* Oral Health, Disparities

## INTRODUCTION

Inequalities and their relation to living conditions are now in the mainstream of public health thinking. In Latin America, the Pan American Health Organization stated the growing impact on health and overall wellbeing of disparities associated with socioeconomic, gender and ethnic macro determinants<sup>1</sup>

Since India gained independence, universal and affordable health care has been central to the planning of the country's health system. Substantial government effort and resources have been devoted to the creation of a wide network of public sector health facilities<sup>2</sup>, at which qualified health workers can provide health services at low cost. However, attempts to establish such a network have not been successful because substantial socio-economic and geographical inequalities exist in access to health care and health outcomes in India.<sup>2</sup>

A desire for social justice is embedded in the majority of the modern health programmes. Access to health services is more and more considered to be a civic right for each person irrespective of income or class.<sup>3</sup>

Although, oral health has long been acknowledged as a critical component of overall health and wellbeing, millions of Indian lacks access to affordable dental services.<sup>4</sup> The oro-dental diseases are emerging as considerable public health problems in India.

According to estimates, about 50% of schoolchildren are suffering from dental caries and more than 90% of adults are having some degree of periodontal diseases.<sup>1</sup> The use of tobacco products, smoking or smokeless form, are widely prevalent in our country. Thirty percent of the population 15 years or older-47% men and 14% women-either smoked or chewed tobacco.<sup>5</sup> Hence, oral pre-cancers and cancers are emerging as major threat to younger people and are increasing to alarming proportion in India. They can be prevented and controlled by public education and motivation to a significant level.<sup>1</sup>

Equity of access to dental services is an ultimate goal for which one should strive. Equity means the quality of being fair or impartial and access implies naturally, entry to the health care system.<sup>3</sup>

Thus the purpose of the present literature review is to give an overview of existing state of oral health services and their benefits, shortcomings and to provide direction for the future reforms & efforts needed to achieve affordable quality oral health care for all people.

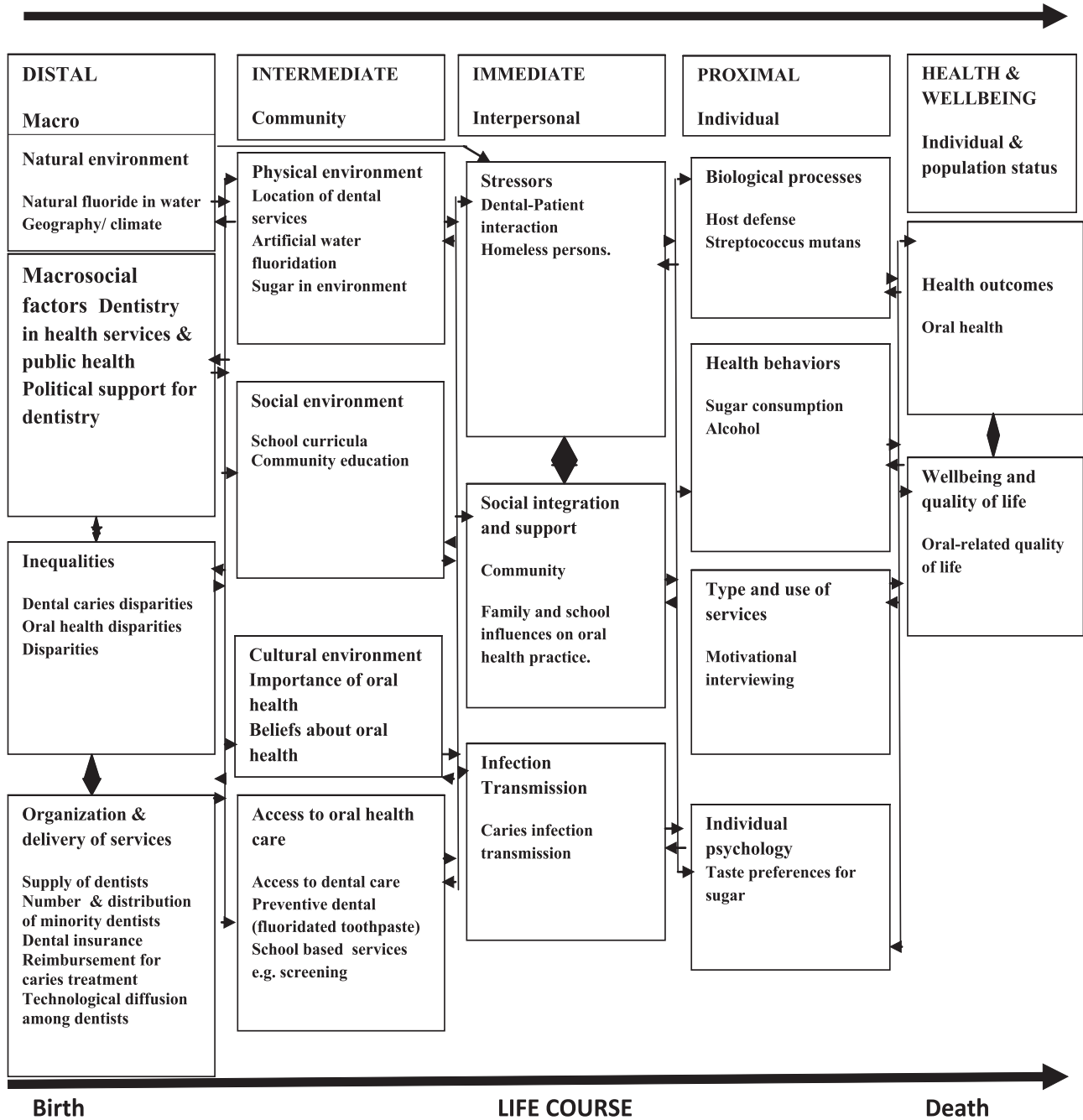
## ORAL HEALTH DISPARITIES

Occurrence of oral health disparities can be described by three key concepts. They are social determinants of health, health disparities and population health.<sup>6</sup>

The 'Inverse Square Law of health services' operates here i.e those who most need care do not get it, and health services are available to those who do not need them.

### INFLUENCES ON ORAL HEALTH AND ORAL HEALTH DISPARITIES

Individual Status-Ascribed: Genetic, Ethnicity, Age, Gender Achieved: Education, Income, Occupation



*Influences on Oral Health and Oral Health Disparities. (Donald L Patrick, Rosanna Shuk Yin Lee, Michele Nucci et al)<sup>6</sup>*

*Based on Patrick and Erickson, 1993 and Schulz and Northridge, 2004*

Above figure is a conceptual framework that encompasses oral health as a dynamic process in which a variety of forces operate both to perpetuate and reduce social disparities in oral health.

**Distal/ Macrolevel factors:** At this broadest level, disparities are produced & reproduced by political, economic, social & cultural forces. For example- In India, national policies, legal frameworks and social ideologies have created & perpetuated unequal distribution of wealth, spatial segregation & concentrations of poverty.<sup>6</sup> The aggregate expenditure on health sector is 5.2% of the GDP, out of this 17% of the aggregate expenditure is public health spending.<sup>7</sup>

**Intermediate/ Community factors:** These factors include the physical, social, economic & cultural environment of a particular community.<sup>6</sup> The community must involve in the planning, implementation and maintenance of health services. They provide primary health care by overcoming cultural and communication barriers, in ways that are acceptable to the community.<sup>8</sup>

**Proximal/ Individual factors:** The focus at this level is on the actions and beliefs of individuals who make up a community. Personality traits, motivations, values & personal preferences come into play along with health needs.<sup>6</sup>

### VISION FOR FUTURE

The FDI & WHO established the first global oral health goals jointly in 1981 to be achieved by the year 2000. A review of these goals, carried out just prior to the end of this period, established that they had been useful for many populations.<sup>9</sup>

The FDI, WHO & IADR have prepared new oral health goals for the year 2020. The goal is to promote oral health and to minimize the impact of diseases of oral and craniofacial origin on general health and psychosocial development, giving emphasis to promoting oral health in populations with the greatest burden of such conditions and diseases and to minimize the impact of oral and craniofacial manifestations of general diseases on individuals and society, and to use these manifestations for early diagnosis, prevention and effective management of systemic diseases.<sup>10</sup>

### PERSEVERANCE BY PRESENT

The Ottawa Charter (WHO, 1986) outlined five

areas of actions as creating supportive environments, building healthy public policy, strengthening community action, developing personal skills, reorienting health services.<sup>11</sup>

There are six strategic areas which will have significant role in making oral health care affordable for all sections of society.<sup>9</sup>

1. System infrastructure
2. Oral health data
3. Oral health promotion
4. Oral disease prevention
5. Dental manpower
6. Implementation and sustainability

### SYSTEM INFRASTRUCTURE

Adequate infrastructure is needed to enhance the effectiveness of a system. Important components of infrastructure includes: partnership, funding and technology.

**National Oral Health Policy:** The ministry of health and family Welfare, Govt. of India accepted principle National Oral Health Policy in the year 1995 to be included in National Health Policy. The proposed oral health care programme envisages three pronged implementation strategies of: oral health education, preventive programme and curative service programme at various levels of primary, secondary and tertiary health care delivery services.<sup>7</sup>

**Partnership within community:** Public and community based organizations should be mobilized and empowered to identify and implement solutions for their oral health needs.<sup>9</sup>

**Success in community collaborative practice can be achieved by nonprofit organizational structure:** All the team members of this type of organization should be aligned with & accountable to a common mission to improve the oral health of people with special access needs to those who faces barriers to care.

**Partnership across professions:** Collaborations across health professions and allied services in the public & private sectors should be strengthened.

**Tri sector partnership:** Tri sector partnership in oral health care can be described as a long term contract

between government, one or more private sectors and civil society. The private sector can play an important role in transferring management skill, can provide employment opportunities, can improve health infrastructure and can finance new research projects.

**Role of dental colleges:** Each dental college should be given the responsibility to adopt one whole district so as to take care of the preventive oral (dental) health services to the rural and the urban communities of the district effectively using internship programmes.

**Setting up of apex bodies of dental education and research:** It is important to set up apex bodies of national importance in post graduate dental education and research on the pattern of NIDR (National Institute of Dental Research) in USA and in India, the AIIMS in New Delhi. This will give proper lead to the total health care systems in the country.

**Reorientation of dental education in India:** Community dentistry component in each dental college should be made more dynamic, active and viable.

**Funding:** The budget allocated for the health is one of the basic requirements for implementing the health care strategies. India allocated only 6.1% of the GDP for health related expenditures<sup>12</sup>, this amount is very meagre. Out of total health budget only a minute percentage is allocated for oral health related activities. In fact, there is no separate allocation for oral health in Indian budget.<sup>13</sup>

**Dental insurance plans:** Dental coverage can be offered by a medical plan or by stand alone dental plan. Income based subsidies must be made available for purchase of insurance plan. The intent of plans should be to promote good oral health by reducing costs for preventive, routine & major restorative dental services.<sup>3</sup>

**Technologies:** Use of proven technology should be expanded to facilitate oral health promotion, dental education, and delivery of oral health services.

**Teledentistry:** Is a combination of telecommunication and dentistry that involves the exchange of clinical information and images over remote distances. Implementation of teledental system can increase access to prevention and educational dental healthcare services.

**Mobile dental unit:** As the dentist population ratio is 1:2,50,000 in rural areas<sup>14</sup>, two dental surgeons

should be posted Primary Health Centre for providing preventive & curative services. Mobile dental unit can render services to the rural masses at their doorsteps, more so in various remote areas

**Role of Dental Electronic Health Records:** It provide opportunities for the critical data collection that drives quality measurements, performance analysis & development of evidence based best practice.<sup>15</sup>

## ORAL HEALTH DATA

Sound information about a present oral health status scenario of India is needed to formulate effective policies & programmes.

A national oral health survey & fluoride mapping conducted by Dental Council of India in 2002-03 puts the percentage of people having experienced caries at least once in lifetime at 84.7% in the age group of 65-74 years and the mean DMFT (Decayed, Missing, Filled Teeth) at 14.6 for the same age group<sup>16</sup>. The same study points that periodontal disease (or) gum disease is another major oral health concern with 89.2% having bleeding, calculus or pockets in the productive age group of 35-44 years.<sup>16</sup>

## ORAL DISEASE PREVENTION

Population based disease prevention is the most effective approach to decrease health disparities. There are many evidence based preventive activities that will prevent oral diseases & help to sustain oral health.<sup>17</sup>

**Health education:** Is fundamentally a learning process, which aims at favorably changing attitudes and influencing behavior with respect to healthy practices.<sup>8</sup>

**Dietary changes:** As diet of a person is an important risk factor for dental caries therefore some dietary changes should be made in people who are prone to develop dental caries. These dietary changes are:

- Minimize fermentable sugars from diet as much as possible.
- Avoid solid and sticky sugary diet.
- Include vegetables and fruits, nuts and cheese as basic diet. Cheese contains casein phosphopeptide amorphous calcium phosphate nanocomplexes, which play an important role in the remineralization process.<sup>18</sup>



**Fluorides in prevention of dental caries-** The value of tooth brushing in caries prevention lies with the regular topical application of fluoride. Toothpastes containing fluoride at 1000-2800 parts per million (ppm) have been shown to be effective in preventing dental caries in children aged between six and 16 years.<sup>19</sup>

**Pit & fissure sealants-** It has long been .Pit & fissure sealants have been extensively tested since 1979 in randomized clinical trials and have proven to be effective in reducing this most common form of surface decay.<sup>20</sup>

**Tobacco Control Program -**The tobacco control program is a comprehensive, coordinated program that seeks to prevent initiation of tobacco use, reduce current use of tobacco products, eliminate exposure to second-hand smoke and reduce the social acceptability of tobacco use.

**Dental Fluorosis-** Fluorosis can be prevented by monitoring the amount of fluoride that children up to 6 years old are exposed, therefore, the dentist must be aware of the main sources of fluoride to prevent fluorosis & instruct parents or caregivers on how daily dose should be managed in order to achieve success in prevention.<sup>21</sup>

**Dental Trauma-** Overall, tooth injury is more common in males (greater than a 2:1 ratio). A regular use of mouth guard during sports and other high-risk activities (such as military trainings) are the most effective prevention for dental trauma.<sup>22</sup>

## ORAL HEALTH PROMOTION

The five approaches to health promotion are preventive approach, behavior change, educational, empowerment & social change<sup>23</sup>.

**Health promoting schools-** School provide an effective platform for promoting oral health because they reach over one billion children worldwide, moreover through school one can reach to the school staff, families & community as a whole. Reinforcement of oral health messages throughout the school years will have an impact on children's lives because school age is best to develop beliefs, attitudes & skills<sup>24</sup>.

## DENTAL MANPOWER

Dental manpower includes the dental practitioners, dental teaching faculties, dental students and dental

auxiliaries. According to the oral health survey 2002-2003, the dentist population ratio is 1:10,000 in urban area & 1:2,50,000 in rural areas.<sup>14</sup>

## CONCLUSION

Health is an invaluable part of human being's life. Oral health is one of the integral part of general health with more unmet needs. India is a rapidly developing nation and is making great progress in information and technology sector, but unfortunately only few people have access to affordable quality oral health care. Affordable quality oral health care can be provided by government initiative through formulation of oral health policy. Emphasis should be laid more on preventive strategies of which oral health education programmes is the most cost effective on a mass approach. Due to increasing burden of dental diseases like caries, fluoridated tooth paste and mouth rinse serve as an effective alternative. Pit and fissure sealant can be used on targeted groups, further by taking help of dental auxiliaries will reduce the cost of dental services. So, the above mentioned ways will help a common man to achieve the distant dream of 'Healthy Life'.

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# Management of Patients with Severe Head Injury

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## ABSTRACT

**Background:** Management of patients with severe head injury in the intensive care unit is extremely challenging due to the complex domain. An Expert system - an innovative tool was adopted to automate the management process.

**Material and Method:** A study was conducted among the Head injury Patients of Government General Hospital (GGH), Chennai. The necessary information like socio demographic factors, medical history, Clinical parameters and Clinical symptoms were recorded. Based on the Neurosurgeon's opinion on important clinical factors, an expert system Management of Head Injury Patients (MHIP) has been developed

**Results:** The factors older Age ( $p=0.001$ ), lower GCS ( $p=0.008$ ) and abnormal Respiratory Rate ( $p=0.003$ ) were found to be statistically significant and also the most consistent risk factors of mortality.

**Conclusions:** The cumulative effect of the immediate and indirect effects of head injury is usually devastating, not just for the victim, but also for his or her family. An expert system MHIP would definitely help the clinician in identifying the patient who needs the immediate medical attention.

**Keywords:** Severe Head Injury, GCS, Respiratory Rate, GOS, ICP, Expert System

## INTRODUCTION

Head injury is a crucial worldwide public health problem. It accounts for one third of Trauma deaths and for a much large proportion of lifelong disability after trauma. The associated outcomes after severe head injury include disability or death for the grievously injured<sup>1,2</sup> and marked disruption of the lives of their family members due to the high costs in terms of lost work and wages, increased medical bills, legal fees and frequent transportation's charges.<sup>3</sup> Amongst all the disorders of the Brain, Head Injuries are the most vicious and major killers, it is major because they are now almost on top of the list of killers of mankind. They kill in such a subtle way that the Americans call them, "The Hidden Epidemic." They kill or disable their victims who are quite often in the prime of their lives and often are also the sole "bread-winners" of their families.

Head injury is a clinical problem frequently treated by neurosurgeons. It is also a major cause of disability, death, and economic cost to our society. One of the central concepts that emerge from clinical and

laboratory research is that all neurological damage do not occur at the moment of impact, but evolve over the ensuing hours and days. It is also recognized that the deleterious effects of delay add to the severity of brain injury at the clinical and biochemical levels<sup>4</sup>

Doctors dealing with patients with severe head injuries have to make a series of management decisions; these begin in the hospital emergency room but continue in the case of the severely injured, for months or years. Early decisions<sup>5</sup> include to which department the more severely injured should go, and whether or not expensive and elaborate investigations and treatment should be instituted or continued.

A very few published reports are available to know the Epidemiology of trauma and head injury in India and particularly in Tamilnadu to understand the burden of illness. The traditional neglect of injuries as public health problem is attributable in part to the notion that they are a consequence of bad luck or "acts of God." The fact that infectious diseases were also once thought of in the same way indicates how shortsighted such a view can be.

Outcome prediction after severe head injury is of great clinical importance especially for countries like India for better targeting of limited healthcare resources. The management of severe head injury patients demands the dedication of expensive intensive care resources for considerable length of time. In spite of these efforts, mortality and long term morbidity remains high.<sup>6</sup> Outcome prediction after severe head injury continues to be an area of intense interest and reflects the natural curiosity of the neurosurgeon, but as an increasing attention is paid to resource allocation in all societies, the ability to accurately predict outcome becomes very important for targeting of scarce resources.<sup>7</sup>

Constant increases in high velocity accidents and violence over the past decades have made the management of severe head injury of prime importance in to-day's neurosurgical practice. After severe injuries, the question is whether or not the patient will survive, and if he does, what is the likelihood of persistent disability. Therefore it became useful to identify patients who had a reasonable probability of survival. This has led to an interest in developing better monitoring and treatment methods to minimize any potential for secondary injury and to present the Neurosurgeon with a patient who is alive and has a good chance of good survival. The quality of a medical treatment is primarily based on two factors: the quality of the treatment decision and the quality of the outcome that follows the decision. The quality of the decision depends on the Neurosurgeon's ability to discern the parameters influencing the problem, to establish the domain relationship among the parameters and to rank the parameters according to their importance. The Neurosurgeon tackles all these issues, and suggests the optimal treatment. However, it is not always possible to have the Neurosurgeon around when an emergency arises. Hence, it would be of tremendous help if the Neurosurgeon's knowledge could be transferred to an Expert system that could be queried in the case of emergency. An important application of numerical methods to determine the prognostic significance of clinical factors is to pin down in order of severity those factors associated with a poor-prognosis. Such factors may provide important information regarding expected outcome. Studies have shown that when clinical features<sup>8</sup> are well selected, the independence model performed well and gave predictions that were more consistent and reliable<sup>9</sup>.

## MATERIAL AND METHOD

The study was carried out in the Department of Neurosurgery, Madras Institute of Neurology, Government General Hospital (GGH), Chennai, India. A structured proforma was designed to incorporate all the variables which were found to be statistically significant by various multivariate statistical models such as Log-linear, Logistic regression, Survival analysis using SPSS package and important clinical factors based on the opinion of the Neurosurgeon, an Expert system MHIP (Management of Head Injury Patients) has been developed with the help of Visual basic, to provide the clinician a prognostic guideline on severe head injury patients for priority care. The following information was collected from patients suffering from Head injury: Socio Demographic Factors, Clinical parameters, Intra Cranial Pressure (ICP), Glasgow Comma Scale (GCS), Clinical symptoms and Glasgow Outcome Scale (GOS). Glasgow Coma scale score was recorded in 801 cases. Those individuals whose GCS  $\leq 8$  were considered as Severe Head Injury (SHI) patients and they were considered for the study.

## EXPERT SYSTEM

An Expert System is a knowledge-based computer program containing expert domain knowledge about objects, events, situations and courses of action, which emulates the process of human experts in the particular domain. In other words, expert system is a computer application that performs a task that would otherwise be performed by a human expert. Expert systems are extensively used in the medical field.<sup>10</sup>

Expert systems are a recent product of Artificial Intelligence (AI). They have now become one of the most important innovations of AI. Expert systems had proved to be effective in a number of problem domains which normally requires the kind of intelligence possessed by a human expert. The areas of application are almost endless. Since the introduction of these early expert systems, the range and depth of applications has broadened dramatically. Applications can now be found in almost all areas of business, medical and government.<sup>11</sup>

Decision analytic approach to severe head injury management<sup>12</sup> was adopted to automate the management process and analyzed the effectiveness and limitations of the decision analytic approach and

presented a set of desiderata for effective knowledge acquisition in this setting.

Head injury decision support system (HIDSS) combined<sup>13</sup> experts' partial and uncertain knowledge for global decision-making. The integration is carried out such that the global uncertainty is minimal. The integrated knowledge is provided in form of a probabilistic rule base. The output of the rule base provides the optimal treatment in terms of patient recovery.

Purpose of the study is to develop an expert system for Management of Head Injury Patients (MHIP) to automate treatment planning support for severe head injury patients. The MHIP provides automated guidelines for both consultation as well as educational purposes. Its primary purposes are:

1. To assess the effectiveness of the various treatments available for a particular patient with severe head injuries.
2. To suggest the treatment recommendations to the patient for a priority care.

While choosing the prognostic factors and the treatments, experts' utilize two knowledge sources:

- (i) The protocol used at the Neuroscience Intensive Care Unit.
- (ii) The trends observed by the neurologist in the course of the treatment.

### RESULTS

There were 801 head injury cases of which 261 were severe head injury cases (GCS ≤ 8) and 540 with mild head injury (GCS > 8) (Table 1).

**Table 1: Study subjects**

Number of patients	
Total number of patients with head injury	801
Glasgow coma scale score ≤ 8	261
Glasgow coma scale score > 8	540

Out of 261 severe head injured cases, 157 were dead, 1 was in persistent vegetative state, 16 were with severe

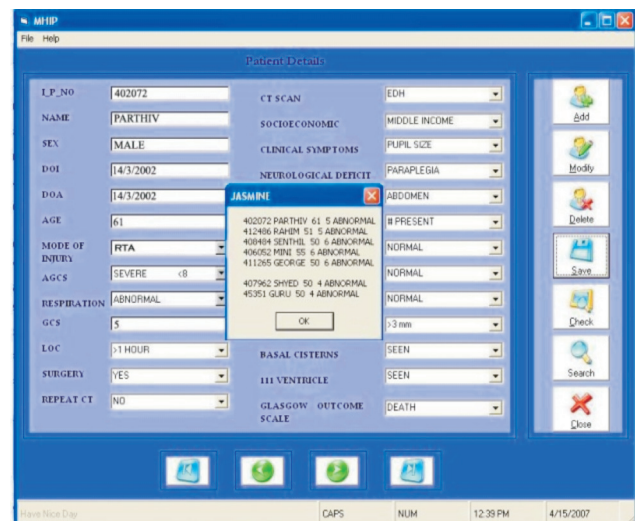
disability, 25 were with mild disability and 62 were with good recovery. Of the remaining 540 with mild head injury (GCS > 8), 98 were dead, 2 were in persistent vegetative state, 15 were with severe disability, 61 were with mild disability and 364 with good recovery (Table 2).

**Table 2: Outcome in the study subjects of Severe Head Injury and Mild Head Injury**

Outcome of the Patients	Glasgow coma scale (GCS) score	
	Severe Head Injury (GCS ≤ 8)	Mild Head Injury (GCS > 8)
Poor Outcome		
Death	157	98
PVS	1	2
Good Outcome		
Severe Disability	16	15
Mild Disability	25	61
Good Recovery	62	364
Total number of patients	261	540

It was alarming to observe that around 60% of the severe head injury cases were dead.

The traumatic head injury usually has debilitating consequences ranging from a mild disability to a vegetative survival and death. An Expert system MHIP would be useful in identifying patients (Fig. 1) who have a reasonable probability of survival.



**Fig. 1. Screen – shot of an Expert system MHIP shows the patients details and lists out the Patients for Priority care**

Given a patient state, the purpose of the MHIP is to list out the patients according to their severity for priority care. Statistical techniques had identified that the most consistent risk factors (Table 3) for mortality are older age ( $P=0.001$ ), low Glasgow coma score ( $P=0.008$ ) and abnormal respiratory rate ( $P=0.003$ ).

Hence those patients, who are older, having low Glasgow coma score and abnormal respiratory rate, either singly present or in combination should be given priority for treatment and an Expert system MHIP will list out such patients.

**Table 3: Significance level of the factors considered for study**

Factors	b	SE (b)	p-value	OR	95% CI for OR
GCS	0.314	0.118	0.008	1.37	1.09 to 1.73
Respiratory rate	1.084	0.370	0.003	2.95	1.43 to 6.09
Age	0.032	0.010	0.001	1.03	1.01 to 1.05
Obstructive Airway	0.482	0.363	0.184	1.62	0.79 to 3.30
Bleeding through throat	0.766	0.546	0.161	2.15	0.73 to 6.27
Muscular power	- 0.456	0.343	0.184	0.63	0.32 to 1.24
Type of Breathing	- 0.468	0.451	0.299	0.62	0.25 to 1.52
Pupillary reaction to light	0.221	0.334	0.509	1.24	0.65 to 2.40
Extra Ocular movement	0.108	0.260	0.677	1.11	0.66 to 1.85

From the estimate of the co-efficient, it is inferred that the individual with the age above 50 years has 3 (95% CI = 1.59 - 5.45) times more chance for poor outcome than individual in the age group less than 50 years. Similarly an individual with GCS 5-6 has 2 (95% CI = 1.09 - 3.97) times more chance for poor outcome than the individual with GCS 7-8. It is also inferred

that the risk estimate increases as GCS decreases and is 4 (95%CI = 1.88 - 9.84) for individual with GCS 3-4. The individual with abnormal respiratory rate has 3 (95% CI = 1.59 - 5.45) times more chance for poor outcome than an individual with normal respiratory rate (Table 4).

**Table 4: Significance level of the most consistent risk factors of Severe Head Injury Patients**

Consistent Risk Factors	b	SE(b)	p-value	OR	95% CI for OR
Age <sup>3</sup> 50	0.832	0.315	0.001	2.94	1.59 to 5.45
GCS 5-6	0.737	0.329	0.025	2.09	1.09 to 3.97
3-4	1.461	0.421	0.001	4.31	1.88 to 9.84
Abnormal Respiratory rate	1.080	0.315	0.001	2.95	1.59 to 5.45

## DISCUSSION

The study reveals that an advanced age (> 50 years) is associated with outcome of the head injury patient. It was observed that risk of mortality is twice for the patient with age above 50 years compared to the patient who is below 50 years. The variables, older age, GCS and abnormal respiratory rate would be useful in identify patients who have a reasonable probability of survival. It is also observed that cumulative incidence of discharge alive is always high for individual with age less than 50 years compared to the individual with age more than 50 years and above, at different period of their hospital stay. In the same way, the individual with normal airway has high probability of discharge alive compared to the individual with abnormal airway.

Statistical analysis identifies that older age, lower GCS and abnormal respiratory rate are the factors associated with PVS/Death. There is an inverse relationship between GCS and outcome ie. as GCS decreases the mortality increases. It is inferred that GCS can be used as a method of immediate assessment of the severity of injury and as a predictor of immediate and long term outcome. A very low score suggests a very severe injury and little likelihood of total recovery. The Glasgow Coma Scale is very useful for predicting early outcome from head injury. Our study reveals that GCS ranked very highly within the prediction model.

## CONCLUSION

Severe head injury involves damage to the brain. The immediate effects of the head injury often results

in a number of related problems, such as loss of income, loss of friends, loss of intimacy and the loss of freedom. Head injuries are becoming more frequent due to increasing urbanization, industrialization and also violence in our society. The mixture of slow and fast-moving vehicles on the road always increase the possibility of accidents and, carelessness and ignorance of rules of the road add to the woes. Especially, two-wheelers ignore the safety of wearing helmets when internal head injury is not readily visible and many a time the result is fatal, therefore policy makers should take steps to educate people to avoid the accidents and strict enforcement of traffic rules by the Government can help to save life by reducing the incidence of severe head injury.

In a developing country such as India, the availability of trained staff and intensive care facilities are restricted<sup>14</sup> in these circumstances, it is even more important to identify patients with severe head injury who have the potential for a good functional outcome, who would greatly benefit from such restricted resources.

Study confirms that older Age, lower GCS and abnormal Respiratory rate are the consistent risk factors and can be easily monitored even by a Paramedical person/Advanced Practice Nurses/Nurses/Physician Assistants/Physicians to estimate the probability of outcome following severe head injury and it would be useful to prognosticate and direct resources effectively and present the Neurosurgeon a patient who is prone to a high risk of mortality for priority care and whose life can be saved by using an Expert system MHIP. If the patients who need an immediate attention can be recognized soon after injury then the maximum effort can be devoted to their care.

The results obtained in this study are specific to the outcome of severe head injury patients.

#### ACKNOWLEDGMENT

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# Oral Health for the Common Man- A Fiction to Fact

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## ABSTRACT

Today people are suffering from many oral diseases especially in rural areas as they are unable to get the dental benefits thus in order to provide dental health services to each and every individual cost effective preventive and curative treatment such as School based oral health services, Teachers training programmes, Public private partnership, Dental auxiliaries, Affordable fluoridated tooth paste, Atraumatic restorative treatment, Various outreach programmes, government initiatives should be provided for better oral health.

**Keywords:** Oral health promotion, Preventive and Curative dental services, Outreach Programmes, Public Private Partnership

## INTRODUCTION

Oral health is related to well-being and quality of life as measured along functional, psychosocial and economic dimensions. Diet, nutrition, sleep, psychological status, social interaction, school and work are affected by impaired oral and craniofacial health. Reduced oral health-related quality of life is associated with poor clinical status and reduced access to care.<sup>1</sup>

The Oro-dental diseases are emerging as considerable public health problems in India. Hence, in the long run, they are bound to have a significant impact on our economy. According to estimates, about 50% of schoolchildren are suffering from Dental caries and more than 90% of adults are having periodontal diseases. The use of tobacco products, smoking or smokeless form, are widely prevalent in our country. Hence, oral pre-cancers and cancers are emerging as major threat to younger people and are increasing to alarming proportion in India. Oral cancer is a life threatening malady and the available treatment modalities are expensive and are way beyond the reach of the common man.<sup>2</sup>

### Issues of the Dental Workforce in India

1. Deficient manpower planning and projection,
2. The changing disease pattern affecting the workforce, and

## Deficient Manpower Planning and Projection

Dental Education Until 1966, all the dental colleges in India were government-aided. In that year, the first dental college in the private sector was established.

At present there are nearly four times as many private colleges as government colleges. In tune with the increase in number of dental colleges, there has been a steady increase in the number of dental graduates from the 1950s when there were only a few dental colleges in India. To cope with such an enormous number of dentists graduating each year will require a massive infrastructure, a factor that requires the very urgent attention of all concerned<sup>3</sup>

## Uneven dentist: population ratio

At the moment India has one dentist for 10,000 persons in urban areas and about 2.5 lakh persons in rural areas.

Lacking Dental Auxiliaries An increase in the number of dental auxiliaries should be another high priority. Since there are district hospitals where no dental service is available, dental auxiliaries should first be placed in those locations. There are no registered dental nurses or chair side assistants and no denturists. This situation is becoming increasingly difficult with a decrease in the number of schools for hygienists and laboratory technicians from forty (20+20) in 1990s to twenty (10+10) in 2000 with the



result that there has been no increase in the efficiency of overburdened dentists.<sup>3</sup>

Inadequate Workforce in Rural Areas Dentistry faces serious problems regarding accessibility of its services to all. In many developing countries like India, oral health services are offered by dentists, who practice in the cities and treat the affluent parts of the urban population. It is often difficult for the poor urban and the rural population to get access to emergency care.<sup>3</sup>

Immigration and Migration of the Dental Workforce Retention of dentists and therapists, particularly in the early years beyond graduation, is a major issue. Since the number of seats in various postgraduate courses is very few in proportion to the large number of graduates each year, many of the new graduates immigrate to other countries to fulfil their aspirations. Another reason for an increase in this immigration is the monetary benefits that the dentists get in most of the developed countries, especially the United States, United Kingdom, Canada, Australia, and New Zealand.<sup>3</sup>

Lack of adequate research facilities is also one of the reasons for a small percentage of immigration. The facilities in the developed countries are more advanced, easily accessible, and promising as compared to those available in India or any other Southeast Asian nation. Those aspiring to rise in research and academics prefer to go abroad.<sup>3</sup>

### Changing Disease Patterns and Treatment Needs

Transition in Disease Patterns An important factor that will affect the dentists' supply-demand equation of the future centres on changing disease patterns. The two most prevalent diseases are dental caries and periodontal diseases, followed by malocclusion and oral cancers. The potential disease levels have remained high over the years. Moreover, about 40-50 percent of children have malocclusion, and 40 percent of all cancers reported in India are oral cancers. Because of the changing disease patterns, the dental sector is going through a transition from a service mix that has been predominantly therapeutic to a service mix that will be mostly preventive.<sup>3</sup>

Changing Treatment Need People across the world are becoming more knowledgeable about dental health and what is required to maintain it. As the population has become more affluent and educated, the value placed on oral health has increased. In addition, the

desire for aesthetic dentistry has grown and will probably continue to do so. All of these factors have enhanced the demand for dental services.<sup>3</sup>

## STRATEGIES

### Intersection of Oral Health and Primary Health Care

In 1981, the WHO adopted a global strategy of Health for All by the Year 2000. This effectively established an agenda for a primary health care approach based on practical, scientifically sound and socially accepted methods and technology. It was to be made universally accessible to all individuals and families in the community at a cost that each community and each country, in the spirit of self-reliance and self-determination, could afford to maintain as it developed. Oral health is an integral part of primary health care based on community participation and self-reliance with emphasis on the promotion of health and the prevention of diseases<sup>1</sup>

Global oral health goals by the year 2000 In 1979, in the context of Health for All by

the Year 2000, the WHO Global Oral Health Programme set the first global goal that 12-year-old children should not have more than 3 decayed, missing or filled teeth (DMFT) by the year 2000. This goal was modified at the WHO Eastern Mediterranean Regional Office (EMRO) Meeting on Strengthening Oral Health in Primary Health Care, 1993, in Nicosia, Cyprus, to be 1.5 DMFT in the Eastern Mediterranean Region. Then, in 1981, the Federation Dentaire Internationale (FDI) and the WHO formulated these global goals for other age groups

- Ages 5–6 years: 50% caries-free.
- Age 18 years: 85% retain all teeth.
- Ages 35–44 years: 50% reduction in the number of persons with no teeth.
- Ages 65 years and over: 25% reduction in the number of persons with no teeth.<sup>1</sup>

During the last 20 years, most EMR countries have established National Oral Health Plans and the WHO EMRO has helped to develop the Oral Health Programme (ORH) in the Region to achieve these goals.

The planning or re-planning process should be done in the next two decades and must take into

account new concepts in delivering oral health care. The WHO has adopted the renewal of the Health for All strategy for the 21st century. The ORH should be integrated with general health into the frame of primary health care. Recently, the WHO reoriented the ORH initiative towards health promotion and disease prevention<sup>1</sup>

### Common Risk Factor Approach

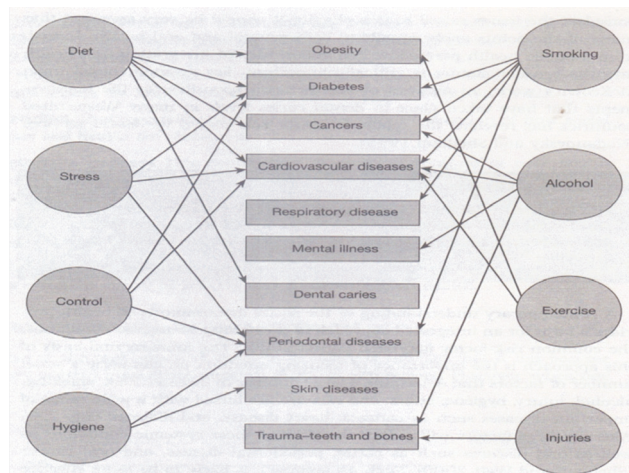


Fig. 1. Common Risk factor approach by Sheiham & Watt<sup>4</sup>

### Community Oriented Oral Health Promotion

#### School Based Oral Health Services

Children spend considerable period of their lifetime in the school right from their childhood to adolescence.

This period has a special importance in their growing age as they are particularly receptive during this phase. They can be nurtured well for their general and oral health and the saying "catch them young" can very well be implemented.<sup>1</sup>

Oral health educational programmes implemented through schools have the additional advantage of imparting primordial and primary preventive instructions to all the children of all socio-economic status<sup>5</sup>

School-based programs, that include School Based Oral Health Services, have traditionally provided fluoride varnish, dental sealants and dental screenings<sup>6</sup>

Effective oral hygiene practices, good dietary behaviours and appropriate use of fluorides, together with sustainable, effective and accessible professional care, are keys to good oral health. Daily tooth brushing with fluoridated toothpaste is a habit that should be

encouraged to become a norm early in life. Early dental visiting experience enables children to develop a good rapport and relationship with the dental team, so that preventive measures can be implemented before oral disease begins.<sup>7</sup>

#### School-Based or School-Linked Pit and Fissure Sealant Delivery Programs:

These programs provide pit and fissure sealants directly to children who might not otherwise receive them. School-based programs usually are conducted entirely in school settings. The appropriate application of pit and fissure sealants to at-risk teeth is one of many complementary strategies for preventing dental caries (tooth decay). Although sealants are necessary to further reduce pit and fissure caries, fluoride is necessary to prevent caries on all types of tooth surfaces.<sup>8</sup>

Use of fluoride has been considered the most important reason for the decline in incidence and severity of dental caries<sup>9</sup>.

**Fluoride mouth rinses** have been one of the main modalities of topical fluoride delivery system. Studies show that fluoride mouth rinse has reduced caries experience among school children up to 30 percent<sup>10</sup>. Children aged six year and over whom use fluoride mouth rinse is not a risk for usually detectable changes in their teeth from ingesting fluoride.<sup>11</sup>

There are several advantages with the school-based fluoride rinse program. Generally, compliance is better because children perform the procedure as a group activity under supervision. Because fluoride rinses are generally administered by volunteers, the cost per child is less when compared with that of professionally applied topical fluorides.<sup>12</sup> School fluoride mouth rinse programs are inexpensive compared to professionally applied fluorides<sup>13</sup>, which might be useful for dental public health programs in countries like India.

**Fluoridated toothpaste** has proven to be the most effective public health measure to reduce caries. The decline in dental caries in the past 25 years in many countries is mainly due to increased use of fluoridated toothpaste. This demonstrates the importance of this vehicle for fluoride delivery as a means to reduce dental caries on a national scale.<sup>14</sup>

While teachers are crucial to the implementation of school oral health education, they do not necessarily possess adequate knowledge and skills to enable them

to deliver the programmes effectively. With adequate training, they can significantly improve the development and implementation of the programme.<sup>8</sup>

In addition to various learning and teaching strategies, teachers should also be trained in the use of health curriculum as well as in oral health and health promotion.<sup>8</sup>

In a Health-Promoting School, oral health education should be an important part of school health education and incorporated across a number of curricular areas, as relevant.<sup>8</sup>

School teachers can effectively influence student's knowledge, attitude and practices regarding oral health and can bring change in behavior.<sup>5</sup>

### **Supportive Curative Procedures**

#### **Atraumatic Restorative Treatment**

The Atraumatic restorative treatment (ART) approach for dental caries has been developed in the last 10 years and is the least invasive of the minimal intervention approaches among preventive and curative procedures. It does not involve drills, water or electricity. It depends on the use of hand instruments to remove soft decayed tissues and to fill the clean cavity with Glass Ionomer cements. The WHO supports this approach as part of primary oral health care. Clinical research has shown that this approach is effective in treating caries in both primary and permanent dentitions when compared with the conventional approach.<sup>1</sup>

### **Reaching the Unreached**

#### **DISABLED**

The persons with various developmental and physical disabilities have difficult life and they have to cope up with extreme situations even for performing day to day activities.

The oral hygiene maintenance is a problem for most of them due to physical disabilities and poor neuromuscular coordination, especially in mental retardation and mental illness patients.<sup>15</sup> The Dental Professionals should have attitude, behaviour and understanding of the special needs of people with disabled.<sup>15</sup>

#### **GERIATRIC**

A number of factors are known to be associated with oral health of the elderly e.g. as socio economic status, literacy level, marital status, smoking or chewing tobacco and alcohol consumption.<sup>16</sup>

Other factors such as oral hygiene practices, social and cultural beliefs, attitudes, perception regarding oral health and attitude, behaviour and philosophy of the dentist also influence oral health in the elderly. Dental caries is a public health problem for subgroups of older individuals such as those of lower socioeconomic status and who institutionalized.<sup>16</sup>

As future generations of the elderly will be better educated and more health conscious, there will be a concomitant increase in the demand for dental care.<sup>16</sup>

Topical application and mouth rinsing with fluorides are shown to reduce the number of root surface caries lesions, both in active old-age people and in seniors in long-term care facilities and fluoride containing dentifrices are also effective in preventing both coronal and root surface caries.<sup>17</sup>

#### **RURAL SECTOR**

School in the rural areas are the ideal sites for promoting oral health, through education and preventive programs. The overall high level of patient satisfaction reflected the dental team's approach of responsibility and accountability of towards the target population. In outreach dental treatment programs, comprehensive oral health care with adequate review of patients should ensure satisfaction in patients.<sup>18</sup>

#### **Social Welfare Sector**

Non Governmental Organizations should be encouraged to join in our efforts to promote oral health care in rural children. Since schools are already aimed at through education sector for Oral Health, it is suggested that NGOs can supplement the work plan of education and training aimed at house to house visits.<sup>19</sup>

#### **Control of Tobacco-related Oral Diseases**

Tobacco use is a major preventable cause of premature death and of several general diseases. In addition, cigarette, pipe, cigar and bidi smoking, etc

have several effects in the mouth. Tobacco is a risk factor for oral cancer, oral cancer recurrence, adult periodontal diseases and congenital defects such as cleft lip and palate in children. Tobacco suppresses the immune system's response to oral infection, compromises healing following oral surgery and accidental wounding, promotes periodontal degeneration in diabetics and adversely affects the cardiovascular system.<sup>20</sup>

The tobacco-related goal of the WHO Oral Health Programme is to ensure that oral health teams and oral health organizations are directly, appropriately and routinely involved in influencing patients and the public at large to avoid and discontinue the use of all forms of tobacco.<sup>20</sup>

Aim of cancer control is a reduction in both the incidence of the disease and associated morbidity and mortality. This requires not only knowledge of the natural history of the disease but also an understanding of the underpinning social, economic and cultural factors.<sup>20</sup>

### Public Private Partnership

Public Private Partnership is based on providing of mobile van dental units with an objective to take an oral health care to the door steps of the communities in rural areas. These vehicles can be operationalised by Non Governmental Organizations or in the alternative Multi National Companies e.g. Colgate Palmolive India Ltd, Hindustan Lever Ltd, etc may be requested to donate such fully equipped mobile units.

They may distribute free samples of tooth paste, tooth brushes, tooth powder along with leaflets for oral health promotion<sup>19</sup>

### CONCLUSION

Working with other international entities involved in oral health, WHO will provide support to Member States in raising awareness of the determinants of oral and general health, and fostering health-promoting environments, healthy behaviour and prevention-oriented oral-health systems.

WHO will further strengthen its support for building capacity at national and community levels to plan and implement comprehensive and integrated oral-health programmes, particularly in low- and middle-income countries and for poor and disadvantaged groups.

If these affordable treatment and programmes are provided then chances of poor health will be reduced to minimum level and this will lead to better health promotion in upcoming future.

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# Health Financing in Progressive India- A Comparative Analysis of Priorities

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## ABSTRACT

**Objective:** a. To estimate the budget priorities for health, b. To estimate the increase in public health expenditure required to achieve the declared health goals.

**Materials and Method:** This study is an analytical study based on budget estimates placed in public domain. The study estimates the health expenditure across various components of the national rural health mission in comparison with the total health expenditure. The study also compares the expenditures of other sectors like Defense and compares it with health expenditure.

**Result:** a. General government health expenditure (GGHE) has been roughly 2 % of the general government expenditure (GGE), out of which National Rural Health Mission (NRHM) expenditure takes a share of about 50%. This is about 0.9% to 1.1% of the GGE.

b. The expenditure on defense is 7 to 10 times more than that made on health and 14-20 times that of NRHM annually. This is with respect to General Government Expenditure.

**Conclusion:** Increase of 0.2% of GDP per annum on healthcare, to help government reach the goal of 1% of GDP increases in its contribution, would mean an increase in the share of health expenditure by nearly 1% from the present estimation of 2.29% in 2011-12 to 3.07% in 2012-2013. The expenditure of NRHM would increase from 1.13 % of GGE to 1.62% of GGE. Percentage GDP for the allocation could be the policy road map, however, share in expenditure budget could be a more cognitive approach in determining the operational guidelines to achieve policy objectives.

**Keywords:** General Government Health Expenditure (GGHE), General Government Expenditure (GGE), National Rural Health Mission (NRHM)

## INTRODUCTION

It is quite noticeable that every budget document of Government envisages an increased funding for health, and so is the case with similar important documents generated by Planning Commission of India. It is envisaged that government would be trying to raise its share in total health expenditure to about 2-3% of the GDP. It is however, important to note that an increased share of the GDP may not necessarily reflect the priorities of expenditure.

GDP (Y) is a sum of Consumption (C), Investment (I), Government Spending (G) and Net Exports (X – M):  $Y = C + I + G + (X - M)$ . (1)

**Background:** The consumption with respect to healthcare services depends upon the burden of disease (need), the playability (purchasing capacity

and empowerment) and availability of healthcare facilities. Investment subjected to market and profit forecasts, and imports & exports (unless in terms of foreign bio-medical equipment) makes less of niche on healthcare. The only factor well within the control is the Government spending and the increase in funds utilization capacity amongst the States, health facilities and the health seeking public. The recent and on-going struggle of the countries against economic crashes also alarms us of the fluctuating GDP growth rates and further strengthens the opinion that net share in Government's expenditure could be an easier way for layman to track governments priorities especially with respect to healthcare. National Rural Health Mission (2), the flagship healthcare programme of Government of India since 2005 has seen and shown few wonderful and encouraging results in country's healthcare environment. Right from the issue of appointment of

accredited social health activist – popularly called ASHA (hope), the mission has been very hopeful in achieving the millennium development goals, though practically difficult at the current rate of progress which includes appreciable progress gained in MMR & IMR-base line indicators of health. The other noticeable point in the mission is unification of all vertical programs under one umbrella and increased centre-states cooperation for health. However, this mission while pacing further in its objectives was supposed to achieve results encouraging enough for the Government to launch National Urban Health Mission, and eventually unifying both NRHM & NUHM for overall health protection to the maximum population.

The Programme Implementation Guidelines with respect to NRHM financing have been both robust and methodical. However, what is interesting is that NRHM consumes about 50%-60% of the general government health expenditure done by the central government every financial year. In the light of the fact that about 73% of population is rural, this share in total central government spending is quite encouraging. If NRHM has to bring fundamental positive change in the healthcare environment in India,

it would need more resources for it to achieve the targets at the same rate if not at a greater pace, eg., to reduce MMR from 540 to 420 (decrease by 120) needs far less resources than what would be required to bring it further down from 420 to 300 (decrease by 120). As we see in the table below, the Government spending on healthcare as a share of its total expenditure has not increased, nor has the share of NRHM further strengthened to convey this priority sufficiently.

**Analysis and Findings:** The expenditure profile for NRHM from the time of its inception is stated below (table 1), which quite apparently shows an increase, however, table -2, shows that healthcare has not gained sufficient priority ranks in the overall agenda of growth and development. The overall central government health expenditure remains around 2% of the General government expenditure over the last 5 years of NRHM. The two comparator tables are mentioned here to illustrate the point that looking at mere increase in health expenditure is not adequate to understand the priority. As established from table-2, a priority is sufficiently understood only in the light of total budget and total government expenditure.

**Table 1: Allocation & Expenditure profile for NRHM from 2005-2011**

YEAR	Allocation	Release	Expenditure.
2005	4633.39	4433.75	3204.17
2006	6997.05	5774.3	4518.68
2007	8928.85	8508.87	7010.07
2008	10192.23	9625.09	10565.1
2009	10601.67	11224.53	13121.95
2010	12992.98	12871.23	9366.69
2011	14263.72	****	****

Table 2 estimates that the share of general government health expenditure in general government expenditure has not changed drastically. It continues to claim mere 2% of the annual GGHE, whereas

NRHM get only about 1.1% of GGHE which is a very low share given the scope and mandate of NRHM as a systemic reform agenda in Indian health care.

**Table 2: Share of Health and NRHM in General Government Expenditure**

	GGE	GGHE	NRHM
2005-2006	508705.37	10039.83	4633.39
		1.97% of GGE	0.91% of GGE 46.15% of GGHE
2006-2007	581637.04	11757.74	6997.05
		2.02% of GGE	1.20% of GGE 59.51% of GGHE
2007-2008	709373.26	14974.34	8928.85
		2.11% of GGE	1.26% of GGE 59.62% of GGHE

**Table 2: Share of Health and NRHM in General Government Expenditure (Contd.)**

	GGE	GGHE	NRHM
2008-2009	900953.41	18476.00	10192.23
		2.05% of GGE	1.13% of GGE
			55.16% of GGHE
2009-2010	1021546.53	21680.00	10601.67
		2.12% of GGE	1.03% of GGE
			48.90% of GGHE
2010-2011	1216575.73	25055.00	12992.98
		2.06% of GGE	1.07% of GGE
			51.86% of GGHE
2011-2012 (estm)	1257728.83	28756.00	14263.72
		2.29% of GGE	1.13% of GGE
			49.60% of GGHE
Total	6196520.17	130738.91	68609.89
		2.11% of GGE	1.11% of GGE
			52.48% of GGHE

Table 3 & 4 provides an illustration, where expenditure on defense services has been compared over last five years (from 2005- the year of inception of NRHM) for the sake of comparability, not undermining the importance of both forms of protection – political and social. Ministry of Defense claims about 16%- 18% of the GGHE in comparison to NRHM which gets just over 1 % of GGHE (3). Ministry of Defense spent about 20 times NRMH in 2005-06, after which there was a sharp decline; however it continues to get about 14 times the allocated budget for NRHM and about 8 times the entire general government health expenditure.

**Table 4: NRHM, Health and Ministry of Defense expenditure as a share of GGE.**

Year	GGHE	NRHM	Ministry of Defense
	(% of GGE)	(% of GGE)	(% of GGE)
2005-2006	1.97	0.91	18.86
2006-2007	2.02	1.2	17.46
2007-2008	2.11	1.26	15.44
2008-2009	2.05	1.13	15.23
2009-2010	2.12	1.03	16.03
2010-2011	2.06	1.07	14.50
2011-2012	2.29	1.13	16.10

**Table 3: Ministry of Defense expenditure for 2005-2011**

Year	Ministry of Defense
2005-2006	95957.33 Crores
	10 times GGHE, 21 times NRHM exp.
	18.86 % of GGE
2006-2007	101533.05 Crores
	9 times GGHE, 21 times NRHM exp.
	17.46% of GGE
2007-2008	109519.00 Crores
	9 times GGHE, 12 times NRHM exp.
	15.44 % of GGE
2008-2009	137221.64 Crores
	7 times GGHE, 13.5 times NRHM exp
	15.23% of GGE
2009-2010	163844.49 Crores
	7 times GGHE, 16 times NRHM exp
	16.03% of GGE
2010-2011	175771.85 Crores
	7 times GGHE, 13.5 times NRHM exp
	14.5% of GGE
2011-2012 (estm)	202572.30 Crores
	7 times GGHE, 14 times NRHM exp
	16.10% of GGE
Total	986419.66 Crores
	8 times GGHE, 14 times NRHM exp.
	15.92% of GGE since 2005

## DISCUSSION

An increase in 0.2 % of the GDP per year from 2011, on healthcare, which would eventually meet government's said agenda of improving its share in the healthcare expenditure up to 2-2.5% of the GDP (4) would mean an additional expenditure of \$1.25 trillion  $\times$  0.2% = Rs. 11250 Crores additional expenditure increase per annum at current values of GDP and exchange rates. If the present ratio of 60% of GGHE towards NRHM continues this would mean an additional allocation of Rs.6750 Crores towards NRHM alone. The GGE of Govt. of India (2010-11) was Rs. 1216575.73 Crores and the GGE estimates for 2011-12 is Rs. 1257728.83 Crores which shows an increase of 3.38%. Applying the same percentage increase as the minimum expected increase next fiscal year, this would mean that the GGE for 2012-13 would touch Rs. 1300000 Crores. With the additional expenditure on health equivalent to 0.2% of the GDP, the total government health expenditure with respect to total



general government expenditure would rise up to 3.07% in the year 2012-13 and the share of NRHM would rise to 1.62% of the total general government expenditure still maintaining its share of 60% in the GGHE.

It is, therefore, quite empirical that an increase of 0.2% of GDP per annum on healthcare, to help government reach the goal of 1% of GDP increases in its contribution, would mean an increase in the share of health expenditure by nearly 1% from the present estimation of 2.29% in 2011-12 to 3.07% in 2012-2013. The expenditure of NRHM would increase from 1.13% of GGE to 1.62% of GGE. Allocation of money being the primary responsibility of government and the back bone of economy, it is quite appropriate that the percentage GDP for the allocation could be the policy roadmap, however, share in expenditure budget be the operational guideline to achieve policy objectives.

### CONCLUSION

With respect to other forms of expenditure like space, aviation, defense and other government responsibilities, it is to be assured that healthcare get a fair position. It is for the sake of a healthy nation that all other forms of expenditure are made including those related to security and technological advancement. Even if other forms of expenditure continues, and expenditure on health remains relatively low, with the onslaught of non-communicable diseases in India, it would only mean

protecting individuals of a nation most of whom could be of poor health, at the cost of strong borders and healthy international relations – a direct output of rapidly increasing GDP growth rate. Who is to be protected, is the question that could potentially be incorporated in the budgets of forth-coming years, so as to prove and ensure to the community in a country that the nation is spending on priorities that not only helps to preserve life from avoidable life threatening issues but also those priorities that make the saved lives more meaningful, contributory to nation and more healthy.

**Conflict of Interest:** Nil

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# Bacteriological Profile of Acute Meningitis: A One Year Study in a Tertiary Care Centre in Assam

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## ABSTRACT

Bacterial meningitis is still a life threatening epidemiological problem especially in many developing countries. The aim of the present study is to ascertain different bacterial agents from cerebrospinal fluid of patients with signs and symptoms of acute meningitis admitted in Gauhati Medical College and Hospital, Guwahati and to determine their *in vitro* antimicrobial susceptibility pattern of different bacterial isolates. A total of 316 cerebrospinal fluid specimens were processed by standard procedures for culture and antibiotic susceptibility patterns the Department of Microbiology, Gauhati Medical College and Hospital, Guwahati, from August 2009 to July 2010. Bacterial pathogens were isolated from 44 patients showing an isolation rate of 13.91%. The predominant organism in CSF culture was *Staphylococcus aureus* 15 (34.1%), followed by *Klebsiella sp.* 8 (18.18%), *Escherichia coli* 6 (13.63%), *Acinetobacter sp.* 4 (9.09%), *Neisseria meningitidis* 2 (4.54%) and *Streptococcal pneumoniae*, 2 (4.54%). All the Gram positive isolates were 100% sensitive to Linezolid and Vancomycin. The Gram negative bacilli isolates were found to be highly sensitive to Polymyxin B, Imipenem and Piperacillin-Tazobactam. Among the cephalosporins, least sensitive was Cefoperazone followed by Ceftriaxone, Cefotaxime and Ceftazidime. The present study reveals the changing epidemiological trend of acute bacterial meningitis in this part of the country along with their changing *in vitro* antimicrobial susceptibility pattern. This microbiological study may provide a guideline to formulate the initial empiric antibiotic therapy for the patients of acute bacterial meningitis.

**Keywords:** Acute Bacterial Meningitis, Sensitivity Pattern

## INTRODUCTION

Meningitis is a very serious infection of the meninges that surround the brain and the spinal cord<sup>[1]</sup>. Causative agents of acute meningitis can be viral, bacterial or fungal pathogens. Among these, bacterial meningitis can be quite severe and may result in brain damage, hearing loss or learning disability and death<sup>[2]</sup>. Vieusseux described an outbreak of meningococcal disease with 33 deaths in the small community of Eau Vive, near Laka Geneva in Switzerland, in the spring of 1805<sup>[3,4]</sup>.

Among the bacterial agents causing meningitis, the most commonly responsible for community-acquired bacterial meningitis are *Streptococcus pneumoniae* (~50%), *Neisseria meningitidis* (~25%), Group B *Streptococcus* (15%) and *Listeria monocytogens* (~10%). *Haemophilus influenzae* now accounts for less than 10% of cases of bacterial meningitis. The epidemiology of

bacterial meningitis has changed significantly in recent years, reflecting a dramatic decline in the incidence of meningitis caused by *Haemophilus influenzae* and *Neisseria meningitidis* following the introduction and increasingly widespread use of vaccines for both these organisms. Enteric Gram negative bacilli are increasingly common cause of meningitis in individual with chronic and debilitating diseases like diabetes, cirrhosis or alcoholism and in those with chronic urinary tract infection. *Staphylococcus aureus* and Coagulase-negative *Staphylococcus* are important causes of meningitis that follows invasion of neurosurgical procedures<sup>[5]</sup>.

In most studies, besides conventional pathogens other bacteria like *Klebsiella* species, *Escherichia coli*, *Pseudomonas* species, *Acinetobacter* species, *Citrobacter* species, *Enterococcus* species etc. have been isolated from admitted patients.

In partially treated meningitis, CSF may become clear with predominant lymphocytes; culture also may be sterile [6].

## MATERIALS AND METHOD

A total of 316 CSF samples were tested in the Department of Microbiology in Gauhati Medical College and Hospital, from August 2009 to July 2010.

CSF samples were collected as a part of the routine clinical management from patients with signs and symptoms of acute meningitis admitted in different wards of the hospital that includes Medicine wards and ICUs, Paediatric wards and ICUs, Neonatal Intensive Care Units (NICU) etc.

The CSF samples were collected in sterile containers by attending physicians and delivered to the Microbiology laboratory as soon as possible. 2-3 ml of CSF was transferred to a sterile centrifuge tube and it was centrifuged at 3000 rpm for 5 minutes. The supernatant part was transferred to a clean container for chemical examination [7].

The CSF deposits were seeded on to Blood Agar, Chocolate Agar, and Chocolate Agar medium with supplements, MacConkey's Agar and Glucose broth. The MacConkey's Agar and Glucose broth were incubated aerobically while Blood Agar, Chocolate Agar, Chocolate Agar medium with supplements were incubated in presence of 5-10% carbon dioxide in candle jar at 37 °C for 24 hours. The plates and broth were examined after overnight incubation and if there was no growth the plates were re-incubated for further 24 hours and examined. The broth was sub-cultured on the above solid media and examined.

Organisms were identified by standard microbiological methods, which included colony morphology, as well as staining, and biochemical tests [1, 8-9].

Antibiotic sensitivity test was conducted on pure culture isolates employing the disc diffusion method for the commonly used antibiotics per disc: Penicillin G (P, 10 µg), Gentamicin (G, 10 µg), Amikacin (AK, 30µg) Erythromycin (E, 5µg)), Vancomycin (V, 30 µg), Linezolid (LZ, 30 µg), Ciprofloxacin (CF, 5µg), Amoxicillin-Clavulanic acid (AC, 10 µg), Piperacillin Tazobactam (PZ, 100/10 µg), Cefotaxime (CE, 30 µg),

Ceftriaxone (CI, 30 µg), Cefoperazone (CS, 75µg), Ceftazidime (CZ, 30 µg), Cefoxitin (CN, 30 µg) and Polymyxin B (Pb, 300 U), (HiMedia). The diameters of growth inhibition around the discs were measured and interpreted as sensitive, intermediate or resistant as per the guideline set by Bauer, et al [10]. Reference strains: E. coli ATCC 25922 and S. aureus ATCC 25923 were tested as controls according to the CLSI guidelines [11].

## RESULTS

A total of 316 CSF samples were investigated during the study period from August 2009 to July 2010.

In this study, out of total 316 CSF samples, 163 (51.58%) samples were collected from patients of the age group 0-10 years, followed by 41 (12.97%) in the age group of 11-20 years. Only one sample (0.32%) was collected above the age of 70 years.

Out of the total 316 cases, 212 (67.09%) were males and 104 (32.91%) were females; the male to female ratio is 2:1.

Fever (92.72%), altered mental status (74.36%), headache (61.71%) and convulsion (57.6%) were the most common clinical manifestations of meningitis among the patients in the present study. Frequencies of clinical manifestations of patients are shown in Table 1.

**Table 1: Clinical manifestation of acute meningitis in 316 cases**

Clinical features	No. of cases (%)
Fever	293 (92.72)
Altered mental status	235 (74.36)
Headache	195 (61.71)
Convulsion	182 (57.59)
Vomiting	178 (56.33)
Irritability	167 (52.85)
Neck rigidity	138 (43.67)
Kernig sign	110 (34.81)
Bulging fontanel	51(16.14)
Refusal to feed	49 (15.51)
Skin rash	5 (1.58)

Out of total 316 cases of meningitis, predisposing conditions were associated with 45.25% cases of meningitis. The commonest predisposing condition was found to be diabetes mellitus (14.24%), followed by low birth weight/ pre-term babies (11.39%) (Table 2).

**Table 2: Predisposing Conditions among 316 cases of acute meningitis**

Predisposing Conditions	No. of Patients (%)
Diabetes mellitus	45(14.24)
Pre-term/Low birth weight	36(11.39)
Malignancy	33(10.44)
HIV Infection	17(5.38)
Head injury	12(3.8)
No predisposing factor	173(54.74)
Total	316(100)

Bacterial pathogens were isolated from 44 patients showing an isolation rate of 13.92%. The number of pathogens isolated was 33 in males and 11 in females; male: female ratio was 3:1. Pathogen isolation rate was

higher in the age group 3 months to 10 years (31.82%). The type and frequency of pathogens isolated from CSF is shown in Table 3.

Out of total 44(13.91%) culture positive samples, Gram positive organisms accounted for 19(43.18%) cases while Gram negative organisms accounted for 25 (56.82%). The predominant organism isolated from CSF culture was *Staphylococcus aureus* 15 (34.1%), followed by *Klebsiella sp.* 8(18.18%), *E. coli* 6(13.63%), *Acinetobacter sp.* 4(9.09%), *Pseudomonas sp.* 3(6.82%) and *Citrobacter sp.* 2(4.54%). Isolation of *Neisseria meningitidis*, *Streptococcus pneumoniae* and *Listeria sp.* were less in number in the present study, 2 (4.54%) each (Table3)

**Table 3: Common bacterial isolates from CSF by sex and age distribution**

Isolated organisms	No.(%)	Male	Female	newborn to 3 months	>3months to 10 years	11-45years	>45years
<i>Staphylococcus aureus</i>	15(34.09)	12	3	3	6	3	3
<i>Klebsiella sp.</i>	8(18.18)	7	1	1	4	1	2
<i>Escherichia coli</i>	6(13.63)	3	3	3	2	1	0
<i>Acinetobacter sp.</i>	4(9.09)	4	0	0	0	2	2
<i>Pseudomonas sp.</i>	3(6.82)	1	2	0	0	3	0
<i>Listeria sp.</i>	2(4.54)	2	0	1	1	0	0
<i>Neisseria meningitidis</i>	2(4.54)	1	1	0	1	0	1
<i>Streptococcus pneumoniae</i>	2(4.54)	1	1	0	0	1	1
<i>Citrobacter sp.</i>	2(4.54)	2	0	2	0	0	0
Total	44(100)	33	11	10	14	11	9

The results of the antibiotic susceptibility patterns of Gram positive organisms are presented in Table 4. It shows all the Gram positive isolates are 100% sensitive to Linezolid and Vancomycin. Isolates of *Streptococcus pneumoniae* were also found to be 100% sensitive to some other antibiotics like Amoxicillin-Clavulanic acid, Amikacin, Gentamicin, Erythromycin and Ciprofloxacin. Among the 15 isolates of

*Staphylococcus aureus*, 80% was sensitive to Amoxicillin-Clavulanic acid followed by 60% to Amikacin. Penicillin was sensitive only in 26.66% cases. The Cefoxitin discs were used to isolate Methicillin Resistant *Staphylococcus aureus* (MRSA). Among the total 15 isolates of *Staphylococcus aureus*, 12 were found to be sensitive to Cefoxitin, thereby 3 MRSA were isolated.

**Table 4: Antibiotic sensitivity pattern of Gram positive bacterial isolates from CSF**

Antibiotics	P	AC	VA	LZ	G	AK	E	CF	CI
Isolates									
<i>S. aureus</i> (15)	26.6%	80%	100%	100%	53.3%	60%	46.6%	53.33%	13.33%
<i>S.pneumoniae</i> (2)	50%	100%	100%	100%	100%	100%	100%	100%	50%
<i>Listeria sp.</i> (2)	nil	100%	100%	100%	50%	50%	50%	50%	50%

The results of the antibiotic sensitivity patterns of Gram negative organisms are presented in Table 5. The above table shows Polymyxin B at 92% sensitivity as the most effective antimicrobial agent against the entire spectrum of the Gram negative bacilli isolated. It was

followed by Imipenem 88% and Piperacillin-Tazobactam 64%. Among the cephalosporins, least sensitive was Cefoperazone 8% followed by Ceftriaxone 16%, Cefotaxime 36% and Ceftazidime 44%.

**Table 5: Antibiotic sensitivity pattern of Gram negative bacterial isolates from CSF**

Antibiotics	P	AC	PT	AK	CF	CI	CE	CS	CZ	I
<b>Isolates</b>										
Klebsiella sp. (8)	nil	75%	87.5%	62.5%	75%	25%	37.5%	12.5%	37.5%	87.5%
E. coli (6)	nil	66.6%	83.3%	83.3%	66.6%	16.6%	33.3%	16.6%	50%	100%
Acinetobacter sp. (4)	nil	25%	50%	25%	25%	nil	25%	nil	25%	75%
Pseudomonas sp. (3)	nil	nil	33.3%	33.3%	66.6%	nil	33.3%	nil	66.6%	100%
Neisseria meningitidis (2)	50%	50%	nil	50%	50%	50%	50%	nil	50%	50%
Citrobacter sp. (2)	nil	50%	50%	50%	nil	nil	50%	nil	50%	100%

## DISCUSSION

The epidemiologic trend of acute bacterial meningitis has been changed in recent years. This change may influence the choice of initial empiric antibiotic treatment [12], which is an important strategy for a successful treatment of acute bacterial meningitis. Hence, there is a need for periodic review of bacterial meningitis worldwide, since the pathogens responsible for infection vary with time, geography and patient's age. Increase in awareness, availability of vaccines may also reflect a change in the epidemiological pattern of these pathogens. The etiological agents of community acquired meningitis may differ from hospital acquired meningitis. Delay in diagnosis and initiation of treatment can result in poor outcome of the disease [13]. Thus, the data presented in this study can provide information of immediate public health importance to clinicians on the selection of antimicrobial agents for the treatment of patients suffering from acute bacterial meningitis.

The isolation rate of 13.91% found in the present study is in agreement with a various studies by different authors [14,15,16]. Even though all febrile patients with signs and symptoms of acute meningitis have underwent lumbar puncture to rule out bacterial meningitis, the bacterial isolation rate was found to be low. This may be due to the fastidious nature of the organisms or prior exposure to antibiotics [1,17,18] or over clinical diagnosis of meningitis. The predominant organism isolated in CSF culture was Staphylococcus aureus 15 (34%) out of which 3 (20%) were found to be Methicillin Resistant Staphylococcus aureus (MRSA) in this study.

Among the Gram negative isolates, Klebsiella sp was found to be the commonest isolate, 8 (18.18%). Other Gram negative bacilli were Escherichia coli 6 (13.63%), Acinetobacter sp. 4 (9.09%), Pseudomonas sp. 3 (6.82%) and Citrobacter sp. 2 (4.54%). The change in the epidemiological trend of isolated organisms in meningitis cases is due to mainly hospital acquired

infection associated with increasing immunocompromised status of the patients like diabetes, HIV infection, pre-term delivery, malignancy etc.

Isolation rate of Streptococcus pneumoniae and Neisseria meningitidis were less in the study. Haemophilus influenzae have not been isolated from CSF in this study. This may be because of fastidious nature of the organisms, vaccination against Streptococcus pneumoniae and Haemophilus influenzae implementation or antibiotic treatment prior to lumbar puncture.

Among the 15 isolates of Staphylococcus aureus, 80% was found to be sensitive to Amoxycillin-Clavulanic acid followed by Amikacin 60%, Gentamicin and Ciprofloxacin 53.33% each. The Cefoxitin discs were used to isolate Methicillin Resistant Staphylococcus aureus (MRSA). Among the total 15 isolates of Staphylococcus aureus, 12 were found to be sensitive to Cefoxitin, thereby 3(20%) MRSA were isolated. In the previous study of this institution, all isolates of Staphylococcus aureus were found to be sensitive to Gentamicin, followed by Chloramphenicol and 57.1% were sensitive to Cotrimoxazole. Similar finding was observed by previous author of Gauhati Medical College and Hospital which was about 14% [19]. Higher prevalence of meningitis due to Staphylococcus aureus, in the present study, may be due to predisposing factors as well as co-morbidities associated with the patient. Inappropriate use of antibiotics and prolonged hospital stay are the causes of emergence of Methicillin-resistant S. aureus (MRSA).

However, all the Gram positive isolates of CSF are found to be sensitive to newer antibiotics like Linezolid and Vancomycin.

The in vitro susceptibility tests of the bacterial isolates revealed that Polymyxin B at 92% sensitivity was the most effective antimicrobial agent against the

entire spectrum of the Gram negative bacilli isolated. It was followed by Imipenem 88% and Piperacillin-Tazobactam 64%. The sensitivity of each of Ciprofloxacin and Amikacin was 56%, followed by Amoxicillin-Clavulanic acid 52%. Penicillin was found to be 50% sensitive to *N. meningitidis* while it was resistant to *Acinetobacter sp.* Chlaphenicol was 100% sensitive to *N. meningitidis*. Among the cephalosporins, least sensitive was Cefoperazone 8% followed by Ceftriaxone 16%, Cefotaxime 36% and Ceftazidime 44%.

Increasing resistance to empirically used antimicrobials in meningitis especially to cephalosporins (Cefoperazone, Ceftriaxone, Cefotaxime, Ceftazidime etc.) is an alarming condition. Resistance to newer drugs like Imipenem is another alarming condition for the clinicians.

Thus, this study gives a clear idea about the changing epidemiological trend of acute bacterial meningitis in this part of the country along with their changing *in vitro* antimicrobial susceptibility pattern. Producing updated information on local causative pathogens of acute bacterial meningitis and their antibiogram is a prime tool in combating this global infection. This microbiological study helps the clinicians to formulate the initial empiric antibiotic therapy on the basis of the recent epidemiological trend and antimicrobial susceptibility of the organisms.

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# Reproductive Health Needs of Adolescent Girls in the Age Group of 15-19 Years in an Urban Slum of Mumbai

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## ABSTRACT

**Background:** Behaviours adopted during adolescence affect the reproductive health in the long run.

**Objectives:** 1.To study the socio-demographic characteristics of adolescent girls.2.To study knowledge, attitude and behaviour of adolescent girls with reference to reproductive health issues .3.To explore the reproductive health needs of adolescent girls.

**Materials and Method:** A list of all adolescent girls was obtained from ICDS project catering to the study area. Total 200 adolescent girls in the age group of 15-19 years were interviewed by systematic random sampling, maintaining full privacy, with prior consent using a pretested questionnaire containing structured, pre-coded and few open ended questions. The data was analyzed by using percentages and chi-square test.

**Results:** Only 28.14% females had a prior knowledge of menstruation. About 11.5% mentioned that females determine the sex of the child. Less than half, 49.5% were aware about any family planning method. More than 3/4th adolescent girls interviewed knew about the principle modes of transmission of AIDS. Only 38.5% females were aware of the potential benefit of condom use in preventing HIV transmission.92% expressed the need to have detail information on conception and family planning.

**Interpretation and conclusions:** A significant number of girls were unaware about the various reproductive health issues, ranging from menstruation, conception, contraception to

STI'S and HIV-AIDS. Significant association was seen between their level of education and knowledge on HIV-AIDS and Myths about HIV.

**Keywords:** Adolescent, Menstruation, Conception, Contraception, STI's/STD's, HIV/AIDS

## INTRODUCTION

'ADOLESCENCE' is a fascinating period of life, which marks the transition from being a dependent child to becoming an independently functioning adult. World Health Organization considers adolescence to be the period between 10 and 19 years, which encompasses the time from onset of puberty to the full legal age.

The current generation of 10-19 year olds are more than a billion strong, and will be the largest generation in history to make the transition from children to

adults<sup>1</sup>.Currently, one in every five person on the earth is an adolescent, and 85% of them live in developing countries.<sup>2</sup> In India, 21.2% of the total population are adolescents, till recent times, it was a much neglected group. This neglect may be perhaps because adolescence was considered as one of the healthiest period, looking at the available morbidity and mortality statistics of this age group.<sup>4</sup>Today with the advent of the killer disease HIV-AIDS, affecting chiefly the young people, adolescent health is gaining its importance, the foundation of which was laid down by World Health Assembly by incorporating Adolescent Health Programme in 1989.

There are many factors which contribute to their reproductive ill health they are

- Higher risk taking behaviour having a long term reproductive health consequences.
- Lack of access to appropriate information on STD'S, and HIV/AIDS, contraception, conception, and on issues related to adolescent sexuality, and a lack of preventive services, with limited access to the available services.<sup>5</sup>

With decline in average age at menarche and trend towards increased age at marriage, the length of time in which adolescents may experience premarital sexual activities is also becoming longer. According to behavioural surveillance survey (BSS) conducted by NACP-II, the median age at first sex was 21 years for males and 18 years for females in the entire country.<sup>6</sup>

Globally every year there are more than 330 million new cases of STD'S and 1 in 20 adolescent become infected.<sup>7</sup> HIV infects 5.2 million people every year globally, out of which more than 50% are seen among 15-24 year olds.<sup>7</sup> Some 7000 young people aged 15-24 years are newly infected with HIV each day.<sup>1</sup>

Another reproductive health problem faced by adolescents due to unprotected sexual behaviour and lack of knowledge on contraception is 'unwanted pregnancy'. Surveys in developing countries show that, 20 to 60 % of pregnancy and birth to women under age of 20 are unwanted.<sup>8</sup> The view that sexual activity among unmarried adolescents is wrong or immoral, has resulted in induced abortion as likely outcome of pregnancy, most of which are performed illegally and under hazardous circumstances.<sup>4</sup> At least one fourth of all unsafe abortions are among girls 15-19 years of age.<sup>9</sup>

From the above it is clear that adolescents have special needs which range from, need of appropriate information on conception, contraception ,sexuality, STD'S and HIV-AIDS However, review of existing information suggests that very little is known about the health needs of adolescent girls , and reproductive health needs in particular, from their own perspective. This community based survey was therefore undertaken to explore and identify the RH needs of adolescent girls, in urban slum of Mumbai.

## AIM

- To identify the reproductive health needs of adolescent girls in the age group of 15-19 years in an urban slum.

## OBJECTIVES

- To study the socio-demographic characteristics of adolescent girls.
- To study knowledge, attitudes and behaviour of adolescent girls with reference to reproductive health issues.
- To explore their reproductive health needs.

## MATERIALS AND METHOD

A cross sectional, community based, study was conducted in slums of Dharavi, Mumbai. Out of total six sectors, two sectors were selected randomly. A list of adolescent girls in the age group of 15-19 years was obtained from the supervisors of these two sectors. A total of 2170 adolescent girls in the age group of 15-19 years were present in the study area. Making use of the last digit of a currency note, the first girl was selected randomly from the list and then every 10<sup>th</sup> girl was selected by systematic random sampling. About 17 girls refused or were unavailable for the study. A total of 200 girls in the age group of 15-19 years were studied. A one to one interview was conducted, and questions on knowledge, attitude and behaviour on RH issues, use of health services and their RH needs was asked. The primary tool of data collection was a predesigned and pretested questionnaire. The participation in the study was voluntary. Data was analyzed using Epi-Info statistical package. Chi-square test was applied wherever necessary.

## RESULTS

Majority of respondents (25.5%) were in the age group of 15-16 years, followed by 17-18 years (21.5%). 68% of respondents were Hindu by religion. Majority of them 37.5% belonged to Class IV socioeconomic status as per B.G Prasad's Classification.

Only 11.5% were ever married. Majority 68.5% of the girls had higher secondary school education.



**Table 1: Distribution of Respondents as per the Socio-Demographic Profile**

	Number	Percentage
<b>Religion</b>		
Hindu	136	68.0
Muslim	40	20.0
Buddhist	17	8.5
Christian	7	3.5
<b>Type of family</b>		
Nuclear	148	74.0
Joint	43	21.5
Extended joint	9	4.5
<b>Class &amp; Percapita income Rs.</b>		
Class V(200 or less)	16	8.0
Class IV(200-499)	75	37.5
Class III(500-999)	64	32.0
Class II(1000-1599)	28	14.0
Class I (1600 & above)	17	8.5
<b>Marital Status</b>		
Unmarried	177	88.5
Ever Married	23	11.5
<b>Educational Status</b>		
Primary (1-4 <sup>th</sup> std.)	10	5
Lower Secondary (5-7 <sup>th</sup> std.)	36	18
Higher Secondary(8-10 <sup>th</sup> )	137	68.5
Higher Education	17	8.5

Majority of the respondents (68.8%) had attained menarche by the age of 13 years. Only one female had not attained menarche at the time of study. Nearly 3/4<sup>th</sup>, 143 respondents (71.86%) did not receive any prior information on menstruation. 67.83% respondents used a separate cloth during menses. Only 12.06% used a sanitary napkin. Nearly half of the respondents 96(48.24%) suffered from dysmenorrhoea, however only 20.83% of them sought any medical help for it. 48(24.12%) of adolescent complained of irregular menses, however only 12(25%) availed medical treatment for the same.

Only 58 (29%) girls correctly responded that male factor is responsible in determining the sex of the child. Majority of the girls 109(54.5%) preferred 19-21 years as the age group for having first child.

Majority of the respondents 187(93.5%) had no knowledge about the fertile period.

Only 4% females correctly identified the most likely time for conception in relation to the menstrual cycle. Majority (83.8%) knew about oral contraceptive pills.

A significant association was seen between respondent's knowledge of family planning methods

and educational status. ( $X^2=17.59$ ,  $p<0.05$ ). From the total 23 ever married adolescents, 17 (73.91%) never used any contraceptive methods.

98% respondents had heard about HIV-AIDS. Only 5% respondents had heard about STD's. More than 3/4<sup>th</sup> respondents knew the principle modes of transmission of AIDS. Only 56% correctly mentioned homosexual contact as one of the mode of spread of HIV.

**Table 2 Respondents knowledge of modes of HIV transmission as per their Educational status**

Educational status	Complete knowledge		Incomplete knowledge	
	No.	%	No.	%
Primary	3	30	7	70
Lower Secondary	11	30.56	25	69.44
Higher Secondary	70	51.09	67	48.91
Higher Education	11	64.71	6	35.21
Total	95	47.5	105	52.5

$X^2= 8.1$ ,  $P< 0.05$

A significant association was observed between the educational status of respondents and their level of knowledge of modes of transmission( $X^2=8.1$ ,  $p<0.05$ )

44.5% respondents had a myth that HIV is transmitted by coughing and sneezing. HIV is transmitted by mosquito bites were quoted by 43.5% respondents. Presence of myth was less among respondents with higher secondary education and above .A significant association was observed between the educational status of respondents and the presence of myth ( $X^2=14.53$ ,  $p<0.05$ )

85% appreciated the fact that AIDS is preventable. Abstinence, use of disposable needles, staying away from AIDS patient were the chief preventive measures mentioned by 19%, 17% and 15.5% respondents respectively. Only 38.5% respondents were aware of the potential benefit of condom use in preventing HIV transmission. 38.5% respondents did not want to shake hands with people living with HIV. Only 1% of the study population had a permissible attitude towards premarital sexual relations, while extramarital relationship was disapproved by all.

92% expressed need to have detail information on conception and family planning. 66.5% respondents wanted to have a more scientific explanation of menstruation and menstrual hygiene. Provision of services catering to specific adolescent health problems was suggested by the respondents.

## DISCUSSION

Dharavi is the largest slum in Asia with majority of its residents belonging to the lower socio economic class, the same is observed in this study, where 22.5%, less than 1/4<sup>th</sup> of the population belonged to upper and upper middle class and a majority 77.5% belonged to lower middle, upper lower and lower classes.<sup>10</sup>

11.5% of adolescent girls were ever married; NFHS-II reported that in India 18% females in urban areas in age group of 15-19 years is ever married.<sup>11</sup>

The mean age of menarche in the study population was 13.12 years. Dr.Ratna Majumdar reported similar finding among adolescent girls, where mean age of menarche was 13years.<sup>12</sup>

Only 28.14% respondents had prior information on menstruation. Asha A.Bhende also reported that there was a lack of biological explanation in knowledge regarding menstruation among 210 adolescent girls studied.<sup>13</sup> A study from Bangladesh also found that adolescent girls do not know about menstruation before they experience it.<sup>2</sup>

During menstruation 80.89% girls used home-made cloth, out of which 13.06% shared it with their mother or sister. Only 12.06% girls used disposable pads. A similar finding was reported by K.A.Narayan, where majority 72.2% females used home- made cloth, and 8.3% used sanitary napkins.<sup>14</sup>

101(50.5%) respondents had no knowledge about any of the family planning method. Study conducted by H.G.Thakor et al reported a higher percentage of school going girls (61.7%) had no knowledge of contraceptive methods.<sup>15</sup>

Only 4% respondents were aware about the fertile period. Quamrun Nahar et al reported a similar finding, where 3% of study group was aware of the fertile period.<sup>2</sup>

Out of 99 respondents who were aware about any of the family planning method, majority 83.8% were aware about O.C. pills, followed by condom, Cu-T, sterilization. This finding is supported by a study conducted by John Kekovole et al in Kenya.<sup>16</sup>

Only 2% respondents had not heard about HIV-AIDS, as against 5% of them being aware about other STD's. This wide gap can be due to the extensive awareness campaign for HIV-AIDS as against that for other STD's. Majority (64.71%) of the girls who had

complete knowledge of HIV-AIDS transmission were college going followed by 51.09% with secondary schooling.

37% of the respondents had the myth that sharing clothes and utensils used by HIV positive people transmits HIV.17% also felt that talking to AIDS patients transmits the disease. Presence of such myths is a hurdle in preventing the social deprivation and stigmatisation of people living with HIV-AIDS. Considerable percentage 38.5% respondents did mind shaking hands with HIV patients. Such attitude will increase the already existing isolation of HIV patients.

More than three fourth of the respondents 85% agreed that AIDS is preventable. A dissimilar finding was observed by Asha Bhende, where only 18.5% adolescent girls mentioned AIDS is preventable.<sup>14</sup>

Use of condom prevents AIDS transmission was mentioned by only 7% females. Whereas in a study by Mburano Rwenge et al 89% mentioned condom use as a chief mode of HIV prevention.<sup>17</sup>

About 56% respondents were aware that AIDS is incurable. A similar finding was reported by S.K.Benara et al where 57.5% mentioned that AIDS is incurable.<sup>18</sup>

Majority 92.5% adolescent girls felt that HIV-AIDS education should be given in school. This finding is supported by study done by Ralph.J.Diclemente where 87.6% students thought that students should receive AIDS instruction in schools.<sup>19</sup>

Majority 86.5% held the traditional opinion of not having premarital sexual relationship, while 1% had no objection to it. A strikingly opposite observation was made by A.K.Sharma et al, where 46.7% secondary school students had permissible attitude towards premarital sex. There is a slow diminishing of the traditional view of not accepting pre marital sexual relations and thus a need of correct information about the preventive methods for AIDS or any other STD's.<sup>20</sup>

66.5% respondents expressed the need for information on menstruation. 92% wanted to have detailed information on conception and contraception preferably before marriage.

## CONCLUSION

The inadequacy of knowledge along with misinformation about the various reproductive health

issues along with unfavourable attitudes and practices are hurdles in the healthy development of these adolescent girls. Equipping them with appropriate and adequate information on the various reproductive health issues will be beneficial for the generations to come.

Adolescents should be given family life education which should be comprehensive in nature. It should incorporate issues related to growing up, gender issues, conception, contraception, care during antenatal, postnatal period, RTI/STI, HIV/AIDS, negotiation and assertive skills so that they are able to take correct decisions with reference to health and responsible behaviour.

From the present study it is observed, school training programme has benefited many school children. Training of peer groups among them in schools as well as community can thus be beneficial.

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# Indirect Estimation of Life Expectancy at Birth for the Districts of the Major States of India (2001-05)

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## ABSTRACT

Life expectancy at birth ( $e_0^0$ ) is considered as an important indicator of the mortality level and quality of life in a population. In India, direct estimation of  $e_0^0$  through construction of life tables is not possible due to incomplete death registration. The Sample Registration System of India provides information on  $e_0^0$  only for 16 states. The estimates of  $e_0^0$  for the districts are not available. Most of the indirect methods for estimating  $e_0^0$  are inapplicable due to the unavailability of the required data and/or failure to satisfy the associated assumptions at the sub state level. An effort is made in this paper to estimate the  $e_0^0$  at the district level of India for the period 2001-05 by developing a regression model. We have found that, of the major states, Pathanamthitta district of Kerala has the maximum and Katni district of Madhya Pradesh has the minimum  $e_0^0$ .

**Keywords:** Life expectancy at birth, India, District, Regression

## INTRODUCTION

Knowledge on level of mortality is a crucial aspect for assessing the current health situation of a particular geographical area. The pattern of mortality of a place is universally described in terms of a life table, the ultimate output of which is the life expectancy at birth ( $e_0^0$ ), the average number of years a new born of a particular place can expect to live, if the current age schedule of mortality prevails. Increase in  $e_0^0$  reflects declines in mortality and it results from quality of environment, life style changes, improvement in public health practices, medical advancements among other factors.<sup>1</sup> Therefore, it is usually considered as a quantitative reflection of the quality of life in a place.<sup>2</sup>

India was divided in 28 states and seven union territories (U/T's) with 593 districts at the time when 2001 census was conducted. Great interstate diversity exists among these states and U/T's with respect to economy, social development, religion and ethnicity and the level and trend of demographic transition.<sup>3,4</sup>

In India, owing to the poor civil registration data, the usual way of constructing a life table from the age specific deaths cannot be adopted.<sup>5</sup> Sample registration

system (SRS) is the main source of reliable information on vital statistics for the country and its constituent states. However, possibly due to its sample size problems, SRS has not gone beyond the 16 major states in estimating the life expectancy at birth ( $e_0^0$ ) and the construction of the life tables.

Like the United States, India has a federal political structure, and health is a "state subject", which means that the level and allocation of health expenditures are decided at the state level.<sup>6</sup> Districts are the most suitable administrative units for decentralized planning below the state level as they are at the next level of administrative hierarchy after the states and also because the Government of India and the state governments monitor the progress of implementation of most of the developmental activities district wise. Information on district level life expectancy at birth may be helpful to the state health departments to build necessary infrastructure and get equipped with required human resources at the district level.

In the absence of age distribution of deaths construction of life tables are possible by census age distribution at one or two points of time. But this method requires the assumption of constant number

of annual births and deaths in the recent past and also requires that the population is closed to migration.<sup>7,8</sup> Both the assumptions are not satisfied at the sub national level in India.

Several methods for estimating the expectation of life at birth are available. These methods are based on (i) stable population concept, (ii) biological theories of ageing, (iii) age distribution of population, (iv) widowhood status and (v) regression approach.<sup>2,9,10,11,12,13,14,15,16,17,18,19,20</sup>

Of these methods, perhaps, the regression method is the most suitable to estimate the life expectancy at birth at the sub national level in India as it requires limited data and does not need the assumptions demanded by the other methods.<sup>21</sup>

In the United States, Swanson (1989) developed a full quadratic regression model for estimating the life expectancy for sub state areas using only two data elements; crude death rates (CDR) and percentage of population aged 65 years and over [P(65+)]. The model is based on the fact that the percentage of population aged 65 years and over increases exponentially as a function of relative mortality. Further, Swanson, Palmore and Sundarum (1977) proved that the index used to measure relative mortality is itself an index of population ageing. Given this index and its exponential relationship with P(65+), the relationship of P(65+) with  $e_0^0$  is approximately logarithmic.<sup>2</sup> Unfortunately, data on CDR is not available at the district level of India.

It has been observed that in case of declining mortality, the population in the very young and the older age groups are relatively more affected by the changes in mortality level than the population in between these two age groups.<sup>21,22</sup> Pathak and Singh (1992) found very strong relationship of probability of survival of the children up to age 5 years [l(5)] and P(65+) with  $e_x^0$  (for  $x=0,1,5,10,15,20,\dots$ ) in Coale Demeny life table, United Nations model life tables for developing countries and SRS based abridged life tables for India and its states. In the absence of data on l(5) at district level they used the data on children surviving in the age group of 30-34/children ever born in the age group 30-34 and P(65+)/P(15), the ratio of old population to child population as independent variables and developed new regression models to estimate  $e_0^0$  for the districts of the state of Uttar Pradesh in India.

Ahmed (1997) developed regression models to estimate l(5) and  $e_0^0$  for both sexes combined at national and district levels of Bangladesh using West Model and United Nations life tables for developing countries (South Asian pattern) by exploiting the relationship between l(5) and the ratio p65+/p(15) and between  $e_0^0$  and the ratio p65+/p(15) where p65+ and p(15) are the observed proportions in the West model life tables.<sup>22</sup>

From the above discussion it has been emerged that life expectancy at birth mostly depends on child survival and survival of the old population. An effort is made in this paper to formulate empirical models based on regression approach to calculate life expectancy at birth at the district level of India. For this we have taken P(65+) and q(1), the probability of dying from birth to exact age one, as independent variables. We have taken the 2001 census data for computing the values of the independent variables as the recently conducted 2011 census data have not been published at the time of preparing this paper.

## DATA AND METHODOLOGY

Trussell's (1975) variant of Brass's (1964) method using data on children ever born (CEB) and children surviving (CS) derives the estimates of the probability of dying from birth to age x, q(x) for  $x=2, 3$  and 5.<sup>23,24</sup> The state and the district level estimates of q(x) by this method are inconsistent when applied to India's 2001 census data. Sarma and Choudhury (2012) have smoothed these estimates of q(x) using logit of the Brass general standard life table and using two of the smoothed estimates of q(x), estimated the life table infant mortality rate [q(1)] by fitting a two parameter Weibull survival function for the states and U/T's of India.<sup>25</sup> Applying the same procedure, the estimates of q(1) and l(5) [=1-q(5)] for the states and the districts can be obtained.

### Regression Equation

As mentioned earlier we have only 16 states for which SRS calculates  $e_0^0$  which seems to be small for regression analysis. Clubbing the Data for both sexes combined (person), male and female into one group serves our purpose. The reference period for the estimated l(5) values are approximately seven years prior to the census whereas that of q(1) values are of one year prior to the census, i.e., of 2000. Taking the 2001-2005 SRS  $e_0^0$  (dependent variable); and computing

P(65+) from 2001 census data of the 16 major states we have found that the correlation between the estimated  $q(1)$  and  $e_0^0$  is -0.839 and that between P(65+) and  $e_0^0$  is 0.840. There exists no strong correlation between  $q(1)$  and P(65+) ( $r=-0.547$ ) to rule out the effect of multicollinearity.<sup>26</sup> Our experimentation with different functional forms reveals that the best fitting regression, while still using only two data elements resulted from a linear model involving square of  $q(1)$  and square of the natural logarithm of P(65+). The estimating equation for  $e_0^0$  is:

$$e_0^0 = 58.410 - 949.263 * [q(1)]^2 + 3.998 * [\ln\{P(65+)\}]^2 ; \\ R^2 = 0.917 \quad (1)$$

Using this regression equation and the data P(65+) and  $q(1)$  on the basis of sex, we have estimated  $e_0^0$  for the districts of the major states of India.

It has been observed that the SRS estimates of  $e_0^0$  for the major states of India, the difference between the male and female  $e_0^0$  are almost at constant levels from 1990's and therefore, will have no or little effect on our regression estimates even if we use a single equation for estimating  $e_0^0$  for male and female.

## RESULTS AND DISCUSSION

Table-1 presents the mean and standard deviation of the absolute differences between the proposed estimates of  $e_0^0$  from the regression model and the SRS estimates (2001-2005) of the 16 major states for person, male and female respectively. It is found

that the regression model satisfactorily estimates the  $e_0^0$  of these states.

Table-2 presents the districts with lowest and highest  $e_0^0$  of each major state (Total, person) along with the difference between them which reflects the differentials of district level  $e_0^0$  prevailing in the states.

Table-3(i)-(ii) presents the 20 districts of the major states with lowest  $e_0^0$  and the 20 districts with highest  $e_0^0$  (Total, person).

Table-3 presents the number of districts in different intervals of  $e_0^0$  for person, male and female. It has been found that females have more longevity than the males as in 47 districts female  $e_0^0$  are over 70 years compared to 31 districts where male  $e_0^0$  are over 70 years.

Table-4 presents the number of districts of different zones of India in broad intervals of  $e_0^0$  (Total, person). It has been found that south zone enjoys better life expectancy at birth as 81 percent of its districts have  $e_0^0$  in the range of 60-70 years followed by north zone (71%), west zone (69.4%), east zone (66%), north-east zone (42.1%) and central zone (34.4%) while in west zone 29% of the districts have  $e_0^0$  above 70 years followed by south zone (14.9%) and north zone (7.5%). No districts of other zones have  $e_0^0$  in the above 70 category.

The estimated  $e_0^0$  of the districts of the major states for the period 2001-05 for person, male and female can be obtained from the authors on request.

**Table 1: The mean and standard deviation of the absolute differences between the proposed estimates of  $e_0^0$  and the SRS estimates (2001-2005) of the 16 major states.**

	Person	Male	Female
Mean	0.93	0.90	1.13
SD	0.63	0.62	0.86

**Table 2: The districts with lowest and highest  $e_0^0$  of each state with  $e_0^0$  differentials within the state (Total, person):**

State	District with lowest $e_0^0$	District with highest $e_0^0$	Difference
Andhra Pradesh	Vizianagaram (60.84)	Karimnagar (68.82)	7.98
Assam	Dhubri (55.00)	Dibrugarh (61.95)	6.95
Bihar	Kishanganj (53.20)	Siwan (65.64)	12.44
Gujarat	Dohad (58.53)	Amreli (68.59)	10.06
Haryana	Gurgaon (61.07)	Ambala (67.43)	6.36
Himachal Pradesh	Sirmur (62.47)	Hamirpur (74.23)	11.76
Karnataka	Bellary (59.46)	Udupi (73.01)	13.55
Kerala	Wayanad (66.83)	Pathanamthitta (78.82)	11.99
Madhya Pradesh	Katni (47.70)	Indore (64.50)	16.80

**Table 2: The districts with lowest and highest  $e_0^0$  of each state with  $e_0^0$  differentials within the state (Total, person): (Contd.)**

State	District with lowest $e_0^0$	District with highest $e_0^0$	Difference
Maharashtra	Gadchiroli (60.67)	Osmanabad (76.04)	15.37
Orissa	Kandhamal (48.50)	Jagatsinghpur (67.48)	18.98
Punjab	Firozpur (66.43)	Nawanshahr (71.44)	5.01
Rajasthan	Banswara (51.80)	Jhunjhunun (65.62)	13.82
Tamil Nadu	The Nilgiris (62.66)	Erode (71.40)	8.74
Uttar Pradesh	Pilbit (53.14)	Baghpat (66.01)	12.87
West Bengal	Maldah (56.31)	Kolkata (68.31)	12.00

**Table-3.(i). 20 Districts with Lowest  $e_0^0$  (Total, person)**

20 districts with lowest $e_0^0$		
State	District Name	$e_0^0$
Madhya Pradesh	Katni *	47.70
Orissa	Kandhamal	48.50
Madhya Pradesh	Panna	49.59
Orissa	Rayagada *	51.34
Madhya Pradesh	Jhabua	51.73
Rajasthan	Banswara	51.80
Madhya Pradesh	Sheopur *	51.83
Madhya Pradesh	Umaria *	51.95
Orissa	Koraput	52.16
Orissa	Gajapati *	52.29
Madhya Pradesh	Sidhi	52.58
Madhya Pradesh	Shivpuri	52.62
Orissa	Malkangiri *	52.62
Rajasthan	Dungarpur	52.98
Madhya Pradesh	Guna	53.05
Uttar Pradesh	Pilibhit	53.14
Bihar	Kishanganj	53.20
Madhya Pradesh	Barwani *	53.43
Orissa	Nabarangapur *	53.47
Madhya Pradesh	Mandla	53.59

**Table-3.(ii). 20 Districts with Highest  $e_0^0$  (Total, person):**

20 districts with highest $e_0^0$		
State	District Name	$e_0^0$
Kerala	Thiruvananthapuram	71.84
Kerala	Kozhikode	71.9
Maharashtra	Wardha	72.08
Himachal Pradesh	Una	72.28
Kerala	Kollam	72.71
Maharashtra	Latur	72.84
Kerala	Kannur	72.86
Karnataka	Udupi *	73.01
Maharashtra	Sangli	73.59
Kerala	Ernakulam	73.75
Himachal Pradesh	Hamirpur	74.23
Maharashtra	Ratnagiri	74.28
Maharashtra	Bid	74.42
Maharashtra	Satara	74.51

**Table-3.(ii). 20 Districts with Highest  $e_0^0$  (Total, person): (Contd.)**

20 districts with highest $e_0^0$		
State	District Name	$e_0^0$
Kerala	Thrissur	74.55
Kerala	Alappuzha	75.79
Maharashtra	Sindhudurg	76.01
Maharashtra	Osmanabad	76.04
Kerala	Kottayam	76.82
Kerala	Pathanamthitta	78.82

**Table 4. The number of districts in different intervals of  $e_0^0$  (Person, Male, Female) (Total):**

$e_0^0$ Interval	Number of Districts(person)	Number of Districts(Male)	Number of Districts (Female)
Below 50	9	9	9
50-60	188	189	187
60-70	355	364	350
Above 70	41	31	47
Total	593	593	593

**Table 5. The number of districts (%) of the different zones of India in broad intervals of  $e_0^0$  (Total, person):**

$e_0^0$	North Zone	East Zone	Central Zone	N.E.Zone	West Zone	South Zone
Below 50	1 (0.9%)	1 (1%)	3 (2.3%)	4(5.3%)	0	0
50-60	22 (20.6%)	34 (33%)	83 (63.4%)	40 (52.6%)	1 (1.6%)	3 (3.2%)
60-70	76 (71%)	68 (66%)	45(34.4%)	32 (42.1%)	43 (69.4%)	77 (81.9%)
Above 70	8 (7.5%)	0	0	0	18 (29%)	14 (14.9%)
Total	107 (100%)	103 (100%)	131 (100%)	76 (100%)	62 (100%)	94 (100%)

**North Zone:** Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttaranchal.

**East Zone:** Bihar, Jharkhand, Orissa, West Bengal.

**Central Zone:** Chattisgarh, Madhya Pradesh, Uttar Pradesh.

**N.E. Zone:** Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura.

**West Zone:** Goa, Gujarat, Maharashtra.

**South Zone:** Andhra Pradesh, Karnataka, Kerala, Tamil Nadu.

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# Pandemic H1N1 2009 among Pediatric Age Group in Tamilnadu, June 2009 - Aug 2010

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## ABSTRACT

Influenza A viruses causes recurrent outbreaks on local or global scale with potentially severe consequences on human health and the global economy. The new strain of Influenza A virus - H1N1 2009 had caused pandemic disease among human, probably owing to little or no preexisting immunity to the new strain. This is a retrospective analysis of the impact of H1N12009 on the pediatric population of Tamil Nadu during the pandemic period of June 2009- August 2010. Throat and nasal swabs were taken from the suspected cases admitted in pediatric wards and intensive care units (ICUs) and were subjected to Real time RT PCR. A total of 6245 suspected pediatric cases were screened, of which 787 (12.60 %) were found to be positive for H1N12009. A majority of cases belonged to the 6-12 age group (35.58%). Male children were more affected than female children. Despite a fall in the number of positives in 2010, there is a concern about the probability of a new reassortment of H1N1 2009 with other viruses of either human or animal hosts during the next season that could result in a potentially pathogenic strain.

**Keywords:** Influenza, Pandemic H1N1 2009, Real time PCR, Thermal Cycler

## INTRODUCTION

The H1N12009 influenza outbreak originated from Mexico and the United States and had spread worldwide since April 2009<sup>(1)</sup>. A total of more than 1 million confirmed cases with approximately 10,000 deaths have been reported by the World Health Organization (WHO). The source of this novel rearranged virus is from swine, avian and human influenza viruses<sup>(2)</sup>. The successful zoonotic transfer of Influenza A virus containing gene segments of avian, swine and human origin to humans along with consistent human-to-human transmission in each of the continent fulfilled the current criteria for a pandemic strain<sup>(3)</sup>. A higher rate of transmission was observed among H1N1 2009 viruses compared to

seasonal influenza viruses<sup>(4)</sup>. The Influenza H1N1 2009 was primarily seen among young and previously healthy adults, suggesting this age group being most vulnerable to infection<sup>(5)</sup>. It was also noted that the young people were more susceptible to the infection with occasional deterioration in their clinical manifestations<sup>(6)</sup>. Amongst the pediatric population, those who inhabit crowded areas such as schools etc can facilitate the spread of infection. The seasonal flu poses a very similar presentation and cannot be easily differentiated from H1N1 2009 based on clinical assessment alone<sup>(7)</sup>.

The first case of H1N12009 was identified in India on May 16, 2009 Hyderabad, with subsequent cases observed in many other states. Influenza H1N1 2009 virus was identified in Coimbatore, Tamil Nadu on June 1<sup>st</sup> 2009. Initially those who had returned from travel abroad were affected and later the common public was involved, indicating human to human transmission. Although seasonal influenza viruses have been associated with a high rate of hospitalization but low mortality among children, the effect and

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severity of H1N1 2009 in children is unknown. This is a descriptive retrospective analysis of H1N1 2009 infection among the pediatric population attending both government and private pediatric hospitals in Tamil Nadu.

**MATERIALS AND METHOD**

The Influenza Regional Reference centre at King Institute of Preventive Medicine and Research had been screening for H1N1 2009 in samples referred from all over Tamil Nadu. The first case in Tamil Nadu appeared on 1<sup>st</sup> June 2009 followed by its epidemic spread into the community by July 2009. All suspected pediatric cases less than 18 years of age belonging to category C, as per CDC diagnostic protocol referred to our centre were subjected to rRT PCR. Throat and nasal swabs were taken from the suspected cases admitted in pediatric wards and intensive care units (ICUs) with ILI (Influenza like illness) and SARI (severe acute respiratory illness) like signs and symptoms based upon the case definition of CDC. A standard laboratory request form that included demographic data, history, underlying medical condition, clinical signs & symptoms and treatment course were filled and informed consent obtained from the parents or from the guardian.

Nasal and throat swabs were collected and were inserted into 3 ml of viral transport medium (Himedia). All samples were subjected to RNA extraction using viral RNA kit (Qiagen) and r RT- PCR was performed as per CDC protocol, (1) wherein four sets of primers and probes were used. Each sample was subjected to

primers against Pan A, Swine A, Swine H1 and RNase P. Ambion super script one-step RT PCR kit was used for performing Real time RT- PCR. The reaction mix concentration is as follows, (a PCR reaction volume of 25 µl for the matrix assay, which contained 5 µl of RNA template, 2x reaction buffer 12.5 µl, 0.5 µl of four different target assays (probe and primer), 6 µl nuclease free water and 1 µl of 25X of Enzyme Mix.). Thermal cycling was done on Real-time PCR system (ABI 7500 and Roche lightcycler 480) instrument under the following cycling conditions: 30 min at 50 °C; 2 min at 95 °C; 45 cycles of 15s at 95 °C and 35 s at 55 °C. The CDC supplied all primers and probes.

**Statistical Analysis:** The data presented were analyzed using Chi-square test for proportion and the Chi-square test for linear trend using Graphpad prism 5.02 program. Result were statistically significant at p<0.05

**RESULTS**

**Table 1. H1N1 2009 positivity among pediatric cases**

No of cases screened	No of cases tested positive	Percentage positive
6245	787	12.6

From June 15<sup>th</sup> 2009 till the end of August 2010, 6245 pediatric cases were screened by rRT-PCR of which 787 (12.60%) were found to be positive for H1N1 2009. We had received 19,847 cases during this period of which 6245 were pediatric cases. (Age less than 18 years).

**Table 2. Clinical spectra of H1N1 2009 positives**

Day of onset of symptoms	Symptoms %													
	Fever	Chill/rigor	Nasal discharge	Ear discharge	Cough	Sore throat	Breathlessness	Expectoration ache	Head	Body ache	Fatigue	Vomiting	Diarrhea	Asthma
1	25	24	21	1	11	12	13	7	11	24	19	8	6	4
2	20	41	38	1	19	15	18	19	14	39	7	6	6	4
3	9	10	9	1	11	10	11	7	11	11	5	5	5	3
4	4	4	4	0	6	5	5	4	5	6	4	3	3	2
5	3	4	3	0	5	4	2	2	4	5	3	1	2	1
6	2	4	3	0	5	5	2	1	3	4	2	1	1	1
7	2	3	2	0	4	4	1	1	2	3	2	1	1	1
>7	1	5	3	0	2	2	1	1	5	7	2	0	0	0
Without symptoms	34	5	18	96	36	43	46	59	45	0	56	74	76	83

Of the positive cases, 98.12% presented with fever, 90.60% had cough, followed by body ache in 86.65%, head ache 81.58% and breathlessness 80.26%. 35.34% of them presented with diarrhea and 37.78% presented with vomiting.

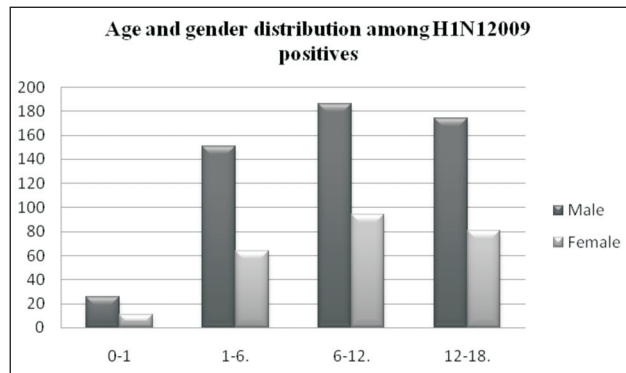


Fig. 1. Age and gender distribution among H1N12009 positives

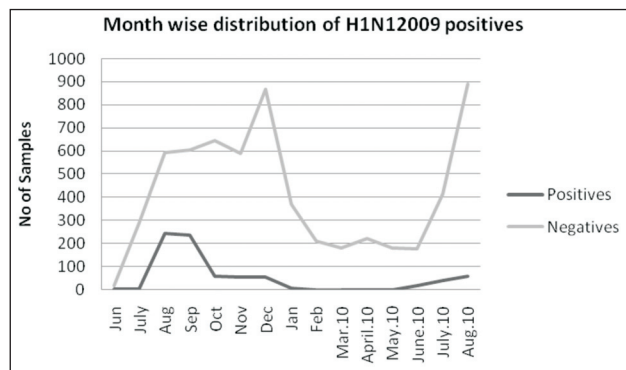


Fig 2 Month wise distribution of H1N12009 positives

Among the 787 (12.60%) positive cases, 537(68.23%) were male cases and 250 (31.77%) were females. The age distribution of positive cases indicated that the virus had affected almost all age groups thus underlining its pandemic potential. Among the pediatric cases positivity was found to be high in 6-12 age group comprising of school going population. This showed Chi-square at 3 df =0.888 and  $p=0.83$  which was statistically insignificant.

The maximum number of cases received and the positivity was higher during monsoon months. In the month of August 09, 244 cases were tested positive followed by 236 cases, in the month of September 09. The number of cases receded thereafter.

## DISCUSSION

In our centre, during this period we had received a total of 19,847 samples, of which 6245 were pediatric cases. Among the pediatric cases (less than 18 years

787 (12.60%) were positive for H1N1 2009 by rRT PCR. It was noted that among the positives, 532 were in the under 12 age group and 255 were between 12- 18 years of age. It was observed that the 6-12 age group was maximum affected- 280(35.58%), followed by 255(32.40%) cases in the 12-18 age group. This indicated the school going, active population are being more affected. The median age in which the majority of cases occurred were in individuals under 30 years and age ranging from 8 months to 65 years. One of the early studies in the US showed that, though the age of the H1N1 2009 patients in their study ranged from 3 months to 81 years, 60% of the patients were 18 years of age or younger which is similar to our study<sup>(6)</sup>. Of the 272 patients with H1N1 2009 infection who were hospitalized in the USA from April to mid-June 2009, 45% were under the age of 18 years, whereas only 5% were 65 years of age or older<sup>(7)</sup>. These data are similar to our study where the young active age group was more affected, whereas in some studies the age group-related incidence rates of ILI was higher among subjects less than 5 years of age and lower among subjects aged 5 to 17 years<sup>(8)</sup>.

In this study, out of the 787 positives 537 (68.23%) were males and 252(31.77%) were females and was found to be statistically insignificant. In our study 98.12% presented with fever, followed by cough in 90.60%, 86.65% had body ache and 81.58% had head ache. Most of the positive cases had come to us on the second day of illness. It was observed that 192 of the positive cases had developed wheeze subsequent to infection, of this 74 had previous history of bronchial asthma. In our study 37.78% of the children had vomiting and 35.34% had diarrhea along with respiratory symptoms. In a study in Canada, 49% to 84% of children presented with fever and cough with or without additional symptoms and 37% had gastrointestinal symptoms such as vomiting and/or diarrhea<sup>(9)</sup> which is similar to our study. In another study in Argentina, the signs and symptoms on admission included fever in 88% of the children, cough (70%), rhinorrhea (32%), hypoxemia (82%) and wheezing was noted in 16% of the patients<sup>(10)</sup>.

As a policy decisions in India all the H1N1 2009 positives, both children as well as adults were kept in isolation wards and oseltamivir was administered for a period of five days. A follow up study was not done hence data of those who required further hospitalization subsequent to complications was not tabulated. Though seven deaths were reported in our state during the pandemic, one death occurred in the

pediatric age group. In Australia during the pandemic, the rate of hospitalization was 23 per 100, 000 population, the highest rate of hospitalization occurred among children under 5 years of age<sup>(18)</sup>. In one study in Argentina, among 251 children who were hospitalized with confirmed H1N1 2009, 19% were admitted to ICU, 17% required mechanical ventilation and 5% died and a 10 fold increase in the pediatric death rate as compared with seasonal influenza in previous years was also noted<sup>(10)</sup>.

According to article by Ana Clara Monsalvo et al in contrast to seasonal disease, the elderly were relatively spared and young children had milder disease than middle-aged subjects. This could be because of the preexisting neutralizing cross-reactive antibodies elicited by H1N1 virus circulating before 1957 which had protected the elderly.<sup>(11)</sup> But middle aged adults had been exposed repeatedly to seasonal influenza viruses leading to antibody production, while young children often lacked previous exposures. Thus an antibody repertoire in middle aged adults shaped by seasonal infections may recognize, but fail to neutralize the new pandemic strain, leading to immune complex mediated disease and thus can be responsible for severity.

In our study, maximum number of cases received as well as those tested positive were during the monsoon months of August and September when the rainfall was high as well as the temperature was low, favoring the easy spread of the virus. In south India, the incidence of seasonal influenza usually starts with the onset of monsoon that is by mid August. In the case of H1N1 2009, initial cases were reported during the month of April 09 which started to gain momentum later on and with favorable season setting in, the cases started increasing by July 2009 with peaks in August 09 and September 09. There was a fall in the number of cases by February 2010 with a gradual increase noted in July 2010.

With declaration of the pandemic, the Indian Government had taken drastic measures by intensive awareness campaign, encouraging social distancing, admitting all positive cases in isolation wards till declared negative and by issuing a government order regarding the diagnosis and testing and treatment protocol. There were a few limitations in our study, firstly the clinical spectrum and magnitude might vary when compared to the experiences in other countries. Secondly, there was delay in streamlining of data and evaluation. Finally, a lesson that we learnt from this

influenza outbreak is that such an emergency can only be dealt with, if a well-established public health and surveillance program is available that allows an appropriate protocol to be adhered to following the recommendations of health officials and recognized experts in the field of virology.

## CONCLUSION

Though the number of new cases has been decreasing, there is still concern about the probability of a new reassortment with other viruses of either human or animal hosts, that could result in a more pathogenic strain. There is concern that the farther the virus spreads the more likely that it will reassert again, posing a threat for every nation. Hence it is vital that conglomeration of all actions taken to contain the pandemic and pitfalls be analyzed in the public health point of view to effectively tackle any epidemic situation in future. Additionally, further education and preparation of health care workers and first responders is critical to deal with an influenza pandemic, particularly regarding the performance of specific and sensitive diagnostic assays that effectively detect positive cases. Therefore, government authorities must consider that every measure of response has a cost-benefit ratio that should be carefully analyzed, particularly in the light of health benefits such as immunization programs that seem to provide significant hope for suppressing the long-term impact of this pandemic.

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# Effect of Maternal Education on Adoption of Immunization Services-A Case Control Study in Bhubaneswar, Odisha

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## ABSTRACT

**Back ground:** Immunization is the most powerful and cost-effective weapon for the prevention and control and even eradication of a disease. So awareness about immunization among the parents is essential to immunize their children.

**Objective:** The present study was done to assess the effect of maternal education on adoption of immunization practices.

**Materials and Method:** Data was collected in the immunization clinic of Hi-Tech medical college and hospital from the mothers of children coming for immunization. Results were analyzed by applying percentage and Chi-square test

**Results:** 83.2% mothers have adequate knowledge about routine immunization. Majority (66.4%) mothers knew about adverse effects following immunization (AEFI), 66% knew about optional vaccines. Mothers with high educational levels had significantly better knowledge about immunization.

**Conclusion:** Health education should be integrated with immunization to increase acceptance as well as coverage and success of immunization programme.

**Keywords:** Immunization, Educational status, chi-square test

## INTRODUCTION

Immunization is an important cost-effective weapon for combating child mortality<sup>1</sup>. Yet the coverage against vaccine preventable diseases (VPDs) remain far from complete. About 34 million children are not completely immunized and almost 98 percent of them residing in developing countries<sup>2</sup>. Focus on routine immunization coverage, research on public perception to immunization and political will to deliver –all together can save million of lives and make Universal Immunization Programme(UIP) truly universal. Vaccination coverage has now reached a plateau in many developing countries<sup>3</sup>, and even in India coverage of fully immunized children under UIP is quite low<sup>4,5,6</sup>. Thus there is an urgent need to find ways to increase vaccination coverage. Though UIP

was started in 1985, in Odisha the coverage of the full immunization rate was 73%, 46% and 53% for 1999, 2000 and 2001 respectively<sup>7</sup>.

Immunization being one of the pillars of child health, the present study was undertaken to assess the mother's awareness relating her education and adoption of immunization services as well as their perception towards the health personnel behaviour and the services provided at the immunization clinic.

## MATERIALS AND METHOD

The present study was conducted in the immunization clinic working under the department of community medicine, Hi-Tech Medical College, Bhubaneswar between 1<sup>st</sup> July to 31<sup>st</sup>

August, 2011. It was a cross sectional study and the study subjects were the mothers of children aged between 1 day to 5 years who visited the clinic during the study period. Almost all the mothers were interviewed after taking the verbal consent. A predesigned and pretested semi-structured questionnaire was administered to the interviewees and their responses were recorded. Data thus collected was compiled, scrutinized and evaluated for their completeness and finally 238 questionnaires were chosen for final analysis. SPSS 15.0 software was used and percentage and Chi-square test were applied to analyze the results.

## RESULTS

**Table 1. Knowledge of respondents about Immunization (n=238)**

Variable	No. of respondents	percentage
<b>Children should be immunized up to the age of</b>		
5 years	140	58.8
10 years	98	41.2
<b>Source of knowledge about Immunization</b>		
Health care provider	181	76
Mass media	37	15.5
Friends/Relatives/others	20	8.4
<b>Knowledge about routine immunization</b>		
Inadequate	40	16.8
<b>Knowledge about adverse effect Following Immunization (AEFI)</b>		
Yes	158	66.4
No	80	33.6
<b>Knowledge about optional Vaccines</b>		
Yes	157	66
No	81	34

Table 1 represents knowledge of mothers about immunization and all the respondents knew about it and were unanimous that it was necessary; however only 58.8% aware that routine immunization is done for children upto 5 years of age. When mothers were asked how they knew about immunization, most of them answered they knew it from health care providers (76%). When asked to name the diseases prevented by routine immunization, majority of the women (83.2%) named four or more vaccine preventable diseases and their knowledge was considered as adequate. 66.4% mothers knew that there may occur adverse effect following immunization where as 66% of respondents were aware about one or more optional

vaccines (Hepatitis B, H. influenzae, MMR, Typhoid, Chicken pox)

**Table 2: Immunization practices of respondents as regards to their educational status. (n=238)**

Variable	Educational Status		Statistical Analysis Chi-square & pvalue
	Secondary & Higher (%)	Illiterate & Low (%)	
<b>Awareness about VPDs</b>			
Adequate	168(70.6)	19(7.9)	$\chi^2=36.8, p<0.001$
Inadequate	27(11.3)	24(10)	
<b>Aware about adverse effects Following immunization (AEFI)</b>			
Yes	152(63.8)	12(5)	$\chi^2=41.3, p<0.001$
No	43(18.1)	31(13)	
<b>Aware about optional vaccines</b>			
Yes	168(70.6)	5(2.1)	$\chi^2=98.8, p<0.001$
No	27(11.3)	38(15.9)	
<b>No. of immunization contacts in a year</b>			
Correct answer	145(60.9)	7(2.9)	$\chi^2=51.4, p<0.001$
Incorrect answer	50(21)	6(15.1)	

There is significant knowledge gap among respondents with regards to their educational status (Table-2). Higher educated mothers were significantly better off their knowledge about vaccine preventable disease ( $\chi^2=36.8, p<0.001$ ), AEFI ( $\chi^2=41.3, P<0.001$ ), optional vaccines ( $\chi^2=98.8, p<0.001$ ) and required no. of immunization contacts in a year ( $\chi^2=51.4, p<0.001$ ).

## DISCUSSION/CONCLUSION

The present study shows that though mothers were aware about immunization and its importance but some have (16.8%) incorrect knowledge about routine immunization in children and UIP. Adequate knowledge about VPDs was found in 78.5% of mothers in our study which was similar as reported by other studies<sup>8,9,10</sup>. A study in Rajasthan had found that specific information about vaccine preventable diseases other than polio was very limited in mothers<sup>11</sup>. Awareness about immunization was mainly obtained from health care providers and mass media. These two sources have a responsible role of spreading a strong message about immunization. Mothers with higher education have better awareness in the present study which is same as shown by other studies as well<sup>1,12</sup>. Mothers with higher educational level were significantly more aware about four immunization contacts in a year for infants (60.9%) and hence better prepared for the event. Immunization gives each child



a minimum of four contacts with the health system before the age of one year is a tremendous opportunity that is often underutilized<sup>13</sup>.

Since maternal literacy was strongly associated with awareness and practice of immunization, policies that encourage female education might lead to significant gains in immunization. There is a need for improving awareness about routine immunization and universal immunization programme.

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# A Study on Weight Status and Weight Perception of College going Girls in Agra District of U.P.

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## ABSTRACT

**Context:** Often coexisting in developing countries with under-nutrition, obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups.

**Objective:** 1. To find out the prevalence of obesity and faulty weight perception among college going girls of Agra. 2. To compare the actual with perceived weight status and 3. To have an eye on the desired weight status of the study subjects

### Material and method:

**Study design:** Cross sectional study.

**Setting:** Urban and rural colleges of Agra

**Study period:** January to June 2009 Sample size: 400 college going girls of 18-24 years.

**Study variable:** Height, weight, weight perception, desired weight

**Statistical Analysis:** Percentage, Kappa statistics

**Results:** The prevalence of overweight and obesity was found to be 18.5% & 4.5% respectively. The prevalence of underweight was 31.5%. The prevalence of faulty weight perception was 54.5% and was found to be inclined towards feeling of higher weight. This accounted for the relatively lower prevalence of perceived underweight (13.5%), perceived normal weight (31.8%) and higher prevalence of perceived overweight (54.7%) compared to actual weight status based on body mass index.

**Conclusion:** The dual burden of underweight and overweight among the college going girls, along with prevailing faulty weight perception, if not corrected in time, may lead to adoption of faulty weight control practices, development of eating disorders, and, above all, may end up in aggravating the already existing high level of under nutrition. The later can have adverse long term impact on the health and well being of the offspring born to these 'would be mothers'.

**Keywords:** Body Mass Index, Underweight, Overweight, Obesity, Faulty Weight Perception

## INTRODUCTION

Obesogenic changes in dietary pattern and physical activity level are spreading across the world like an infectious disease – first in the developed and then in the developing countries, first in affluent then in poorer

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sections<sup>1</sup>. Almost all countries (high income and low income alike) are now experiencing an obesity epidemic<sup>2</sup>. Heavy marketing of energy dense, fatty, salty and sugary foods and beverages on the one hand, and of labor saving devices for use at home, work place and leisure time on the other, are making healthy choices much more difficult.

Side by side, changes in body image ideal towards thinness and the resulting slimming tendency thereof, though not so pronounced among males, are particularly noticeable among young girls<sup>1</sup>. This may be somewhat advantageous in population where the

risk of under nutrition does not exist. But in countries like India where the problem of obesity coexists with the problem of chronic energy deficiency (CED), this trend might result in aggravating CED, the implications of which are likely to be far more serious in young girls who will have to bear the future generation. Educational institutions, especially the residential ones, which house large number of young girls, can play an important role in reversing this trend<sup>3</sup>. Against this background the present study was undertaken with the following objectives: 1. To find out the prevalence of obesity and faulty weight perception among college going girls of Agra. 2. To compare the actual with perceived weight status and 3. To have an eye on the desired weight status of the study subjects.

## MATERIAL AND METHOD

A cross sectional study was done in Agra (urban & rural) among 400 college going girls aged 18-24 years between January to June 2009. The prevalence data for calculating the sample size for this study, was taken from a study conducted by Augustine & Poojara (2003)<sup>4</sup>. Thereby assuming a prevalence of overweight & obesity 24%, with an allowable margin of error of 20%, the minimum sample size calculated for the study was 316, using the formula ( $n=4pq/L^2$ ) where p= prevalence of overweight/obesity, q=1-p and L= allowable error. For the sample to be more representative, somewhat larger sample size than the calculated i.e. 400 subjects were taken.

We adopted a multistage stratified random sampling procedure. For the selection of colleges, a list of colleges was obtained from Agra University. Colleges were divided into two educational levels, undergraduate and postgraduate. The colleges were then numbered, and two colleges, one undergraduate and the other postgraduate, were chosen randomly from each geographical region (urban & rural). After reaching the concerned college, written informed permission was sought from the head of the institution. The subjects were selected from each college by a systematic random sampling procedure from college records. All experiments were performed in accordance with relevant guidelines and regulations and informed verbal consent and cooperation was sought from all subjects prior to their participation in the study. The research described was compliant with basic ethical standards.

Each girl was interviewed personally to collect the required information on pretested schedule and appropriate privacy was provided to take their

anthropometric measurements. Height and weight were measured using the standard procedures suggested by Jelliffe (1966)<sup>5</sup>. Body Mass Index was computed using the formula [weight in (kg) / height(m<sup>2</sup>)]. WHO grading<sup>1,2</sup> for body mass index (BMI) was used for determination of actual weight status as underweight (BMI <18.5), normal weight (BMI 18.5-24.9), overweight (BMI ≥ 25) & obesity (BMI ≥ 30). Perceived weight status (thin, normal and fat) was correspondingly compared with underweight, normal and overweight/obese. Their desired weight status has also been asked. Subjects' desired weight status have been arbitrarily defined for the purpose of study as "slightly less than current one" when they desired upto 5 kg weight loss, "much less" when desired > 5 kg weight loss, "slightly more" when desired upto 5 kg weight gain and "much more" when desired > 5 kg weight gain.

## Statistical analysis

Statistical analysis was carried out using the statistical program available in SPSS version 16.0 (Statistical package for social sciences) which is among the most widely used programs for statistical analysis in social science. Subjects' perceived weight status (thin, normal and fat) were compared with actual one using kappa statistics.

## RESULTS

Using BMI cut-off points according to WHO (2003)<sup>2</sup>, the findings revealed that 23% of the subjects were either overweight (18.5%) or obese (4.5%), only 45.5% were having normal BMI and 31.5% had underweight (Figure 1). In general, more than half (54.7%) of the subjects perceived themselves as fat. Less than one third (31.8%) believed themselves normal and only 13.5% as thin (Figure 2).

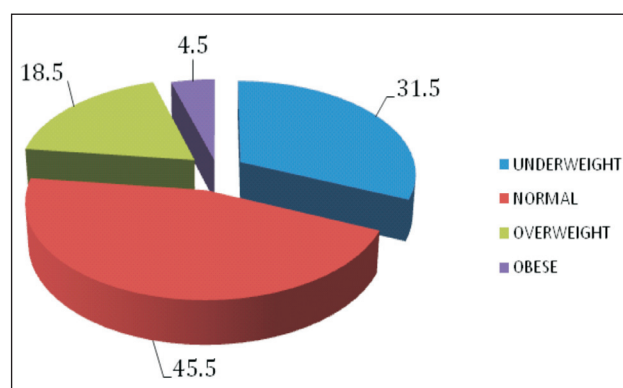


Fig. 1. Distribution of college going girls according to Body Mass Index

(Source: WHO guidelines for body weight classification in adults 2003)

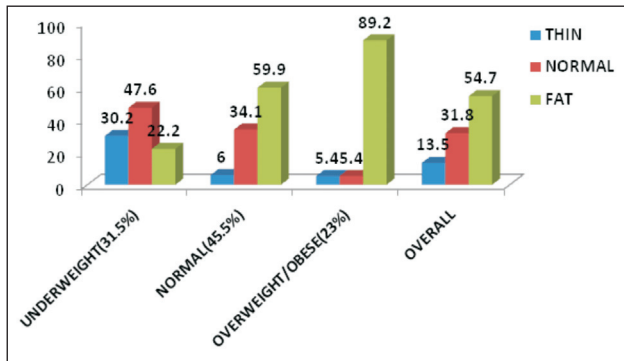


Fig. 2. Weight perception in different weight categories for girls

Overall, overweight/obese subjects had a more accurate judgment and only 10.8% of them failed to consider themselves as overweight/obese. Amongst subjects with normal BMI, more than half (59.9%) of the normal subjects felt themselves as being

fat(overweight/obese) and only close to one third (34.1%) perceived their weight status correctly. More than two third (69.8%) of underweight subjects had wrong self perception of their weight and considered them either normal (47.6%) or fat (overweight/obese, 22.2%).

More than half (54.5%) of all the subjects did not have a correct perception regarding their weight status. Analysis of data showed only a fair degree of agreement (Kappa Index 0.30) between self perception of weight and actually measured weight by BMI (Table 1).

Majority of the subjects (40.5%) desired to have body weight slightly less than the present weight. On the other hand, obese subjects, nearly one third (34.7%) were satisfied with their current weight and desired no change (Table 2).

Table 1: Agreement between body weight perception and actual body weight status based on measured BMI among subjects

Self-judged status	Under-weight	Normal weight	Over weight/Obese	Overall agreement(%)	Weighted kappa (95%CI)
Thin	9.5	2.8	1.2	45.5	0.30(0.23,0.36)
Normal	15.0	15.5	1.3		
Fat	7.0	27.2	20.5		

Table 2: Distribution of subjects according to desired body weight

Desired weight	BMI						Total(n=400)	
	Underweight (n=126)		Normal (n=182)		Overweight /Obese(n=92)			
	No.	%	No.	%	No.	%	No.	%
Current weight	60	47.6	62	34.1	32	34.7	154	38.4
Slightly less than current one	28	22.2	97	53.3	37	40.2	162	40.5
Much less than current one	0	0	15	8.2	11	12	26	6.5
Slightly more than current one	32	25.4	8	4.4	11	12	51	12.8
Much more than current one	6	4.8	0	0	1	1.1	7	1.8

DISCUSSION

In the present study, a total of 400 college going girls were studied. The study revealed the prevalence of underweight and overweight (based on BMI) among study subjects as 31.5% and 18.5% respectively, with 4.5% having obesity (BMI e"30). Various studies<sup>1,2,4,6</sup> have shown wide variation in the prevalence of underweight, overweight and obesity. Kapil et al<sup>6</sup> had obtained 7.4% prevalence of obesity among affluent adolescents in Delhi. Augustine and Poojara<sup>4</sup> in their study on urban college girls of Ernakulam had found the prevalence of underweight and overweight/obesity as 21.5% and 24.0%

respectively. The relative proportion of underweight, overweight and obesity depend on the stage of development reached in a transitional society<sup>1</sup>, and the rapidity with which modern marketing practices displace traditional diet and lifestyle<sup>2</sup>. In the first stage of transition, high BMI remained confined to the wealthier section of society since the obesogenic influences affect them first. It is only in the later phase of transition when poorer sections start showing increase in the prevalence of high BMI.

In the present study, the perceived weight status was thin in 13.5% subjects, normal in 31.8% subjects, and fat in 54.7% girls. Overall prevalence of faulty

weight perception was 54.5% that needed correction. Higher prevalence was reported by Maloney<sup>7</sup> as 75% and Augustine and Poojara<sup>4</sup> as 48%. The prevailing faulty weight perception can be corrected by educating the girls about the importance of weight as the basis for determining and monitoring their weight status instead of any subjective feeling.

In the current study it was found that overweight/obese subjects had a more accurate judgment and only 10.8% of them failed to consider themselves as overweight/obese. This is also supported by a study conducted by Youfa Wang et al. (2003)<sup>8</sup>. They also suggested a moderate degree of agreement (0.53) between actual and perceived body weight status which is more than ours (0.30). The difference may reflect cultural disparity. Also reported by a study done by Patrick CH Cheung et al. (2003-04)<sup>9</sup> among adolescents in Hongkong who showed close to half of the girls perceived them as being overweight. They also showed that the agreement between actual body mass index and perceived weight was poor in females (Kappa 0.137) which is also lower than ours (0.30). This difference can be explained on the fact that their study subjects were more weight concerned adolescents who were more exposed to media which blends thinness with beauty. Study conducted by V. Sekar et al. (2003)<sup>10</sup> among women in Coimbatore showed a moderate degree of agreement (Kappa Index 0.552) higher than our study. However, among the overweight women a large proportion of them (36%) did not consider themselves as overweight which is quite higher than the current study (10.8%). This difference indicates that a large number of women need to be made aware of normal or ideal body weight.

According to present study, amongst subjects with normal BMI, only close to one third (34.1%) perceived their weight status correctly. More than two third (69.8%) of underweight subjects had wrong self perception of their weight and considered them either normal (47.6%) or overweight/obese (22.2%). Augustine and Poojara (2003)<sup>4</sup> reported a relatively higher percent of underweight girls (31%) who perceived themselves as fat as compared to this study (22.2%). It was found that only 24% of girls were satisfied with their current weight slightly lower than our study. Higher literacy rate in South India again might explain the difference from our study which makes them more weight conscious. Study done by Priyanka Tiwari and Aarti Sankhala (2007)<sup>11</sup> also reported normal weight subjects had overall mixed

perception of having normal or slightly higher than normal body weight.

Majority of the subjects (40.5%) in this study desired to have body weight slightly less than the present weight as compared to only 6.5% who desired much less weight loss. Studies conducted by Ash and McClelland et al. (2001)<sup>12</sup> have reported that a vast majority of subjects under their study listed a desirable weight loss. Augustine and poojara (2003)<sup>4</sup> also reported two third (65%) of the girls belonging to various weight categories desired weight loss as in our study.

## CONCLUSION

The dual burden of underweight and overweight among the college going girls, calls for appropriate modification of their diet and physical activity level coupled with regular monitoring of their weight status. The prevailing faulty weight perception, if not corrected in time, may lead to adoption of faulty weight control practices, development of eating disorders, and, above all, may end up in aggravating the already existing high level of under nutrition. The later can have adverse long term impact on the health and well being of the offspring born to these 'would be mothers'.

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# Socio-Demographic Characteristics of Life Term Prisoners in a Central Jail and its Association with Reasons for Crime

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## ABSTRACT

**Background:** For planning any prevention and control strategies, the knowledge of socio-demographic factors and criminal activities is necessary. There are many studies conducted on this issue, however only few of them pertain to Indian population. Moreover, India has diverse socio-demographic and cultural practices that may influence the quantity and quality of crime.

**Objectives:** To study the socio-demographic characteristics of life term prisoners and its association with the reasons for committing crime.

**Materials and method:** A cross sectional study was conducted on 300 life term prisoners of central prison of Gulbarga. Data was collected using pre-designed and pre-tested proforma. Chi-square test was applied to test the association at 5% level of significance using statistical package SYSTAT 13.

**Results:** It was found that rural people, unmarried, illiterates, lower socio-economic status people were more likely to have committed the crime resulting in the conviction for life. Property dispute was the leading reason for committing crime in men and dowry in women. Gender, place of residence, education and socio-economic status were significantly associated with reasons for committing crime.

**Conclusion:** A further multi-centric study at larger level is recommended to identify the independent predictors of crimes leading to life imprisonment. There is an urgent need for a focussed primary prevention strategies utilizing the information on independent predictors to control the population of our overcrowded prisons.

**Keywords:** *Life Term Prisoners, Central Prison, Crime*

## INTRODUCTION

The degree of civilization in a society can be judged by entering its prisons. Prison is not a place where someone would like to live. Whatever are the reasons behind incarceration, whether it is seen as a punishment or as a mode of rehabilitation, the normal life of the inmate is restricted, freedom of movement is curtailed and private space is limited.<sup>1</sup> The quantity

and quality of prison population is directly associated with the quality and the nature of crime prevalent in the underlying population. Crime is present in various forms, like, drug trafficking, money laundering and extortion, murder for hire, human trafficking etc.<sup>2</sup>

All the countries experience crime, violence and victimization although the extent may vary. This may result in to some of the following problems: high

proportions of young men being killed before they live their productive life fully, societies with children losing their parents or with members in prison, who are living in poverty and without access to support or legitimate sources of income.<sup>3</sup>

Many of the prisons over the globe are overburdened; the population confined behind bars in the U.S in 2008 was in excess of 1.6 million<sup>4</sup>. In India too, the situation is no better. There are about 1,276 prisons in the country with an authorized accommodation of 277,304 however the total number of jail inmates is nearing 4 lakhs, indicating overcrowding in prisons<sup>5</sup>. The ideal way of dealing with this overcrowding is to have an effective crime prevention program.

The planning and implementing crime prevention strategies and interventions can bring about long-term reductions in expenditure on criminal justice, health and other services. There is clear evidence that well-planned crime prevention strategies not only prevent crime and victimization, but also promote community safety and contribute to the sustainable development of countries. In recent years, the international community has recognized that development in general, and the achievements of the Millennium Development Goals in particular, are contingent on the establishment of safety and security in societies. High levels of violence in cities and communities are detrimental to social and economic progress, as well as to the morale and well-being of citizens. Thus "Prevention is the first imperative of criminal justice".<sup>3</sup> If we don't change the course now, we will be building prisons forever and ever—prisons we can't afford.

For planning any prevention and control strategies, the thorough knowledge of socio-demographic factors and criminal activities is a necessary requirement. There are many studies conducted on this topic, however only few of them pertain to Indian population. Moreover, India has diverse and unique socio-demographic and cultural practices that may influence the quantity and quality of crime. Therefore present study was conducted to assess a) socio-demographic characteristics of life term prisoners, and

b) the association of these characteristics with the reasons for committing crimes.

## MATERIALS AND METHOD

It was a cross sectional study. The present study was carried out in the central prison of Gulbarga city. Prior to the study, a written permission was obtained from the Inspector General of Prisons, Bangalore as well as Superintendent of Central Jail, Gulbarga. The city of Gulbarga is a divisional head quarter of Hyderabad-Karnataka region of Karnataka state. It was a part of Nizam state prior to the reorganization of state in 1950. The study considered all the convicted inmates as per the register of the prison. Under trial prisoners, Convicted short term prisoners and Prisoners sentenced to death were excluded from the study. Thus, we arrived at a total of 300 convicted life term inmates eligible for inclusion in the study. All the study subjects were personally contacted and interviewed using pre-designed and pre-tested proforma. For the purpose, a pilot study was conducted on 10 subjects and proforma was finalized after incorporating the changes based on the findings of pilot study. Proforma included the items on socio-demographic and economic characteristics of the subjects. In addition, we also collected data on the reasons for committing the crime that resulted in the subject's life term conviction. As the convicts kept in the prison under study were mostly from rural area, BG Prasad's classification modified for the latest price index was used to arrive at the socio-economic status of the study subjects. The collection of data through personal interview was spread over a period of six months from January to June, 2009.

### Statistical analysis

Socio-demographic characteristics of the study subjects and the reasons for committing crime were assessed by working out appropriate frequencies and percentages along with 95% confidence interval. The significance of association of the reason with different characteristics was tested applying chi-square test at 5% level of significance. Data was entered into the computer using Microsoft Excel and analyzed using statistical package SYSTAT 13.



**Table 1: Number (#) and Proportion (%) of subjects (n=300) according to different socio-demographic characteristics and reasons for crime along with 95% confidence interval (CI)**

Characteristics & Category	#	%	95% C I
<b>Sex</b>			
Male	287	95.7	93.4-98.0
Female	13	4.3	2.0-6.6
<b>Age-group (in years)</b>			
20 – 29	61	20.3	15.7-24.9
30 – 39	114	38.0	32.5-43.5
40 – 49	53	17.7	13.4-22.0
50+	72	24.0	19.2-28.8
<b>Place of residence</b>			
Rural	282	94.0	91.3-96.7
Urban	18	6.0	3.3-8.7
<b>Marital Status</b>			
Married	226	75.3	70.4-80.2
Unmarried	68	22.7	18.0-27.4
Widowed	6	2.0	0.4-3.6
<b>Educational status</b>			
Illiterate	158	52.7	47.1-58.3
Literate	142	47.3	41.7-52.9
<b>Type of family</b>			
Joint	192	64.0	58.6-69.4
Nuclear	108	36.0	30.6-41.4
<b>Socio economical status</b>			
Upper	77	25.7	20.8-30.6
Lower	223	74.3	69.4-79.2
<b>Reasons</b>			
Property dispute	135	45.0	39.4-50.6
Quarrel	73	24.3	19.4-29.3
Political	20	6.7	3.9-9.5
Family dispute	33	11.0	7.5-14.5
Kidnap	4	1.3	0.0-2.9
Dowry	35	11.7	8.1-15.3

**Table 2: Association of the reasons of crime with socio-demographic factors under study**

Socio-demographic factors	Reasons of crime			p-value
	Property	Quarrel	Others*	
<b>Sex</b>				
Male	132(46.0)	71(24.7)	84(29.3)	<0.05
Female	3(23.1)	2(15.4)	8(61.5)	
<b>Age-group (in years)</b>				
20 – 29	27(44.3)	20(32.8)	14(23.0)	>0.05
30 – 39	50(43.9)	26(22.8)	38(33.3)	
40 – 49	23(43.4)	14(26.4)	16(30.2)	
50+	35(48.6)	14(19.4)	23(31.9)	
<b>Place of residence</b>				
Rural	130(46.1)	70(24.8)	82(29.1)	<0.001
Urban	5(27.8)	4(22.2)	9(50.0)	

**Table 2: Association of the reasons of crime with socio-demographic factors under study (Contd.)**

Socio-demographic factors	Reasons of crime			p-value
	Property	Quarrel	Others*	
<b>Marital Status</b>				
Married	104(46.0)	50(22.1)	72(31.8)	>0.05
Unmarried	30(44.1)	23(33.8)	15(22)	
Widowed	1(16.7)	0(0.0)	5(83.3)	
<b>Educational status</b>				
Illiterate	78(49.4)	38(24.1)	42(26.6)	<0.01
Literate	57(40.1)	36(25.4)	49(34.5)	
<b>Type of family</b>				
Joint	82(42.9)	46(24.1)	64(33.3)	>0.05
Nuclear	52(49.1)	25(23.6)	31(28.7)	
<b>Socio economical status</b>				
Upper	34(44.2)	14(18.2)	29(37.7)	<0.05
Lower	101(45.3)	60(26.9)	62(27.8)	

\*includes: political, family dispute, kidnap and dowry

## RESULTS

### Socio-demographic characteristics

Present study included 300 prisoners who were convicted for life term imprisonment for various reasons. There was preponderance of males (96%) with females accounting for only 4%. Age of the subjects varied from 20 to 85 years with mean age of 40.4 years and standard deviation of 13.9 years. As the locality of the prison under study was in a rural area, most (94%) of the subjects belonged to rural area. Three quarter of the subjects were married and most (23%) of the remaining were unmarried. Forty seven percent of the subjects were literates whereas the literacy rate in the general population was 67% indicating a higher proportion of illiterates in prison population. Nearly three fourth of the subjects were professionally unskilled indicating that resultant lack of employment and low income might have contributed to their criminal act. Slightly over one third were from nuclear family and rest about two third belonged to joint families. Based on modified BG Prasad's classification, one fourth of the subjects belonged to upper socio-economic status. Based on these observations, it appears that rural people, unmarried, illiterates, lower socio-economic status people were more likely to have committed the crime resulting in the conviction for life. Also, such crimes appear to be more prevalent in men than women.

### Crime pattern

Property dispute was the leading (45%) type of crime resulting in conviction for life imprisonment.

This was followed by quarrel (24%), dowry (12%) and family dispute (11%). This study observed a different pattern of crime in women. Thirty eight percent of women committed such crime due to dowry associated matter, followed by family dispute (23%). Political (7%) and kidnap (1.4%) related matters resulting in to life imprisonment were prevalent only in men.

### Association of socio-demographic characteristics with reasons

To find out the association of the socio-demographic factors as described in Table (1) we cross-tabulated the same with major reasons for committing crime. Gender, place of residence, educational status and socio-economic status were found to be statistically significantly associated with major types of crime. Men were more likely to have committed the crime due to property dispute whereas women were more likely due to dowry. Quarrel as a reason for committing crime was more prevalent in lower socio-economic status (27%) compared to upper socio-economic status (18%). There was an association between sex, place of residence, educational status and socio-economic status with the major reasons of crime which was found to be statistically significant.

## DISCUSSION

The present cross sectional study was undertaken by selecting all the life term prisoners in the central prison, Gulbarga, to assess the socio-demographic factors of the convicted life term prisoners of central prison. Before we discuss the results of our study and

their implications, let us discuss the epidemiology of crime and the rationale for the prevention measures. Like in case of diseases, in case of crime also prevention efforts can be classified into different levels. These levels are primary, secondary and tertiary levels of prevention.

Primary prevention addresses individual and family level factors that may be correlated with criminal activities later in life. Individual level factors such as attachment to school and involvement in pro-social activities decrease the probability of criminal involvement. Similarly, family level factors such as consistent parenting skills also reduce the risk. There are some initiatives which may alter rates of crime at the community level. For example, Sherman reported that changing the policy of police response to domestic violence calls altered the probability of subsequent violence. Policing hot spots, areas of known criminal activity, decreases the number of criminal events reported to the police in those areas. The secondary prevention uses techniques focusing on at risk situations such as youth who are dropping out of school or getting involved in gangs. Giving them a moral education in schools and making orientation towards spirituality. It targets social programs and law enforcement at neighbourhoods where crime rates are high. The use of secondary crime prevention in cities such as Birmingham and Bogota has achieved large reductions in crime and violence. Tertiary prevention is used after a crime has occurred in order to prevent successive incidents and also to rehabilitate the convicts on completion of their tenure of conviction.<sup>6</sup>

Now coming to the results, our study found that most of the prisoners were men and the crime was more prevalent in younger age groups, although differences by age were not statistically significant. It was consistent with a study done by Bellad et al<sup>7</sup> among the inmates of central jail, Belgaum. This may be because our population is a male dominated society; men have greater involvement in the matters outside the household. They move about in society more freely than women and therefore higher risk to commit crime in all communities and all age groups. Regarding age group, a younger person could have greater vulnerability to take deviant ways as well as greater ability to perform a crime. At this age there may be problems like family feuds and unemployment which might have led to an increase in crime.

Regarding place of residence, our finding of preponderance of rural persons in jail was consistent

with the study done by Aggarwal et al<sup>8</sup> in Amritsar jail. This may be attributed to more number of conflicts occurring in rural places owing to illiteracy, unemployment and social mixing as compared to urban where people relatively confined in their own.

Our study revealed that majority of the study subjects was married. This was comparable to the study done by Sunder et al<sup>9</sup> in central prison, Bangalore. Marriage is a crucial factor in the understanding of a person's most intimate and important interaction with life. Any sense of failure, frustration or victimization on this front may provoke unusual behavior.

Education wise, majority of the inmates were illiterates followed by primary schooling and very few were the graduates. This finding was consistent with the study done by Aggarwal et-al<sup>8</sup> in Amritsar jail. Three fourth of the subjects were unskilled and resultant lack of job satisfaction and low income might have contributed in their committing crime.

Coming to the socio-economic status majority of the study subjects belonged to lower socio-economic status which was consistent with a study done by Bellad et-al<sup>7</sup> among the inmates of central jail, Belgaum and Sunder M et-al<sup>9</sup> in central prison, Bangalore. This may be attributed to majority of the prisoners being from rural area. Socio-economic status reveals the functional efficacy of an individual and the presence or absence of the sense of gratification, one may derive from it. Poverty and lack of satisfaction of wants generally serve as stimulants to crime.

Rutter and Giller<sup>10</sup> report that most adult offenders began their criminal careers in childhood and the Standing Committee on Justice and the Solicitor General points out that many persistent delinquents begin their involvement in anti-social activities before adolescence. Thus, research into what generates persistent offending has particularly emphasized the need to focus crime prevention efforts on early childhood. It has long been recognized that males are much more likely to be involved in crime than females (Chilton & Datesman)<sup>11</sup>. Research indicates that males are more aggressive than females due to both biological differences and the influences of social learning. Poverty is often cited as a factor associated with crime, although the link between poverty and crime has not been consistently established by research (Hartnagel & Lee)<sup>12</sup>.

In conclusion, our study has supported the findings of earlier studies that certain socio-demographic factors do have association with occurrence of serious crimes and their reasons. Sections of the population with higher chance of crime are rural people, illiterates, lower socio-economic status and unmarried. A further multi-centric study at larger level is recommended to identify the independent predictors of crimes leading to life imprisonment. There is an urgent need for a focussed primary prevention strategies utilizing the information on independent predictors to control the population of our overcrowded prisons.

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# Gender Difference in Major Depression and Generalized Anxiety Disorder Comorbidity in Patients of Obsessive Compulsive Disorder

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## ABSTRACT

**Context:** Obsessive Compulsive Disorder is a disease with controversies regarding co-morbidities. Studies have noted there are some doubts due to the disease's heterogeneity and cultural influence. Some studies have reflected that women are more likely to have Major depressive disorder (MDD) as co-morbidity while the impact of gender on co-morbid generalized anxiety disorder (GAD) was inconclusive. There are few Indian studies in this regard and hence this cross-sectional study was performed in a tertiary referral centre in Eastern India.

**Material and method:** 100 consecutive eligible patients with OCD (Male=41, Female=59) were interviewed. The data were recorded for socio-demographic profile, depression and anxiety co-morbidities.

**Results:** The mean age of the study sample was 32.73 yrs, mostly from rural background (82%) and nuclear families (62%). The subjects were found to be suffering mostly from co-morbid MDD (85%) and GAD (83%). 93% of our female subjects had co-morbid MDD while 90% of them had co-morbid GAD. The corresponding percentages for 41 males was 73% (for both MDD and GAD). Gender had an impact on both these co-morbid diagnoses ( $P$ -value < 0.05) though the association with depression was more.

**Conclusion:** Our study showed both MDD and GAD were highly comorbid with OCD and gender (i.e. female sex) having influence on diagnosis. This may be due to long-term suppression & underreporting of our patients due to the taboo of suchi-bai, distress caused by this suppression and denial in family life and the female majority.

**Recommendations:** 1) Early diagnosis and prompt management of MDD and GAD in female OCD subjects to reduce morbidity. 2) Further longitudinal community-based studies.

**Keywords:** Depression, OCD, GAD, co-morbidity

## INTRODUCTION

OCD is the 4<sup>th</sup> most common psychiatric disorder<sup>[1]</sup> and a chronic incapacitating illness. OCD is a disorder of co-morbidities<sup>[2]</sup> particularly mood (13-75%)<sup>[3]</sup> and anxiety disorders (24.5-69%)<sup>[4]</sup>. Studies<sup>[5]</sup> have regarded as depression as the most common and important co-

morbid condition because of associated increased severity<sup>[6]</sup>, suicidality<sup>[5]</sup>, chronicity<sup>[7]</sup>, poor response to treatment and poor prognosis<sup>[8,9]</sup>. It is classified so far according to DSM-IV TR as an anxiety disorder as obsessions produce anxiety and because of shared phenomenology and treatment options for OCD and anxiety disorders<sup>[10]</sup>.

Eric Hollander et al<sup>[11]</sup> have argued the co-morbidity patterns which was challenged by later studies<sup>[12,13]</sup>.

Stein et al<sup>[12]</sup> demand place of both OCD under umbrella cover of anxiety disorders under a separate group for increasing diagnostic validity.

Nestadt<sup>[14]</sup> and others have commented on role of culture in determining the nature of illness in OCD and have devised 4 subgroups according to the co-morbidity status.

There are very few Indian studies. Only one study<sup>[15]</sup> was performed in South India regarding depression and anxiety disorder co-morbidity. This study found that females are more likely to suffer from depression as co-morbidity but did not find any influence of gender on comorbid GAD. However the study had some methodological problems.

In view of paucity of Indian data regarding co-morbidity of OCD and the evidence of co-morbidities worsening course of OCD we tried to explore the co-morbidity patterns in OCD and whether the findings of the Indian study as regarding the influence of gender of co-morbidity of OCD was repeated in our study or not.

**MATERIALS AND METHOD**

This cross-sectional study involving 100 patients were conducted in a large teaching hospital of West Bengal over a period of 1 yr (Feb 2010 to Jan 2011). All the patients met DSM-IV criteria for OCD and were screened and assessed for depression and anxiety disorders using Structured Clinical Interview for Diagnosis (SCID). OCD and the co-morbid disorders were assessed for severity using standard scales viz. Yale-Brown Obsessive Compulsive scale for OCD<sup>[16]</sup> Hamilton’s Depression rating scale (HAM-D)<sup>[17]</sup> for depression and Hamilton’s anxiety rating scale (HAM-A) for GAD<sup>[18]</sup>. The socio-demographic

particulars were assessed using standardized formats and history sheets.

Subjects: 100 consecutive eligible patients of OCD of both sexes were taken up as subjects fulfilling the criterion age > 18 yrs.

OCD patients with psychosis, substance abuse, mental retardation and personality disorders were excluded from the study.

Procedure: After explaining the nature of the study, informed consent was obtained from patients. The clinical diagnosis of OCD was confirmed using SCID and its severity was assessed using Yale Brown Obsessive Compulsive scale (Y-BOCS). Data were later collected as regards socio-demographic profile using semi-structured proforma. Other aspects e.g duration of illness, type of compulsion and family history were also noted.

Then we used SCID to screen and diagnose any depression and co-morbid anxiety disorder. Once this was done we assessed the severity of co-morbid diagnoses using standardized rating scales e.g HAM-D for MDD, HAM-A for GAD. The patients were grouped according to the severity of the illness wherever possible into classes.

SPSS (version 15) was used for statistical analyses.

**RESULT**

Analysis of socio-demographic data revealed that the mean age of our patients was 32.73 yrs. Most were women (59%), married (86%), primary school literate (36%). Mostly had contamination obsession (94%) and washing compulsions.

Most of our subjects were of rural background, had severe/extreme OCD (58%) and had a mean duration of illness of 5.48 yrs. The most common obsession noted was contamination (94%). The socio-economic profile of our male and female patients is listed in TABLE-1.

**Table 1: Socio-demographic profile of our patients**

Demographic Variables		Total (n=100)	Male (n=41)	Female (n=59)	P-value
1) Age (mean, in years)		32.73	34.32	31.63	0.002
2) Religion	Hindu	45	22(48.9%)	23(51.1%)	0.08
	Muslim	51	16(31.4%)	35(68.6%)	
	Others	4	3(75%)	1(25%)	

**Table 1: Socio-demographic profile of our patients**

Demographic Variables		Total (n=100)	Male (n=41)	Female (n=59)	P-value
3) Educational status	Illiterate	19	6(31.6%)	13(68.4%)	0.045
	Primary	37	10(27%)	27(73%)	
	Middle School	4	3(75%)	1(25%)	
	High School	21	10(47.6%)	11(52.4%)	
	Post-high school diploma	9	7(77.8%)	2(22.2%)	
	Postgraduate	10	5(50%)	5(50%)	
3) Occupation:	Farmer	6	6(100%)	0(0%)	<0.001
	Semi Skilled Worker	12	12(100%)	0(0%)	
	Service	4	4(100%)	0(0%)	
	Business	16	16(100%)	0(0%)	
	Housewife	0	0(0%)	53(100%)	
	Student	9	3(33.3%)	6(66.7%)	
5) Marital status	Married	86	32(37.2%)	54(62.8%)	0.056
	Unmarried	14	9(64.3%)	5(35.7%)	
6) Residence	Rural	82	31(37.8%)	51(62.2%)	0.166
	Urban	18	10(55.6%)	8(44.4%)	
7) Family type	Nuclear	62	27(43.5%)	35(56.5%)	0.508
	Joint	38	14(36.8%)	24(63.2%)	
8) Socio-economic status	Lower	72	32(44.4%)	40(55.6)	0.2
	Upper lower	23	6(26.1%)	17(73.9)	
	Lower middle	5	3(60%)	2(40%)	

Table 2. Shows the division of our subjects into 4 groups according to their disease severity, based on the scores on the Y-BOCS. The table shows significant gender disparity. (P-value-<<0.05)

**Table 2. showing classification of our male and female subjects according to disease severity**

Severity of OCD	Total	Male	Female	P-value
Mild	4	4	0	0.000
Moderate	38	22	16	
Severe	42	14	28	
Extreme	16	1	15	

Our study showed 85 subjects had co-morbid MDD.

30 of our 41 males (~73%) in our study had co-morbid MDD while 55 out of 59 females (~93%) had co-morbid MDD.15 people had no depression

TABLE 3.1 shows the division of our 85 subjects with co-morbid MDD to 4 groups on the basis of the scores obtained on the HAM-D scales. Statistical tests confirmed gender disparity here (P-value< 0.05)

**Table 3.1:Gender-wise classification of our patients with co-morbid MDD**

Severity of MDD	Total(n=85)	Male(n=30)	Female(n=55)	P-value
Mild	6	2	4	0.006
Moderate	25	18	7	
Severe	22	4	18	
Very severe	32	6	26	

83 subjects (i.e 83%)had co-morbid generalized anxiety disorder(GAD). 30 of the 41 males(~73%) had

GAD while 53 out of 59 females (~90%) had co-morbid GAD.17 subjects(i.e17%) had no GAD.

TABLE 3.2 shows the division of our 83 subjects with co-morbid GAD to 3 groups on the basis of the scores on the HAM-A scales. Here also chi-square test showed gender disparity (P-value < 0.05)

**Table 3.2: Gender-wise classification of our patients with co-morbid GAD**

Severity of GAD	Total(n=83)	Male(n=30)	Female(n=53)	P-value
Mild	9	4	5	0.035
Moderate	37	17	20	
Severe	37	9	28	

One-way ANOVA test done on scores obtained on Y-BOCS scales and the HAM-D and HAM-A scales showed significant association (P-value < 0.001 for both pairs).

The paired sample correlation tests also showed significant correlation between scores on Y-BOCS and HAM-D and HAM-A scores (P-values were < 0.001 for 1<sup>st</sup> pair of scores and 0.001 for 2<sup>nd</sup> pair)

## DISCUSSION

The study aimed at analyzing the demographic variables, severity of OCD and comorbid diagnoses (MDD and GAD) in our male and female subjects and to find out if there was significant gender disparity in co-morbid diagnoses. It was found out that most of the demographic data were not showing any gender disparity. Analysis of marital status showed that married females have a slightly higher chance of developing severe OCD.

The two demographic factors to show significant gender disparity were age and education (P-values 0.002 and 0.045 respectively). This showed that our female subjects had lesser education and higher age than our male subjects. So, lower educational achievement and marital status (to some extent) separated our male and female subjects.

Our subjects had high rates of co-morbid Depression (85%) and GAD (83%).

The statistical tests showed that gender has an impact on OCD severity (p-value: < 0.05). We tried to find out whether such disparity is found as regards HAM-D and HAM-A scores as well. Accordingly we divided our subjects to 4 and 3 classes according to severity of co-morbid MDD and GAD respectively to study gender inequality. In both cases statistical tests showed significant gender disparity. So the female patients in our study are more likely to bear the brunt of co-morbid depression and generalized anxiety disorder. Our findings seem to corroborate with that

conducted in South India<sup>[15]</sup> showing that women are more likely to have MDD as co-morbidity. But that study could not find any gender disparity in co-morbid GAD. We tried to find out the underlying causes of such disparity in case of severity of OCD (As OCD occurs equally among males and females), the high comorbidity of GAD (compared to other studies<sup>[4,19-24]</sup>) and the gender disparity seen in co-morbid GAD.

The landmark article by Ajita Chakravarty et al<sup>[25]</sup> described a culture specific neurotic syndrome in Bengal called "suchi-bai". This relates to excessive desire to remain clean and avoidance of articles presumed to be unclean e.g unclean clothes worn overnight, left-overs of food ('etho' and 'shokri'). The belief was to discard unclean clothes before going to work or avoid contact with left-overs because these can bring about bad results. This results in various washing compulsions. This taboo was particularly imposed on widows and pregnant women and though the community recognizes excess suchi-bai as abnormal, they have a specific 'niche' in the society and are not necessarily treated thus having some degree of cultural acceptance. In a study of 102 Bengali people it was found that 54% were adherent to the rules. It was also noted in the study that the lower the social class, income or education the more adherent the people are. The researches opined that the internal resistance into such compulsions remained dormant unless forced people or circumstances. Denial and suppression of compulsion is also present due to recognition of suchi-bai as an illness and also due to the stigma associated. Circumstances change after marriage because washing compulsions and "suchi-bai" produces great stress on family life. The relation between contamination obsession, washing compulsion and GAD were seen in earlier studies<sup>[13]</sup>. Given the preponderance of female subjects and also due to their low levels of education and long duration of illness, it may be a fact that they may have suppressed the illness and only have expressed their illness when the disease has become very severe or the impact of the disease on family life was such that



it could not be suppressed even in the view of cultural acceptance. Under-reporting of OCD and anxiety disorders have been a feature of Indian population<sup>[15]</sup>. The severity of OCD in our subjects is a testimony to this fact. Since most of our female patients were Bengalis from lower social class and had less education than male counterparts, they may have been more adherent. Most of them were married which added to the stress. The fact that most of the subjects were female(59%) could have been a cause for added burden of co-morbidities.as females are 2-3 times more likely to develop an episode of MDD or GAD during their lifetime<sup>[26]</sup>.Also the fact that most of our female subjects were having more severe illness can cause increased co-morbidity of GAD in females(Since there is correlation among YBOCS and HAM-A scores).

### CONCLUSION AND RECOMMENDATIONS

Our study tried to find out if there was an impact of gender co morbid MDD and GAD in cases of Obsessive Compulsive disorder.

The study was conducted in a tertiary referral centre. The females not only had more severe disease(OCD) but also carried an increased burden for co-morbid depression and anxiety. The cause of higher co-morbidity of GAD in females may be due to more severe OCD(due to correlation between scores observed), poverty and illiteracy (high risk for victimization),taboo of suchi-bai, stress and disruption of family life caused by suppression of 'suchi-bai', presence of contamination obsession. Preponderance of women may have created a bias because of increased propensity to develop depression and anxiety disorders.

**Limitations:** Cross-sectional hospital-based study instead of being longitudinal and community based, no follow-up to see treatment response & no attempt to scrutinize for treatment naivety.

**Recommendations:** We should be very vigilant while treating the female OCD patients in our community because of the increased burden of co-morbid depression and generalized anxiety disorder. Holistic approaches targeting the stigma associated with suchi-bai are needed for reducing the burden of co-morbidities, particularly in females as they can complicate the course and prognosis. Further community based prospective studies with larger sample size and regular follow-up will help to understand the co-morbidity issues better.

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# Awareness and Pattern of Cardiovascular Risk Factors among Patients Attending Cardiac Emergency with Acute Chest Pain of Cardiac Origin in Lucknow

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## ABSTRACT

**Background:** Lack of awareness about the risk factors is an important reason for delay in seeking medical care among patients with acute chest pain of cardiac origin.

**Objectives:** To study the prevalence and awareness of cardiovascular risk factors and its socio-demographic determinants in patients attending cardiac emergency with acute chest pain of cardiac origin of Lucknow district.

**Material and Method:** A Descriptive Longitudinal study was conducted in the cardiac emergency of CSMMU, a tertiary care center, following systematic random sampling technique on a sample size of 220 during study period of one year August 2010 to August 2011. Data was collected through preformed and pretested schedule and analysed using SPSS 17.0 software.

**Results:** It was found that distribution of cardiovascular risk factors among patients attending cardiac emergency with acute chest pain of cardiac origin of Lucknow district were as follows: tobacco use 47.3%, alcohol 17.3%, hypertension 23.2%, diabetes mellitus 32.7%, dyslipidaemia 15%, overweight 23.6%, obesity 9.1%, past history of CAD 21.4% and family history in 9.5% of the patients. The awareness of risk factor was maximum for tobacco use (70%) and least for dyslipidaemia (40.9%). The awareness was less in rural patients, females, low SES class and illiterates.

**Conclusions:** Public awareness campaigns to be conducted periodically to educate people about signs and symptoms of acute chest pain of cardiac origin, to create awareness about the seriousness of the problem and risk factors, as these factors were the major barriers in delay in health seeking.

**Keywords:** Awareness, Risk Factors, Acute Chest Pain, Cardiac Emergency

## INTRODUCTION

Epidemiological transition by the second half of 20<sup>th</sup> century has witnessed a rise in the global burden of non communicable diseases, accounting for 36 million deaths. World health report 2010 indicates 63% of total global deaths and 46% of global burden of disease is due to NCD's and 80 % of these deaths occur in low and middle income countries. Cardiovascular diseases are the leading cause of mortality and morbidity among NCD's contributing to 17 million deaths i.e.

48% of total NCD deaths and WHO report 2010 estimated it to increase to 23.4 million by 2030. Cardiovascular diseases contribute to 170 million DALYs, accounting for 11.3% of global burden.

India, second most populous country in the world, accounts for 5.24 million deaths annually due to NCDs and 20 DALYs lost per 1000 population per year due to cardiovascular diseases. They also contribute to 35.3% of total morbidity.<sup>5</sup>

It has been well documented that tobacco use, Diabetes mellitus, high blood pressure, obesity, physical inactivity, unhealthy dietary habits are the major and alcohol, low socio-economic status and psycho social stress are the minor modifiable risk factors for cardiovascular diseases. India, having an overall prevalence of smoking 34.6% in men and 3.4% in women, having diabetes prevalence of 5.5% is also having the brunt of risk factors.<sup>6</sup>

### **OBJECTIVES OF THE STUDY:**

1. To find out the pattern of cardiovascular risk factors in patients attending cardiac emergency with acute chest pain of cardiac origin.
2. To assess the awareness of cardiovascular risk factors among these patients.
3. To study the socio-demographic factors associated with the awareness of risk factors among these patients.

### **MATERIAL AND METHOD**

This Descriptive Longitudinal study was conducted at Lucknow, capital state of Uttar Pradesh. This study was carried out from August 2010 to August 2011 at Cardiology emergency, CSMMU (Tertiary care centre) with Patients attending cardiac emergency with acute chest pain of Cardiac origin in Lucknow district as Study unit. Sample size was calculated on the basis of 50% of the patients with acute chest pain of cardiac origin were seeking health care within 6 hours from the onset of pain, with the absolute permissible error,  $d=10\%$  in the prevalence with a 95% confidence limit, design effect (W) of 2 and 10% of cases lost to follow up, final sample size worked out to be 220.

Systematic random sampling technique was used and sampling interval was decided on the basis of analysis of baseline data obtained from the cardiac emergency for the month of July 2010. All patients attending cardiac emergency with acute chest pain of cardiac origin (as evidenced by expert clinical opinion or ECG or cardiac enzymes) residing in Lucknow district with minimum stay in the hospital for at least 1 hour were included in the study. Patients with acute chest pain of non cardiac origin, patients with serious unrelated disease (Eg: advanced malignancy, renal

failure, severe COPD, trauma, surgery) which may limit the life expectancy were excluded from the study. A pretested structured interview schedule was used to collect necessary information. Permission to conduct this study was taken from the institutional ethical committee and Head of the department, Cardiology. Informed consent was taken from the study respondents.

Obesity was assessed by measuring body weight and height and thereby calculating BMI and categorise the patient according to NLHBI guidelines for obesity. Blood pressure was measured using mercury sphygmomanometer by taking two readings in the lying down position 30 minutes apart and a cut off of 140/90 was used as a criterion to diagnose hypertension according to JNC guidelines. FBS  $e''$  126mg/dl and PPBS  $e''$  200 mg/dl was used as a diagnostic criterion for diabetes mellitus according to ADA guidelines.

Data entry and analyses were done using SPSS version 17.0. Descriptive statistics such as mean and standard deviation (SD) for continuous variables, and frequency and percentage for categorical variables were determined. The chi-square test and fisher's exact test (when appropriate) was used to show the associations between predictor and outcome variables .The level of significance was set at 0.05. Factors associated with awareness of risk factors of patients were determined by multiple logistic regression analysis methods.

### **RESULTS**

Most of the patients attending cardiac emergency with acute chest pain of cardiac origin were in the age group of 56-65 years (34.5%) followed by 31.4% in the age group of 46-55 yrs. Males outnumbered females with their percentage being 81.4%, 65% belonged to urban area, 97.3 % were married, 78.2% were Hindus, 65% belong to general caste, 66.4% living in a nuclear family. Most of the patients from rural area were literate upto high school (28.6%), with 24.7% illiterates. On the other hand, most of the urban population belong to the post graduate (34.3%), with only 9.8% illiterates. Most of the rural patients belong to socio-economic class IV (46.8%), followed by class III (41.6%), while majority of urban patients belong to socio-economic class II (63.6%).

Of all the patients attending cardiac emergency, 47.3% of the patients were smokers, 17.3% were alcoholics, 23.2% were having hypertension, 32.7% were having diabetes mellitus and 15% were having abnormal lipid profile. 29.5% of patients were doing regular exercise, past history of CAD was present in 21.4% of patients and family history in 9.5% of patients. Of all the patients studied, nearly 60 % of patients were having normal BMI , 23.6 % of patients were having overweight, with 9.1% of obese and 8.2 % of underweight patients. The mean and SD of BMI of the studied patients were 23.8 and 4.2 kg/m<sup>2</sup> respectively. (Table 1)

- Only two fifth of patients (39.5%) were aware of almost all modifiable risk factors enlisted as a predisposing factor for chest pain and about one third of (30%) of the patients were not at all aware of any risk factor contributing to chest pain. The most common risk factor reported was smoking (70%), followed by DM (67.3%). (Table 3)
- The factors that found significant association with the low awareness of the risk factors were: female gender, rural residence, labourer, illiterates, low SES class and having BPL card. Among these, literacy status and rural residence were found to be independent predictors of awareness of risk factors on logistic regression analysis. The religion, caste, type of the family and marital status did not show significant association with the awareness of risk factors in these patients.

## DISCUSSION

Of all the patients attending cardiac emergency in the present study, 47.3% of the patients were smokers , 17.3% were alcoholics, 23.4% were having hypertension , 32.7% were having diabetes mellitus and 15% were having abnormal lipid profile. 29.5% of patients were doing regular exercise, past history of CAD in 21.4% of patients and family history in 9.5% of patients. 23.6% of patients were having overweight and 9.1% were obese. The risk factor prevalence was very high when compared with Jafari H., *et.al.*, (2011)<sup>3</sup> who in their study found that high blood pressure was present in 24.7% of AMI patients, Diabetes mellitus in 14.4% of patients, History of family disease 14.4%, Hyperlipidemia 6.2% and Smoking 8.2% and similar to the study conducted by Abraham S.B ., *et.al.*, (2010)<sup>4</sup>

in their retrospective study in ICU admitted patients in 2006-07 in 130 patients in rural kerala showed that risk factor prevalence in patients with ACS was as follows : Hypertension 82.3%, Pre Hypertension 19.2%, Stage 1 40%, Stage 2 23.1%, Smoking 50.4%, Previous MI 33.1%, Type 2 DM 33.1%, Controlled 18.5%, Uncontrolled 14.6%, Alcohol 19.2%, Dyslipidaemia 18.5%, Obesity 16.2%. Other than hypertension , all other risk factors show similar prevalence as this study is more close, done in same setting as ICU, in the same Indian population. Its quite understandable that study done at tertiary care center likely to yield a population of high risk and hence risk factor prevalence was very high compared to the prevalence in the general population. Similiar studies Yoshimi F., *et.al.*, (2005)<sup>10</sup> done in a multi-speciality hospital at Japan showed the prevalence of smokers 54%, hyperlipidaemia 56%, DM 29%, 43.4% HTN and Angela D.B., *et.al.*, (2006)<sup>2</sup> showed that HTN in 84% , DM in 43% and hypercholesterolaemia in 75% of the patients .

In the present study, only two fifth of patients (39.5%) were aware of all risk factors as a predisposing factor for chest pain, followed by 30% of the patients who were not at all aware of any risk factor contributing to chest pain. The most common risk factor reported was smoking (70%), followed by DM (67.3%), HTN (66.8%), Physical inactivity (44.1%), Obesity (42.3%) and Hyperlipidaemia (40.9%). Sakine M ., *et.al.*, (2009)<sup>4</sup> in their population based study on awareness of heart attack in turkey observed that 11.8% did not know any of the risk factors. The most common reported risk factors were physical inactivity (54.3%), hypertension (42.0%), and hypercholesterolemia (33.0%).

## CONCLUSIONS

Public awareness campaigns to be conducted periodically to educate people about signs and symptoms of acute chest pain of cardiac origin, to create awareness about the seriousness of the problem and risk factors, as these factors were the major barriers in delay in health seeking. IEC activities should be targeted to the high risk groups on short term approach to educate about the immediate action that can be taken after chest pain and about the appropriate health centers for treatment of chest pain so that some lives can be saved before reaching the hospital.

**Table 1: Distribution of patients with acute chest pain of cardiac origin according to their modifiable risk factor status ( n = 220)**

Risk factors	No .	Percent
<b>Smoking</b>		
Current smoker	104	47.3
Non smoker	94	42.7
Previous smoker*	22	10.0
<b>Alcohol</b>		
Current alcoholic	38	17.3
Non alcoholic	172	78.2
Previous alcoholic*	10	4.5
Lack of Regular exercise	155	70.5
Hypertension	51	23.2
Pre-hypertension	40	18.2
Stage I	33	15.0
Stage II	18	8.2
Diabetes Mellitus	71	32.3
On regular treatment	42	19.1
On irregular treatment	29	13.2
Dyslipidaemic	33	15.0
Elevated total cholesterol	7	3.2
Elevated LDL	18	8.2
Decreased HDL	16	7.3
Elevated TG	12	5.5
<b>Status of BMI</b>		
Underweight	18	8.2
Low normal	94	42.7
High Normal	36	16.4
Overweight	52	23.6
Obese	19	8.6
Morbid Obese	1	0.5
Mean $\pm$ SD (BMI)	23.83 $\pm$ 4.18	
Past History of CAD	47	21.4
Family History of CAD	21	9.5

\* Previous smoker or alcoholic means who left smoking or alcohol for past 1 year.

**Table 2 : Pattern of modifiable risk factors among patients with acute chest pain of cardiac origin**

Risk factors Use	Tobacco	Alcoholic	Lack of Regular Exercise	Dyslipidaemia	Diabetes Mellitus	Hypertensives	Overweight	Obese
<b>Bio-social characteristics</b>								
<b>Gender</b>								
Male	117 (62.6)	48 (26.8)	119 (66.5)	27 (15.1)	51 (28.5)	37 (20.7)	43 (24.0)	11 (6.1)
Female	9 (22.0)	0 (0.0)	36 (87.8)	6 (14.6)	19 (46.4)	14 (34.1)	9 (22.0)	9 (22.0)
<b>Place of residence</b>								
Rural	51 (66.2)	16 (20.8)	59 (76.6)	11 (14.3)	19 (24.7)	20 (26.0)	12 (15.6)	7 (9.1)
Urban	75 (52.5)	32 (22.4)	96 (67.1)	22 (15.4)	51 (35.7)	31 (21.7)	40 (28.0)	13 (9.1)
<b>Religion</b>								
Hindu	87 (50.6)	47 (27.3)	114 (66.3)	26 (15.1)	58 (33.7)	38 (22.1)	38 (22.1)	15 (8.7)
Muslim	38 (84.5)	1 (2.2)	39 (86.7)	7 (15.6)	10 (22.2)	11 (24.4)	13 (28.9)	4 (8.9)

**Table 2 : Pattern of modifiable risk factors among patients with acute chest pain of cardiac origin (Contd.)**

Risk factors Use	Tobacco	Alcoholic	Lack of Regular Exercise	Dyslipidaemia	Diabetes Mellitus	Hypertensives	Overweight	Obese
<b>Bio-social characteristics</b>								
<b>Caste</b>								
General	75 (52.5)	33 (23.1)	100 (69.9)	21 (14.7)	49 (34.3)	38 (26.6)	40 (28.0)	13 (9.1)
OBC	33 (71.7)	6 (13.0)	30 (65.2)	7 (15.2)	12 (26.1)	7 (15.2)	10 (21.7)	3 (6.5)
SC/ST	18 (58.1)	9 (29.0)	25 (80.6)	5 (16.1)	9 (29.1)	6 (19.4)	2 (6.5)	4 (12.9)
<b>Socio economic status</b>								
I	8 (47.1)	5 (29.4)	9 (52.9)	5 (29.4)	6 (35.3)	1 (5.9)	9 (52.9)	1 (5.9)
II	43 (44.3)	23 (23.8)	61 (62.9)	15 (15.5)	34 (35.1)	28 (28.9)	24 (24.7)	9 (9.3)
III	45 (75.0)	12 (20.0)	48 (80.0)	10 (16.7)	19 (31.7)	11 (18.3)	12 (20.0)	5 (8.3)
IV	29 (67.4)	7 (16.3)	34 (79.1)	3 (7.0)	11 (25.6)	9 (21.9)	7 (16.3)	5 (11.6)
V	1 (33.3)	1 (33.1)	3 (100.0)	0 (0.0)	0 (0.0)	2 (66.7)	0 (0.0)	0 (0.0)

**Table 3.1: Awareness of predisposed modifiable risk factors among patients with acute chest pain of cardiac origin (n = 220)**

Awareness of risk factor	No .	Percent
Smoking	154	70.0
Alcohol	135	61.4
Obesity	93	42.3
Hyperlipidaemia	90	40.9
Hypertension	147	66.8
Diabetes mellitus	148	67.3
Lack of physical exercise	97	44.1

**Table 3.2: Scoring of awareness of risk factors among patients with acute chest pain of cardiac origin (n = 220)**

Awareness of risk factors	No .	Percent
None	66	30.0
1-2	4	1.8
3-4	54	24.6
5-6	9	4.1
7-8	87	39.5

**Table 4: Association between awareness of risk factors and bio-social characteristics of patients with acute chest pain**

Bio-social characteristics	Awareness of risk factors		P value
	Not Aware (<4 risk factors )	Aware (≥4 risk factors )	
<b>Age ( in years )</b>			
<45	15 (57.7)	11 (42.3)	0.130
45-65	56 (38.6)	89 (61.4)	
>65	17 (34.7)	32 (65.3)	
<b>Gender</b>			
Male	62 (34.6)	117 (65.4)	0.001
Female	26 (63.4)	15 (36.6)	
<b>Place of residence</b>			
Rural	52 (67.5)	25 (3.5)	<0.0001
Urban	36 (25.2)	107 (74.8)	

**Table 4: Association between awareness of risk factors and bio-social characteristics of patients with acute chest pain (Contd.)**

Bio-social characteristics	Awareness of risk factors		P value
	Not Aware (<4 risk factors)	Aware ( $\geq$ 4 risk factors)	
<b>Occupation</b>			
Professional	5 (10.2)	44 (89.8)	<0.0001
Shopkeeper, clerk, farmer	14 (28.0)	36 (72.0)	
Labourer	25 (59.5)	17 (40.5)	
Unemployed/ housewife	34 (49.3)	35 (50.7)	
<b>Literacy status</b>			
Illiterate	23 (69.7)	10 (30.3)	<0.0001
Primary & high school	43 (61.4)	27 (38.6)	
Intermediate	8 (47.1)	9 (52.9)	
Graduate and above	14 (14.0)	86 (86.0)	
<b>Socio economic status</b>			
I	1 (5.9)	16 (94.1)	<0.0001
II	19 (19.6)	78 (80.4)	
III	33 (55.0)	27 (45.0)	
IV	33 (76.7)	10 (23.3)	
V	2 (66.7)	1 (33.3)	
<b>Have BPL card</b>			
Yes	27 (84.4)	5 (15.6)	<0.0001
No	61 (32.4)	127 (67.6)	
<b>Family history of CAD</b>			
Yes	0 (0.0)	21 (100.0)	<0.0001
No	88 (44.2)	111 (55.8)	

**Table 5: Independent predictors of awareness of the risk factors by multiple logistic regression analysis**

Predictor variables	$\beta$ Co-efficient	AOR (95% C.I.)	P value
<b>Gender</b>			
Male	0.425	1.530 (0.592-3.955)	0.380
Female		Reference category	
<b>Residence</b>			
Urban	1.012	2.751 (1.161-6.518)	0.021
Rural		Reference category	
<b>Occupation</b>			
Professional	1.243	3.466 (0.851-14.109)	0.083
Shopkeeper, clerk, farmer	0.874	2.397 (0.695-8.268)	0.166
Labourer	0.756	2.130 (0.621-7.304)	0.229
Unemployed/ housewife		Reference category	
<b>Education</b>			
Illiterate		Reference category	
Primary & high school	1.231	3.425 (0.930-12.614)	0.064
Intermediate	1.358	3.887 (1.521-9.930)	0.05
Graduate and above	1.297	3.658 (1.084-12.349)	0.037
<b>Socio-economic status</b>			
I	1.282	3.603 (0.075-172.206)	0.516
II	1.823	6.187 (0.279-137.170)	0.249
III	2.107	8.222 (0.489-138.284)	0.143
IV	2.417	11.207 (0.693-181.330)	0.089
V		Reference category	
<b>BPL card</b>			
Not having	1.098	2.997 (0.958-9.378)	0.059
Having		Reference category	



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# Effect of Orthodontic Appliances on the Oral Carriage of Streptococcus Mutans and Candida Species

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## ABSTRACT

**Objectives:** To evaluate the prevalence and estimate counts of Streptococcus mutans and Candida species and to compare the efficacy of manual and electronic brushes on their count reduction.

**Materials and Method:** Thirty patients undergoing orthodontic treatment in the Department of Orthodontics, Santosh Dental College and 30 patients without orthodontic appliances (as control) were selected to determine the counts of S.mutans in plaque samples and counts of Candida species on Sabaroud's Dextrose Agar. All 30 subjects with appliances were then divided into two Groups: Group 1 was assigned Manual brushes and Group 2 were assigned Electronic brushes and both the groups were evaluated for the counts at the end of 1st, 2nd and 3rd month.

**Results:** S. mutans counts were high in 80% (24/30) and Candida species were found to be 16% (5/30) in patients with orthodontic appliances as compared to controls. No significant reduction in counts was observed in patients while using manual brushes. However, in patients using electronic brushes their counts were markedly reduced.

**Conclusion:** There occurs a significant increase in S.mutans and Candida counts after appliance insertion, hence the use of manual brushes is insufficient for satisfactory maintenance of oral hygiene in orthodontic patients and reduction in their counts by using electronic brushes should be related to the reduced risk of oral diseases in such patients.

**Keywords:** Fixed Orthodontic Appliances, Electronic Toothbrushes, Manual Toothbrushes, Streptococcus Mutans, Candida Albicans, Dentocult SM Strips

## INTRODUCTION

Oral health is influenced by oral microbial flora, which is concentrated in dental plaque and is a complex environmental niche of interdependent microorganisms embedded in bacterial and salivary products. Dental plaque provides a microhabitat for organisms and an opportunity for adherence of the organisms to either the tooth surface or other microorganisms<sup>1</sup>

Streptococcus mutans is most frequently implicated in decalcification of enamel.<sup>2,3</sup> S. mutans is isolated in 50-80% of orthodontic patients as a common cause of decalcification due to accumulation of cariogenic plaque around the brackets progressing into carious lesions in such patients.

Candida albicans may also be isolated from the mouth of patients using orthodontic devices.<sup>4,5,6,7</sup> The chronic atrophic candidiasis or denture induced stomatitis is the commonest form of oral candidiasis and is present in 24 -60 % of denture wearer and is also associated with orthodontic appliances.<sup>8</sup>

Patients undergoing orthodontic treatment have greater difficulty in satisfactory maintenance of hygiene as orthodontic bands, brackets and wires are impediments to brushing and flossing.<sup>9</sup> These orthodontic appliances create new retentive areas for plaque and debris, which in turn predisposes to increased carriage of microbes and subsequent infection.<sup>10</sup>

Dental plaque may serve as a reservoir for pathogenesis in patients with poor oral hygiene, the greater the area of the tooth covered by a bracket, greater the complexity of the appliance component, and harder it becomes for the patient to clean the tooth properly.<sup>11</sup>

Patients undergoing orthodontic treatment are more likely to suffer from periodontal diseases as in most of the cases they are not aware about the high levels of oral hygiene required, which is conducive to excellent orthodontic treatment results. Effective brushing of teeth is important as a preventive measure in this context and many types of toothbrushes both manual and powered options have been promoted for orthodontic patients.<sup>1</sup>

Thus, the purpose of this study is to estimate the counts and evaluate the colonization pattern of *S. mutans* and *Candida* after application of fixed orthodontic appliances and to compare the efficacy of manual and electronic toothbrushes on reducing the levels of *S. mutans* and *Candida*.

### MATERIALS AND METHOD

This study was conducted among patients coming to our hospital. Ethical clearance was taken prior to the study as per the norms. After complete oral examination, thorough oral hygiene instructions and plaque control measures a total number of 30 orthodontic patients undergoing orthodontic treatment for 3-4 months and an equal number of patients as controls without orthodontic appliances in the age group of 15 to 25 years were selected. Two swabs of plaque samples were taken from buccal and labial aspects of teeth in individuals with and without orthodontic appliances. One swab was used to determine counts of *S. mutans* using DM Strips (Dentocult strip *S. mutans*, Orion Diagnostica Espoo Finland) and rubbed thoroughly on the four rough

surfaces of the DM Strips. The second swab was cultured on Sabouraud's Dextrose Agar to determine the counts of *Candida*.

The study group with appliances was divided further into two groups and assigned sequences of brush use as follows: Group 1: Manual toothbrush and Group 2: Electronic toothbrush. The patients were evaluated in the afternoon periods after 3-5 hours of brushing at the end of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month period for determining the counts of *S. mutans* and *Candida*. All the statistical analysis was calculated by paired - t test.

### RESULTS

Of the 30 patients in the study appliance group 21(70%) were positive for *S. mutans*, 2 (7%) for *Candida* while 3(10%) were positive for both *S. mutans* and *Candida*. In the control group, of the 30 only 1 patient was positive for *S. mutans* in the first visit. Statistical analysis showed that colonization with *S. mutans* was significantly higher in (P< .001) patients with orthodontic appliances as compared to patients without orthodontic appliances.

In Group 1 patients using manual brushes, at the end of the 1<sup>st</sup> month two patients, at the end of the 2<sup>nd</sup> month one patient, and at the end of the 3<sup>rd</sup> month three patients showed counts of *S. mutans* >10<sup>6</sup>.

In group 2 patients using electronic brushes, at the end of 1<sup>st</sup> month two patients showed counts of *S. mutans* >10<sup>6</sup> and none of the patients at the end of 2<sup>nd</sup> and 3<sup>rd</sup> month was positive for the counts of *S. mutans*.

There was no significant reduction in the counts of *S. mutans* in patients using manual brushes for oral hygiene (P< .035), however patients using electronic brushes showed a significant reduction in the counts of *S. mutans* (P<. 086) as shown in Table 1.

**Table 1 Counts of S.mutans Group 1 and Group 2 Patients.**

Groups	Period	<10 <sup>4</sup>	<10 <sup>5</sup>	10 <sup>5</sup> - 10 <sup>6</sup>	>10 <sup>6</sup>	P value
GROUP 1(n=15) (Manual brushes)	1st month	4	4	5	2	(P< .035)
	2nd month	6	3	5	1	
	3rd month	5	2	5	3	
GROUP 2(n=15) (Electronic brushes)	1st month	5	4	4	2	(P<. 086)
	2nd month	9	4	2	0	
	3rd month	13	2	0	0	

*Candida* colonization was not found to be significant in orthodontic patients as only 2 patients in Group 1 showed moderate colonization at the end of the three months while none of the patients showed heavy colonization with *Candida*. In Group 2 none of the patients were positive for *Candida* at the end of 3<sup>rd</sup>

month. However, it was noticed that none of the patients from any of the two groups showed heavy colonization with *Candida* hence the isolation was not significant but counts did get reduced in Group 2 as shown in Table 2.

**Table 2. *Candida* colonization among Group 1 and Group 2 Patients.**

	Period	Mild colonization	Moderate colonization	Heavy colonization
GROUP 1(Manual brushes)	1 <sup>st</sup> Month	2	0	0
	2 <sup>nd</sup> Month	1	0	0
	3 <sup>rd</sup> Month	0	2	0
GROUP 2(Electronic brushes)	1 <sup>st</sup> Month	2	0	0
	2 <sup>nd</sup> Month	0	0	0
	3 <sup>rd</sup> Month	0	0	0

Yeast growth was counted as : Few (1-5 colonies), Moderate (6-10 colonies) and Heavy (>10 colonies). All species of *Candida* were identified as *Candida albicans* in all the positive cases which were confirmed by Gram stain and Germ tube formation.

## DISCUSSION

*Streptococcus mutans* has a polysaccharide coat (glycocalyx) that allows it to stick to teeth, invade the blood stream, produce acid from sugar which promotes erosion of tooth enamel and also produces tough dextran which binds together food debris, epithelial cells, mucus and bacteria to form dental plaque. They become pathogenic under the condition that leads to frequent and prolonged acidification of the dental plaque<sup>12</sup>.

The oral environment of orthodontic patients undergoes changes, such as pH reduction, larger number of sites available for *S. mutans* collection and increased accumulation of food particles, which may lead to an increased number of *S. mutans* colony-forming units (CFU) in saliva.<sup>13,14</sup>

Oral biofilms including orthodontic biofilms (Oral biofilms formed on orthodontic biomaterials during active orthodontic treatment or retention phase), are diverse communities of microorganisms on dental hard and soft tissue and dental biomaterials<sup>15</sup>. This leads to long time retention of *mutans streptococci* and *Candida* and increases their cariogenicity.

Recent studies have reported that demineralization of dental surfaces during treatment can be found in 50 to 75% of all patients with fixed orthodontic appliances.<sup>16,17,18</sup> In a study by Batoni et al. *S. mutans*

was isolated in 83.3% from orthodontic children without caries experience and from 34% of children without orthodontic appliances.<sup>19</sup> This finding was similar to our result in which *S. mutans* was isolated more in patients with orthodontic appliances (70%) as compared to patients without orthodontic appliances (3%). This suggests that these patients can be considered more caries susceptible than subjects without orthodontic appliances.

Appliances increase the number of plaque retention areas. The only effective method of control is oral hygiene. Advice on hygiene, given to the patients undergoing appliance therapy, has three objectives: to prevent enamel decalcification, to reduce gingival inflammation and to reduce appliance breakage.<sup>20</sup> Efficient mechanical removal of plaque has been shown to be the best means of plaque control.<sup>21</sup>

A report by Brothwell et al. highlighted the benefits of using electronic brushes for orthodontic patients as compared to manual brushes. Electronic brushes due to their rotating, oscillating and counter directional action clear more plaque.<sup>22</sup> A recent study by Grossman et al showed superiority of electronic brush over manual brushes.<sup>23</sup> In a study by Body et al patients who used an electric toothbrush showed significantly less plaque accumulation and gingival inflammation during an 18-month period. Few orthodontists (only 20 per cent) routinely recommend electric toothbrushes to their patients—perhaps due to the relatively high cost of such toothbrushes.<sup>24</sup>

In our study Group 2 patients using electronic brushes, counts of *S. mutans* reduced progressively ( $p < .035$ ) as compared to patients in Group 1 using

manual brushes ( $P < .086$ ). Costa et al had also reported that counts of *S. mutans* observed with ultrasonic and electronic brushes both decreased significantly after one month.<sup>1</sup>

*Candida* species are commensal yeast which colonizes the oropharyngeal region of up to 60% of all healthy immune-competent individuals.<sup>25</sup> The ability of *Candida* to become a pathogenic microorganism capable of causing infections is attributed to a number of factors intrinsic and extrinsic factors.<sup>26</sup>

However, there seems following insertion of orthodontic appliances, there occurs a change in the microflora of the mouth after appliance insertion. Denture plaque containing *Candida* could cause not only oral candidiasis, like oral thrush or denture-induced stomatitis, but also caries, root caries and periodontitis of abutment teeth. Various studies have shown a direct relationship between the presence of a removable appliance, *Candida* and low salivary pH levels.<sup>27</sup>

In our study, isolation of *Candida* was not significant but placement of orthodontic appliances increased oral microflora (6.7%) with only moderate colonization with *Candida*. In a study by Hagg et al fixed orthodontic appliance insertion is likely to promote oral carriage of *Candida*. Arendorf investigated 33 patients who underwent removable appliance therapy and found a direct relationship between the presence of removable appliance and *Candida* species.<sup>28,29</sup>

Patients using manual brushes showed moderate colonization with *Candida* at the end of 3<sup>rd</sup> month while counts did get reduced in patients using electronic brushes as no patients were positive for *Candida* suggesting that electronic brushes were effective in cleaning. All the *Candida* species isolated were identified as *Candida albicans*. This supports the finding that *C. albicans* is the single most predominant candidal species in the oral cavity.<sup>29</sup>

There are a few in vivo studies comparing brushes using microbiological techniques as Haffajee et al analyzed the presence and quantity of various bacteria including *S. mutans* in patients with chronic periodontitis using checker board DNA-DNA hybridization. They found no differences in levels of *S. mutans* among the patients who had used electronic brush for 6 months.<sup>30</sup> Effective manual or powered brushing and the use of interdental brushes is still the most important measure of oral hygiene control in

orthodontic patient.<sup>15</sup>

Our study implies that electronic brushes if used for cleaning in orthodontic patients can provide them more cleaner oral health and also can control caries lesions in such patients. Source of funding Resources for the study were self-funded as there was no funding for the study.

**Conflict of Interest:** The authors declare there is no conflict of interest.

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# Twelfth Five Year Plan (2012- 2017): A Hope for Better Health in India

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## ABSTRACT

The economy of India is based in part on planning through its five-year plans, which are developed, executed and monitored by the Planning Commission. The 12 Five Year Plan, which would be implemented across the country during 2012-13 to 2016-17, offers a significant opportunity to the government in our country for radically improving the approach towards public provisioning for socioeconomic development. Like the previous Five Year Plans, the next Plan too would have a larger vision, policies, priorities and strategies; but the medium for translating most of those ideas envisaged by the Planning Commission for the 12th Plan would be several health development schemes. Most of the issues pertaining to public health have been acknowledged by the policy makers and influenced to some extent the formulation process of the 12th Five Year Plan. It is commendable in this regard that the 12th Plan recognizes the need to provide comprehensive healthcare with greater emphasis on communicable diseases and preventive healthcare, need for up-gradation of rural healthcare services to Indian Public Health Standards (IPHS) with districts as the units for planning, training and service provisioning.

**Keywords:** Five Year Plan, Health, Man power, Infrastructure, Programme

## INTRODUCTION

The economy of India is based in part on planning through its five-year plans, which are developed, executed and monitored by the Planning Commission. The 12 Five Year Plan, which would be implemented across the country during 2012-13 to 2016-17, offers a significant opportunity to the government of India improving the approach towards public provisioning for socioeconomic development. However, in order to make any drastic improvement, the government needs to recognize a number of critical issues pertaining to planning and budgeting in the country and make a concerted effort to address those in the 12<sup>th</sup> Plan.

Like the previous Five Year Plans, the next Plan too would have a larger vision, policies, priorities and strategies; but the medium for translating most of those

ideas envisaged by the Planning Commission for the 12<sup>th</sup> Plan would be several health development schemes. The magnitude of government expenditure could be an important indicator of the scale and relevance of any of its interventions; and, budgetary expenditure on implementing the 11<sup>th</sup> Five Year Plan (2007-08 to 2011-12), has accounted for roughly one-third of the total expenditure from government budgets every year.

Earlier this year, eminent health experts expressed concern that the health system in India at present is in a state of "crisis" and called for immediate action to achieve universal health coverage. As far as the challenges are concerned, there is a near consensus among experts that the health sector is plagued by acute inequity in the form of unequal access to basic healthcare across regions and among various income/ social groups, inadequate availability of healthcare services, poor quality healthcare services, acute shortage of skilled manpower along with the largest private sector with least regulation. As a consequence of the heavy reliance on the private sector for curative care, the common people (especially the 836 million people who live on a per capita consumption of less

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than Rs. 20 a day) bear the brunt of meager public health expenditure, further plunging them into poverty.

The Eleventh Plan had drawn attention to the fact that India's health outcome indicators continue to be weaker than they should be, at our level of development. The 12<sup>th</sup> Plan had therefore expressed the necessity of allocating additional resources to health and laid down monitorable targets for parameters such as infant mortality (IMR), maternal mortality (MMR), institutionalized delivery, extent of full immunization, etc. Data available on Infant Mortality Rate (IMR), Maternal Mortality Ratio (MMR) and percentage of deliveries in institutions shows some improvement in the 11<sup>th</sup> Plan. These are marked improvements but their rate of decline is lower than our targets. We must accelerate the pace of progress in this area in the 12<sup>th</sup> Plan.<sup>1</sup>

The Eleventh Plan had noted that the total public expenditure on health in India by Centre and the States was less than 1 per cent of GDP and it needed to be increased to 2 or 3 per cent. The process has begun and the percentage is estimated to have increased to around 1.4 per cent in 2011/12. If expenditure on drinking water & sanitation in rural areas, which are critical for better health outcomes, is included, the percentage would be higher at 1.8 per cent. Regardless, a larger allocation of resources will definitely be needed in the Twelfth Plan. It must be emphasized that financial resources are not the only constraint. Shortage of health professionals at all levels has become a serious impediment to achieving an expansion in the public provision of health services. There has been inadequate attention to improving our education and training capacities in this area. There are also problems of accountability of personnel even when these are recruited. These lacunae will take time to rectify, but the 12<sup>th</sup> Plan must give a special emphasis to solve this problem. We should aim to increase total health expenditure as percentage of GDP to 2.5 per cent by the end of Twelfth Plan.

The 11<sup>th</sup> Plan noted that although the percentage of total expenditure on health in India as a percentage of GDP was around 5 per cent, (which is roughly comparable to other developing countries), there was a disproportionately high reliance on private, particularly household's out of pocket, expenditure. This reflected a critical imbalance in the healthcare system, which stemmed from deficiencies in the public sector's capacity to deliver basic healthcare.<sup>2</sup>

The 12<sup>th</sup> Plan sought to correct this imbalance by raising the share of Public Expenditure on Health (both Plan and non Plan) in the Centre and States taken together from less than 1 per cent of GDP in 2006-07 to 2 per cent to 3 per cent of GDP to be achieved over a period of time. The National Rural Health Mission launched in 2005 aimed at strengthening the healthcare infrastructure in rural areas, providing sub centres, primary health centres, community health centres, etc. National Health Outcome Goals for the 12<sup>th</sup> Plan are (i) Reduction of Maternal Mortality Ratio (MMR) (ii) Reduction of Infant Mortality Rate (IMR) (iii) Reduction of Total Fertility Rate (TFR) (iv) Prevention and reduction of underweight children under 3 years (v) Prevention and reduction of anemia among women aged 15-49 years (vi) Raising child sex ratio in the 0-6 year age group from 914 to 935 (vii) Prevention and reduction of burden of diseases – Communicable, Non Communicable (including mental illnesses) and injuries (viii) Reduction of households' out-of-pocket expenditure from 71% to 50% of total health care expenditure.<sup>3</sup>

#### **Towards Comprehensive Health Care<sup>4</sup>**

The Twelfth Plan must re-strategize to achieve faster progress towards the eight goals listed above, it must also define its health care strategy more broadly. The NRHM has focussed heavily on child birth and pre-natal care. It must however expand to a more comprehensive vision of health care, which includes service delivery for a much broader range of conditions, covering both preventive and curative services. The Twelfth Plan will prioritize convergence among all the existing National Health Programs under the NRHM umbrella, namely those for Mental Health, AIDS control, Deafness control, Care of the Elderly, Information, Education and Communication, Cancer Control, Tobacco Control, Cardio Vascular Diseases, Oral health, Fluorosis, Human Rabies control, Leptospirosis. Other innovative management reforms within health delivery systems with a view to improve efficiency, effectiveness and accountability will be encouraged.

The effectiveness of a healthcare system is also affected by the ability of the community itself to participate in designing and implementing delivery of services. The opportunity to design and manage such delivery provides empowerment to the community as well as better access, accountability and transparency. In essence, the healthcare delivery must be made more consultative and inclusive.



### **This can be achieved through a three dimensional approach of**

- (1) Strengthening PRIs/ULBs through improved devolution and capacity building for better designing and management
- (2) Increasing users' participation through institutionalized audits of health care service delivery for better accountability and
- (3) Bi annual evaluation of this process by empowered agencies of civil society organizations for greater transparency.

The Twelfth Plan must break the vicious cycle of multiple deprivations faced by girls and women because of gender discrimination and under nutrition. This cycle is epitomized by continued deterioration in the sex ratio in the 0-6 year age group, revealed by the Census 2011; by high maternal and child mortality and morbidity, and by the fact that every third woman in India is undernourished (35.6 per cent have low Body Mass Index) and every second woman is anaemic (55.3 per cent). Ending gender based inequities, discrimination and violence faced by girls and women must be accorded the highest priority and these needs to be done in several ways such as achievement of optimal learning outcomes in primary education, interventions for reducing under nutrition and anaemia in adolescent girls and providing maternity support.

### **Health Infrastructure**

One of the major reasons for the poor quality of health services is the lack of capital investment in health for prolonged period of time. The National Rural Health Mission had sought to strengthen the necessary infrastructure in terms of Sub Centres, Primary Health Centres and Community Health Centres. While some of the gaps have been filled, much remains to be done. According to the Rural Health Statistics (RHS), 2010, there is shortage of 19,590 sub centres; 4,252 PHCs and 2,115 CHCs in the country.

It is essential to complete the basic infrastructure needed for health delivery in rural areas by the end of the Twelfth Plan. This will require substantial Plan assistance to the states for infrastructural development including upgrading existing PHCs and CHCs to IPHS norms, building labour rooms and Operation Theatres, which are critical to reducing maternal mortality and also building new PHCs. Government diagnostic services will have to be strengthened at the block and

district levels. This would require not only infrastructural upgrades but also adequate human resource support and well developed service delivery protocols. States also lack infrastructure for ancillary services like drug storage and warehousing, medical waste management, surveillance and cold chain management. Such facilities will have to be ensured at the District level.

District Hospitals need to be greatly strengthened in terms of both equipment and staffing for a wide range of secondary care services and also some tertiary level services. New medical and nursing colleges should preferably be linked to district hospitals in underserved states and districts, ensuring that districts with a population of 25 lakhs and above are prioritized for establishment of such colleges if they presently lack them.

The network of expanded Sub Centres, and fully functional PHCs and CHCs would be effective as a system only if prompt services for transportation of referred cases are available. The existing 1084 Mobile Medical units will be expanded to have a presence in each CHC. Mobile Medical Units may also be dedicated to certain areas which have a marked presence of moving populations. It will have to be ensured that each Mobile Medical Unit has requisite emergency equipment, drugs, basic diagnostics and a trained paramedic assigned to it. The possibility of transferring the Mobile Medical units to the Fire Brigade department, as is the practice in many developed nations, will be explored.

### **Human Resources for Health<sup>5</sup>**

Lack of human resources is as responsible for inadequate provision of health services as lack of physical infrastructure, especially in rural areas. According to Rural Health Statistics (RHS), 2010, there is shortage of 2,433 doctors at PHCs (10.27 per cent of the required number); 11,361 specialists at CHCs (62.6 per cent of the required number); and 13,683 nurses at PHCs and CHCs combined (i.e., 24.69 per cent of the required number). In addition 7,655 Pharmacists and 14,225 Laboratory Technicians are needed at PHCs & CHCs (27.13 per cent and 50.42 per cent of the required number) in the country.

The status of Human Resources for Health (HRH) has improved during the 11<sup>th</sup> Five year plan period, however much more needs to be done. The density of doctors in India is 0.6 per 1,000 and that of nurses and midwives is 1.30 per 1,000, representing jointly 1.9

health workers per 1,000. While no norms for Health Human Resource have been set for the country, if one takes a threshold of 2.5 health workers (including midwives, nurses, and doctors) per 1,000 population, there is shortage of health workers. Furthermore, because of a skewed distribution of all cadres of health workers, the vulnerable populations in rural, tribal and hilly areas continue to be extremely underserved.

The Twelfth Plan must therefore ensure a sizeable expansion in teaching institutions for doctors, nurses and paramedics. Only 193 districts of a total of 640 have a medical college – the remaining 447 districts do not have any medical colleges. Further, the existing teaching capacity for creating paramedical professionals is grossly inadequate. Against 335 medical colleges, there are 319 ANM training schools, 49 Health and Family Welfare Training Schools and only 34 LHV training schools. To fill the gap in training needs of paramedical professionals, the Twelfth Plan proposes to develop each of the District Hospitals (635) into knowledge centres, and CHCs (4535) into training institutions.

The ongoing initiatives for integrating AYUSH and capacity development of other traditional health care providers such as Registered Medical Practitioners (RMPs) and Traditional Birth Attendants (TBAs) must be strengthened. Positive traditional care practices and local remedies should be encouraged. Efforts will be made to improve the working conditions and remuneration of frontline workers both contractual and regular and build positive environments which will reduce their sense of isolation.

### **Publicly Financed Healthcare**

Public financing of healthcare does not necessarily mean provision of the service by public providers. It is possible to have public financing while the service itself is provided by private sector players, subject to appropriate regulation and oversight. This type of partnership is common in many areas, but its scope has not been fully explored in the health sector. However, a number of experiments are now in operation which allow for private sector participation. At the Central level, the Rashtriya Swasthya Bima Yojana (RSBY) is a health insurance scheme available to the poor and other identified target groups where the Central Government and the State Governments share the premium in the 75:25 ratio. The service is

provided on a cashless basis by accredited government and private sector hospitals, which are reimbursed on a predetermined basis. In several Central Government hospitals, pathology and radiology services are outsourced to private providers. State Governments are also experimenting with various types of (Public Private Partnership) PPP arrangements which at times also include actual provision of healthcare by private practitioners. PPP as a mode to finance healthcare services, if properly regulated can be of use to the intended beneficiaries. However, care needs to be taken to ensure proper oversight and regulation including public scrutiny of PPP contracts in the social sector to ensure freedom from potential conflicts of interest and effective accountability

Any social security system must aim at providing some basic Universal Health Care. The Twelfth Plan will explore the possibilities of introducing a government funded health insurance plan for every citizen along the lines of the RSBY, which is currently limited to the poor and for certain select groups. Insurance under the plan will focus on both preventive and curative services.

### **Child Nutrition and Restructuring ICDS**

The ICDS is a 35 year old programme aimed at nutrition and pre school education. It can play a major role in affecting nutrition and therefore health outcomes, though as presently conceived, it has flaws. It focuses mainly on children in the age group of 3 to 6 years who actually attend anganwadis, whereas the greatest need for nutritional support is in the age group of 0-3 years. The programme needs to be radically restructured to focus on reaching pregnant and lactating mothers, and also the more vulnerable children in the 0-3 age group. Restructuring should promote decentralisation of administration, and laying stress not only on expansion, but also on quality.

The Twelfth Plan provides an opportunity of bringing together the world's largest health and child care systems through flexible frameworks that ensure a continuum of care with normative standards, while responding to local needs at village and habitation levels. Convergent action over the next plan period will translate this vision into programmes that will touch the lives of all citizens, meet their expectations and also fulfilling their rights – particularly the rights of women and children in the communities, where they live and grow.

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# Effect of Pranayams and Meditation on Autonomic Cardio-Respiratory Variables in Normal Healthy Volunteers

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## ABSTRACT

**Background:** Yogic techniques produce consistent physiological changes in the body and have sound scientific basis.

**Aims and objectives:** The present study was designed to study the effect of pranayams and meditation on heart rate, blood pressure, respiratory rate and 40 mm endurance test.

**Material and Methods:** This study was done in Santosh Medical College, Ghaziabad. Ethical approval was taken from the research committee of the Institution. Fifty healthy male volunteers in the age group of 20-30 years were recruited for the study. Pranayams and meditation was done under yoga expert's supervision for 3 months. Cardio-respiratory parameters were recorded before and after 3 months of yoga training. ECG was done using RMS (Chandigarh) machine. Heart rate was calculated from the RR interval in lead II. Both systolic and diastolic blood pressure were measured by auscultatory method with the help of mercury sphygmomanometer. Respiratory rate was counted for full one minute in resting supine position. 40 mm endurance test was conducted by asking the subject to take in, a full breath and blow against the mercury column of sphygmomanometer, to the pressure of 40mm Hg, maintaining it as long as possible. The time for which the student could maintain the mercury level at 40mmHg was noted. Rate pressure product was calculated as  $HR \times SBP / 100$  (mmHg/min).

Statistical analysis was done by ANOVA with SPSS version 17.0 using paired 't' test. Results: Results showed that there was significant decrease in the heart rate, SBP, DBP, PP, MBP, RR and significant increase in 40 mm endurance test after 3 months of pranayams and meditation.

**Conclusions:** Pranayams and meditation are of beneficial value in improving the cardio-respiratory efficiency.

**Keywords:** Pranayams, Meditation, Blood Pressure, Rate Pressure Product

## INTRODUCTION

Yoga, the ancient practice of postures, breathing and meditation, is gaining a lot of attention, as its therapeutic aspects are being explored<sup>1</sup>. Man is subjected to stress and stress related problems like essential hypertension, angina, psychoneurosis, gastric ulcer, asthma and insomnia<sup>2</sup>. In this modern era of stress, yoga has health promoting effects. Moreover, it is free from deleterious effects of drug therapy<sup>3</sup>. Health and physical fitness depends highly on cardio-respiratory efficiency of an individual. Yogic exercises have been found to be beneficial for better maintenance of bodily functions, even in normal healthy

subjects<sup>4</sup>. Pranayams or yoga breathing is the science of breath control<sup>5</sup>. Different types of pranayams produce different physiological responses in normal young volunteers<sup>6,7</sup>. Meditation is a yogic process of providing deep rest to the system by allowing the mind to calm down its basal states<sup>8</sup>. Udupa et al<sup>9</sup> showed that pranayams training produces a decrease in basal sympathetic tone and increases parasympathetic activity<sup>6</sup>. During 'OM' meditation, there was a significant reduction in heart rate as compared to the control group in which non-targeted thinking was encouraged<sup>10,11</sup>. The present study was aimed to see that pranayams and meditation modulate cardio-respiratory autonomic variables.

## MATERIAL & METHOD

The present study was conducted in Santosh Medical College; Ghaziabad. Ethical approval was taken from the research committee of the Institution. Fifty healthy male volunteers in the age group of 20-30 years were randomly selected for the study. Informed consent was taken from all the subjects.

Subjects who were trained in yoga before, with h/o any chronic illness, h/o diabetes, hypertension, or on any medication & smokers were excluded from the study.

Anthropometric parameters like age, sex, height, weight were recorded. Body mass index (BMI) was calculated as weight (kgs)/height (metre<sup>2</sup>).

Each subject was asked to lie down comfortably in supine position for 10 minutes. After 10 minutes of rest, ECG was done using RMS(Chandigarh) machine. Heart rate was calculated from the RR interval in lead II.

Resting blood pressure was recorded by auscultatory method with a mercury sphygmomanometer (Diamond) in mmHg. First Korotkoff sound indicated systolic blood pressure (SBP) and fifth Korotkoff sound indicated diastolic blood pressure (DBP). Three BP recordings were taken at 5-minutes interval and the lowest of these was considered for the calculations. Pulse pressure (PP) was calculated as SBP-DBP. Mean blood pressure was calculated as  $(PP+1/3DP)$ . Rate pressure product, an index of myocardial oxygen consumption was calculated as  $HR \times SBP/100$ .

Respiratory rate was counted for full one minute in resting supine position.

40 mm endurance test was conducted by asking the subject to take in, a full breath and blow against the mercury column of sphygmomanometer, to the pressure of 40mm Hg, and maintaining it as long as possible. The time for which the student could maintain the mercury level at 40mmHg was noted. The lips were secured tightly around the mouthpiece with the help of fingers to ensure that there is no leak. Care was taken to see that the subject did not use oral muscles or tongue to develop pressure or block the tubing<sup>12</sup>.

After recording of these parameters, pranayams and meditation training was given to all the subjects by a trained yoga expert for 15 days and then the

subjects performed pranayams and meditation under the yoga expert's guidance.

All the subjects were allowed to relax and get accustomed to the surroundings for 15 minutes before starting pranayams and meditation.

The yoga training consisted of

Prayer-10 minutes

Pranayams-40 minutes

Meditation-10 minutes

The different types of pranayams practiced were<sup>13</sup>

1. Vibhagiya pranayams (sectional breathing)
  - Adama (Kanista) Vibhagiya pranayams (diaphragmatic breathing)
  - Madhyama Vibhagiya pranayams (thoracic/intercostals breathing)
  - Aadya (Jesta) Vibhagiya pranayams (upper lobar/clavicular breathing)
  - Poorna mudra pranayams (Full yogic breathing)
2. Nadishuddi pranayams (Alternate nostril breathing)
3. Kapalabhati Kriya (cleansing breath)
4. Bahya pranayams (external breathing)
5. Cooling pranayams

### Sitali pranayams

### Sitkari pranayams

After completing three months of pranayams and meditation, all the above parameters were reassessed.

## RESULTS

Results were analysed by ANOVA with SPSS version 17.0 using paired 't' test

**Table 1. Anthropometric Parameters of Normal Healthy Male Volunteers**

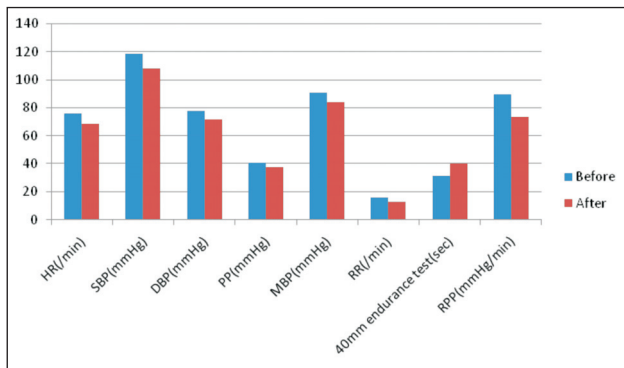
Variables	Mean±SD
Age (years)	26.43±2.23
Height (cms)	165.02±2.11
Weight (kgs)	60.12±3.43
BMI(kg/m <sup>2</sup> )	21.93±1.41

**Table 2: Statistical analysis of SBP, DBP, PP, MBP, RR, 40mm endurance test & RPP of before and after the 3 months of pranayams and meditation**

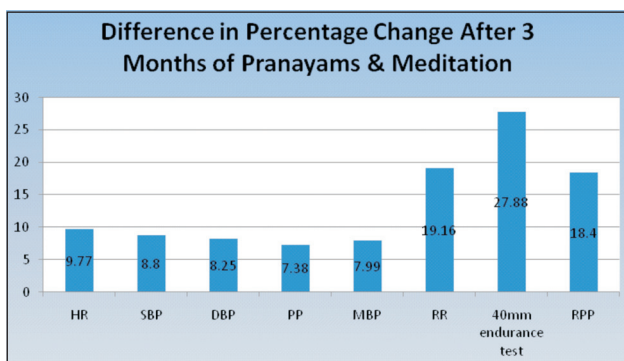
Parameters	Mean ±SD(Before)	Mean ±SD(After)	'p' value
Heart Rate(beats/min)	76.23±3.18	68.78±1.42	<0.001
SBP(mmHg)	118.88±3.34	108.42±2.52	<0.001
DBP(mmHg)	78.12±2.42	71.67±3.28	<0.001
PP(mmHg)	40.76±2.02	37.75±1.76	<0.001
MBP(mmHg)	91.23±3.18	84.48±2.42	<0.001
RR(breaths/min)	16.23±1.47	13.12±2.81	<0.001
40mm endurance test(sec)	31.53±3.46	40.32±2.41	<0.001
RPP(mmHg/min)	89.96±2.11	73.41±2.53	<0.001

Data presented in Table 2 shows that there was a significant decrease in the HR, SBP, DBP, PP, MBP, RR, rate pressure product (p<0.001) and significant increase in 40mm endurance test (p<0.001) after 3 months of pranayams and meditation.

volunteers, there was significant decrease in heart rate (9.77%), systolic blood pressure (8.8%), diastolic blood pressure (8.25%), pulse pressure (7.38%), mean blood pressure (7.99%), respiratory rate (19.16%) and respiratory pressure product (18.4%). Percentage change (increase) in 40 mm endurance test was more (27.88%) as compared to other cardio-respiratory variables.



**Fig. 1. Bar Diagram Showing HR, SBP, DBP, PP, MBP, RR, 40mm endurance test & RPP before and after the 3 months of pranayams and meditation**



**Fig. 2. Percentage change in HR, SBP, DBP, PP, MBP, RR, 40mm endurance test & RPP after 3 months of pranayams and meditation in normal male healthy volunteers**

\*Percent value was calculated by taking parameters before pranayams and meditation as 100%

It is evident from Fig 2 that after 3 months of pranayams and meditation in normal male healthy

### DISCUSSION

The purpose of the study was to determine whether the pranayams and meditation training modifies the cardio-respiratory responses. Results of the present study showed a significant decrease in the SBP, DBP & MBP in the normal healthy volunteers. The essence of pranayams practice is slow and deep breathing. Slow breathing induces a generalized decrease in the excitatory pathways regulating respiratory and cardiovascular systems. As respiratory and cardiovascular has similar control mechanisms, alteration in one system will modify the functioning of the other<sup>14</sup>. During pranayams practice, concentration is on the act of breathing which diverts attention from worries, and “de-stresses”. This stress-free state of mind evokes relaxed responses in which parasympathetic activity overrides sympathetic activity<sup>15</sup>. Diastolic blood pressure depends upon peripheral resistance. Lung inflation decreases systemic vascular resistance. Pranayams increases the frequency and the duration of the inhibitory neural impulses by activating the pulmonary stretch receptors which brings about withdrawal of sympathetic tone in skeletal muscle blood vessels leading to widespread vasodilatation, thus bringing up decrease in peripheral resistance<sup>16,17,18</sup>. During voluntary expiration, the intra-thoracic pressure increases and blood from the lungs is squeezed into the heart, leading to an increase in the stroke volume, the baroreceptors in the carotid sinus experience more

pressure and discharge more. The increase baroreceptor discharge inhibits the tonic discharge of the vasoconstrictor nerves and excites the vagus innervations of the heart, thus producing vasodilatation, a drop in blood pressure and bradycardia<sup>19</sup>. Pramanik et al found a decrease in the heart rate and blood pressure after the bhramari and bhastrika pranayams<sup>20,21</sup>.

Meditation reduces stress-induced sympathetic over activity by modifying the anxiety state therefore decreasing the peripheral resistance which results in decrease of diastolic blood pressure and heart rate<sup>22</sup>. It has been reported that with the regular practice of yoga, there is improvement in baroreflex sensitivity and decrease in the sympathetic tone, restoring blood pressure to near normal levels in patients of essential hypertension<sup>23,24</sup>.

Results of the present study were similar to that of Ankad<sup>8</sup> et al who reported that there was significant reduction in the PR,SBP, DBP &MBP after 15 days of pranayams and meditation, but the present study also assessed respiratory parameters. Our study showed reduction in the heart rate which is similar to the findings of Telles S et al<sup>25</sup>.

RPP<sup>26</sup> which is an index of myocardial oxygen consumption and the load on the heart, decreased significantly after three months of yoga training. Madanmohan et al showed that pranayams training resulted in a decrease in oxygen consumption, the metabolic rate and the load on the heart<sup>3</sup>.

Our study showed significant reduction in respiratory rate and the findings are similar to that of Joshi and Telles et al<sup>27,28</sup>. Pranayams training modifies the basic activity of bulbopontine reflex to slow down its rhythm by voluntarily prolonging the phases of inspiration and expiration by stretching to their fullest extent. Thus making the lungs to work maximum to take oxygen and expire carbon dioxide maximally<sup>27,29</sup>.

The present study showed significant improvement in 40 mm endurance test and the results are consistent with the studies of Madanmohan et al and Chibber et al. Pranayams increases 40 mm endurance time by decreased responsiveness of respiratory centre to carbon dioxide and produces a wakeful hypometabolic state of the body characterized by decreased oxygen consumption and decreased carbon dioxide production<sup>30,31</sup>.

## CONCLUSIONS

Pranayams and meditation are of beneficial value in increasing the cardio-respiratory efficiency. Thus these pranayams and meditation practices can be advised to the patients with respiratory insufficiency, hypertension and stress under yoga expert's guidance along with medical therapy.

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# Frequency Distribution of ABO Blood Group and Rh Factor among the Local Domiciles of East Midnapore District, West Bengal

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## ABSTRACT

Since the discovery of ABO blood group system by Landsteiner a voluminous data is available on the frequencies of ABO blood group and also Rh factor for most parts of the world but such type of data among the localities of East Midnapur is still lacking. The present study is undertaken to find out the normal ABO and Rh frequencies among the localities of East Midnapore.

A total of 2256 domicile individuals from East Midnapore district are selected from the BDS students, staffs of the Dental colleges and local domicile population reported to the pathological laboratory of our associated hospital (Dr. B. C. Roy Hospital) for blood group determination. Blood sample were collected under aseptic condition by venepuncture from the antecubital vein. The ABO blood group and Rh factor are determined immediately after blood collection using the Tile or Slide testing. It is found that the most common type of blood group is B type followed by O, A and then AB. The prevalence of Rh positive population in East Midnapore is considerably higher than the Rh negative individuals like other parts of India.

**Keywords:** Prevalence of Blood Group, Mismatching of Blood

## INTRODUCTION

Since the discovery of ABO blood group by Lansteniner in 1901<sup>1</sup> and Rh system by Landsteniner and Wiener <sup>2</sup> in 1941 it is found that in human beings ABO blood group system is divided into 4 types i.e. Blood group A or B or O or Blood group AB and Rh + or Rh -, though the frequency distribution of specific types of blood group differs in different parts of the world and also differs in different races. Even in India the incidence of ABO and Rh blood group varies very markedly in different areas reflecting racial differences<sup>3,4</sup>. Whereas the need for blood group prevalence study is not only important due to understanding of the group of diseases due to mismatching of the blood but also used in anthropology to study the racial classifications of human population. The regularity of inheritance of

these various blood group systems has also made them most widely used tool in the study of human genetics and also in the solution of problems of identity, percentage and paternity. Though there are few attempts to study the distribution of ABO blood groups among the local population in Midnapore but those are mostly restricted to the local tribes only and not based on general population. So the present study is undertaken to find out the normal ABO and Rh frequencies among the local domiciles of East Midnapore and to compare our result with other studies conducted in different parts of India which may help in

1. The management of blood bank and transfusion services in this area.
2. Establishing possible association of various diseases like cardiovascular disorders, cancers, peptic ulcers etc. with blood group in the said population living there.
3. In anthropological study of racial classification of said population and also in solution of problems of identity, percentage and etc.

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## MATERIALS AND METHOD

A total of 2256 domicile individuals of both sexes from East Midnapore district are selected from the BDS students, staffs of the Dental colleges and also local domicile population reported to the pathological laboratory of our associated hospital (Dr. B. C. Roy Hospital) for blood group determination. The study was approved by the Institutional Ethical Committee.

Blood sample were collected under aseptic condition by venepuncture from the antecubital vein. The ABO and Rh factor are determined immediately after blood collection using the Tile or Slide testing method<sup>5</sup> using commercially prepared antisera-A, antisera-B and antisera-D (Span Diagnostics Ltd. Surat, India). The blood groups were determined on the basis of agglutination (under light microscope as and when required). As per the standard protocol the result was expressed as percentage which is considered as frequency distribution of each ABO blood group and Rh factor. The significance of difference between the observed frequency and the expected (Reference

frequency) if any is done by Chi Square test<sup>6</sup>.

## FINDINGS

The frequency pattern of ABO and Rh blood group of male and female studied population is shown in Table-I. It is found that amongst the studied population the B blood group is most common in both sexes followed by Group O, Group A and then Group AB. Statistical analysis by Chi Square test reflects that the observed frequency distribution does fit to the expected i.e. reference frequency distribution or in otherwise there is no significant difference between the observed frequency distribution and reference frequency distribution. It is also found that the frequency distribution of Rh positive individuals is comparatively more in both male and female population than the Rh negative individuals and the Rh negative population in East Midnapore is significantly lower than that of other countries but matches with that of reference distribution of other Indian provinces.

**Table I: Distribution of ABO blood group & Rh factor**

Blood Group	Male (N=1406)		Female(N=850)		Total (N=2256)	
	Absolute value	% age	Absolute value	% age	Absolute value	% age
B	522	37	352	41	853	38
O	464	33	248	29	723	32
A	336	24	156	18	498	22
AB	84	6	94	11	182	8
Rh +	1294	92	824	97	2120	94
Rh -	112	8	26	3	136	6

**Table II: Comparative table of ABO blood group & Rh factor in percentage**

Countries	A	B	O	AB	Rh+	Rh-
Great Britain	42	9	47	3	83	17
USA & Western Europe	41	9	46	4	85	15
Central & eastern Europe	45	11	40	4	89	11
Australia	44	9	46	4	85	15
India (mixed)	18	33	39	10	95	5
Pakistan	28	32	30	10	90	10
Tamils( Bais & Verhoef,1928)	23	31	38	8	94	6
Jats (Punjab & Hariyana) (Malone & Lahiri, 1929)	25	35	33	7	88	12
Bengalees (Choudhuri 1936)	21	32	38	8	95	5

## DISCUSSION & CONCLUSION

The frequency of ABO and Rh blood group varies in different population throughout the world though the blood group O is the most common. The frequency of A blood group is 2<sup>nd</sup> largest among Americans<sup>7</sup>, Western Europeans<sup>8</sup>, Central and South Americans,

Australians and Central and Eastern Europeans<sup>9</sup>. Whereas the frequency of B type of blood group is 2<sup>nd</sup> largest in Asian countries like China<sup>10</sup>, India<sup>3</sup>, Pakistan<sup>11,12,13</sup>, Singapore<sup>10</sup> etc. It is also reported that the prevalence of different blood group in different parts of India varies. The frequency of blood group B is highest among the Brahmins and Rajputs of

Himachal Pradesh followed by O, A and then AB<sup>4</sup>, whereas in South India O group was found to be most common followed by B, A, AB<sup>3</sup>. In our study also it is revealed that the frequency distribution of B blood group is highest among the population of East Midnapore unlike other parts of India and even Bengalis<sup>14,15,16</sup> as shown in the Table- II. This higher frequency of B blood groups may be due to more Dravidian admixture among the population of East Midnapore<sup>17</sup>. The prevalence of other blood groups are respectively O, A followed by AB. Similarly the prevalence of Rh<sup>+</sup> blood group individuals are more than the Rh<sup>-</sup> individuals like that of other parts of the country.

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# Health Impact Assessments in India: Exploring a Possible Community Health Policy Innovation

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## ABSTRACT

India is now beginning to use Health Impact Assessments (HIAs) to better understand the health impacts of environmental projects. In this paper we analyze how Health Impact Assessments are executed in India and explore the feasibility of expanding the implementation and impacts of HIAs in India. Observations made in this paper regarding India's implementation of HIAs include: non-government organizations (NGOs) play a significant role in executing HIAs, powerful Environmental Impact Assessments (EIA) context frames how HIAs are conducted, and, the need for more preventative HIA investigations that take a closer focus on "community health" issues.

*Keywords:* Health Impact Assessment (HIA), Environmental Impact Assessment (EIA), Community Health

## INTRODUCTION

It is standard community health practice to prevent the occurrence of harmful health outcomes and to mitigate the damage created by negative health events. This is especially true in large population countries like India where it is more cost-effective to address health needs early when they are operating at a more manageable scale than when they widen to a regional or nation-wide health care disaster. HIA (Health Impact Assessment) is an assessment process that can inform health policy and decision-makers on how to maximize the benefits of development and policy decisions and minimize their negative impacts on health.<sup>3</sup> An HIA is a combination of procedures, methods, and tools that generates evidence about the health impacts of proposed (and existing) policies and projects on specific populations.<sup>4</sup> The Health Impact Assessment process actively integrates local residents in the research and assessment of projects and policies that have a direct impact on their health and well-being.<sup>5</sup>

In this paper we assess the current practice on how HIAs are executed in India and identify next-step innovations that can expand the health impact to this procedure. The paper is divided into four parts. We begin with an introduction to HIAs and outline how they work. In part two we establish the three most common HIA models used around the world. This is

followed with the presentation of our research findings of HIA investigations completed in India. The paper concludes with a discussion on the future of HIAs in India and how they can have a greater health impact on local residents.

### Introduction to HIAs

The Health Impact Assessment process has been extensively used throughout the world since 1999 and is actively promoted by the World Health Organization (WHO).<sup>4</sup> It takes a very broad definition of health by looking at economic, environmental, social, and psychological factors.<sup>5</sup> The HIA process is divided by WHO into five sequential steps. They are: 1.) Screening — the process of determining if an HIA is needed, 2.) Scoping — activity that goes into identifying people responsible for conducting the HIA and developing a work plan, 3.) Appraisal — the actual process of doing the research, 4.) Reporting — the conclusion of the Assessment step and where recommendations are made and the final report is produced, and 5.) Monitoring — overall assessment of the recently completed HIA.

An HIA is characterized by how much time is needed to conduct the assessment ("Level") and when the assessment is conducted in relation to the timing of the identified policy or project ("Types").<sup>6</sup> The Level of an HIA is determined by a careful balance between

the size of the situation that needs to be assessed to how much resources are available to conduct the study. There are three Levels of HIAs: *Rapid* (short term, usually one to two days investigation), *Intermediate* (a more detailed study that can take several weeks), and *Comprehensive* (the most detailed study that will take at least one year to complete). Determining the Type of an HIA is mostly a function of when it is the most realistic time to execute the investigation. There are three Types of HIAs: *Prospective* (the assessment takes place before a program/policy is implemented), *Concurrent* (the assessment is conducted while the program/policy is in place), and *Retrospective* (the assessment is conducted after the program/policy is completed).

### International HIA Context

A meta analysis study of HIAs conducted by Gaber and Overacker <sup>7</sup> found that there are clear variations in the way a public HIA is taken up in different countries. In their review of over 120 HIAs conducted around the world from 1999 to 2011, they found three general approaches to HIA projects that are personified by three countries: Australia, United Kingdom, and the United States. As shown in Table 1, the way HIAs are carried out in each country is very distinct. Australia tends to pursue Intermediate HIAs that are conducted before a project has begun (Prospective) and tends to focus on Land Use topics that are usually conducted through a joint government / university partnership. In the United Kingdom, their investigations are more likely to be Rapid HIAs that are conducted before a project has begun (Prospective), and tend to focus on Human Service topics that are evenly authored by either the government or a university. The United States overwhelmingly pursues Comprehensive and Prospective HIA projects that focus on Human Service topics and are more often than not authored by a university.

Among the differences in how Australia, United Kingdom, and United States conduct their investigations, they all share three HIA characteristics. First, HIAs in these three countries were usually conducted before a project was started (Prospective). Here, HIAs are clearly seen as a way to prevent or mitigate the possible health impacts of a proposed project. Second, the HIA's were topically more likely to look at human service and land use projects with little focus on environmental topics. This makes sense because the Environmental Impact Assessment (EIA) process is very well established in all three of these

countries providing little need to re-assess environmental projects with an HIA investigation. In short, HIA's in Australia, United Kingdom, and United States are firmly grounded within a community health approach. Lastly, NGOs are not heavily involved in conducting HIAs in Australia, United Kingdom, and the United States. Both governments and universities (and a combination of the two) have been major powerhouses in conducting HIAs in these countries. As will be shown in the following section, how HIAs are conducted in India is very different from these three international norms.

**Table 1. HIA Strategies in Australia, United Kingdom and United States (\*)**

Variable	Country		
	Australia	United Kingdom	United States
<b>Level</b>			
Comprehensive	21%	29%	60%
Intermediate	53%	21%	20%
Rapid	26%	50%	20%
<b>Type</b>			
Prospective	72%	69%	76%
Concurrent	11%	13%	14%
Retrospective	0	8%	0
Combination	17%	10%	10%
<b>Focus</b>			
Environmental	9%	13%	11%
Human Service	36%	52%	47%
Land Use	55%	35%	42%
<b>Authorship</b>			
Government	8%	35%	23%
Govt./NGO	0	3%	5%
Govt./Univ.	27%	10%	5%
NGO	10%	12%	19%
NGO/Univ.	5%	3%	5%
University	16%	37%	43%
<b>General Profile</b>			
Level	Intermediate	Rapid	Comprehensive
Type	Prospective	Prospective	Prospective
Focus	Land Use	Human Service	Human Service
Author	Govt./Univ.	Govt. & Univ.	University

\* Total number reviewed HIAs per country: Australia, n=22,

United Kingdom, n=61, and United States, n=21. The combination of the three countries constitute a little over 66% of the total number of reviewed HIAs (N=129).

### INDIA'S HIA MODEL

Executing a national health care policy in India is extremely difficult due to the fact that it is a very populous country combined with a very dispersed

settlement pattern with more than half of its residents living in small villages with populations of 1,000 to 2,000 persons.<sup>8</sup> The public health system is based on the concept of reaching out to the rural populations and women in traditional rural villages through the local para medical staff appointed by the government within the public health system. This is instituted by the National Rural Health Mission (NHRM) which provides for a three tier structure based on the population numbers. Thus, for a population of 5,000 people in plain areas and 3,000 people in hilly/tribal or difficult areas, a *sub centre* is instituted. For a 30,000 population in plain areas and 20,000 population in tribal/hilly/difficult areas there is to be a *primary health centre* (PHC) and for a 120,000 population in plain areas and 80,000 population in hilly/tribal/difficult areas a *community health centre* (CHC) is to be instituted.<sup>9</sup> The hardships of rural areas and remote distance result in a lack of both adequate medical facilities and easy and timely access to medical services. There is a shortfall of approximately 10% sub centres, 11% PHCs and 50% CHC.<sup>9</sup>

India's path to HIAs has been made via the Environmental Impact Assessment (EIA) route. This is a function of 40 years of steady evolving national environmental policy (1972 Wildlife Protection Act, 1974 Water Act, 1976, first EIA being conducted, and 1981 Air (Prevention and Control of Pollution) Act) in comparison to the 29 years of national health policy (1983 National Health Policy). India's national public health policy is relatively new and is still evolving. With India having limited national health resources, Non-Government Organizations (NGOs) play a significant role in helping meet the overwhelming community health needs. In this context, the designing of programs that address health issues is still in its nascent stage.

India's environmental path to HIAs is not uncommon. The "environmental impact assessment approach to HIAs" is one of the most common HIA approaches pursued by countries.<sup>10</sup> Unfortunately, India's "EIA-influenced" approach to HIAs comes at the cost of limiting the type of projects that are taken on; the type of data slices that are integrated in the assessments; and, providing fewer opportunities for impacted local residents and relevant stakeholders to have a voice in the final report.<sup>11</sup> Even after the case of the Bhopal gas tragedy in 1984 when poisonous gases accidentally leaked out of the Union Carbide Factory which severely impacted the health of many people and their generations for life, India went back to their

strong environmental past with the passing of the Environmental Protection Act in 1986.<sup>12</sup> It is at this juncture of the "EIA-influenced" health impact assessment approach that provides the context to India's approach to HIAs.

### **Analysis of India's HIA Case Studies**

HIA's are just starting to be implemented in India. Our search for HIA projects conducted in India only resulted in five public HIA studies. This is largely because of the limited awareness and knowledge about HIAs and because it is not a mandatory process by the government for community health project development and formulation of policy.

The general profile of India's HIA implementation strategy is very different from the previously identified three international trends. (See Table 2.) Somewhat like the United States, the Level of HIA projects in India tend to be large-scale investigation with 3 out of 5 studies being conducted at the Comprehensive scale. However, unlike the United States that mostly focuses on human service projects, India's HIAs focus exclusively on the health impacts of large environmental projects. A good example of this is the health impact assessment of aluminum smelters in Orissa, India that has a total population of more than 41 million residents.

The Retrospective timing of when HIAs are conducted in India is diametrically opposed to major international HIA trends. This is made more striking in light of the fact that both Australia and United States did not have a single Retrospective HIA show up in their sampled populations. At this point, India's HIA measures are used to address community health problems through a redress mechanism. India's retrospective application of HIAs is not the best use of limited community health resources. It is always more cost effective to engage in health policy practices that prevents unwanted health outcomes than it is to mitigate the health damages created by past policy decisions. An example of this is the health impact assessment and remediation strategies of fly ash on the affected population in Kanpur, India.

All of the sampled HIAs are conducted with an environmental focus. The single-minded environmental focus is another factor that significantly differentiates the implementation of HIA's in India from how they are more commonly applied around the world. It is no surprise that HIAs in India are currently subsumed within Environment Impact

Assessment (EIA) procedure. The EIA processes in India are more widely used and are mandated by the government while HIAs are not. In addition, the nation's health care policy is not as developed as its environmental policy which further pushes HIAs within the rubric of an EIA.

**Table 2. Summary of the HIA Studies from India**

Title	Level	Type	Focus	Authorship
Environmental and health impact assessment due to coal mining in East Parej and North Karampura coal field of Jharkhand state, India - a case study (not dated but after 1997) <sup>13</sup>	Rapid	Retrospective	Coal-based industry	Non-government
Assessment of impact of environmental population on human health in the city of Jodhpur, Rajasthan (2004) <sup>14</sup>	Comprehensive	Retrospective	Environmental pollution	Non-government
Ecological, socio-economic and health impact assessment due to aluminum smelters: a case study of Hindalco in Orissa (2006) <sup>15</sup>	Intermediate	Retrospective	Aluminum extraction	Non-government
Health Impact Assessment and remediation strategies of fly ash on the affected population in Kanpur, India (2007) <sup>16</sup>	Comprehensive	Retrospective	Thermal power plant	Non-government
Health Impact Assessment (HIA) of development projects with reference to mosquito-borne diseases (2008-2009) <sup>17</sup>	Comprehensive	Retrospective	Dam projects (Sardar Sarover, Bargi, Indira Sagar) and Konkan railway project	Quasi-government

The authorship of India's HIAs are mainly (4 out of 5) by non-government organizations (NGOs) with one study by a quasi-government organization. NGOs have close contacts with local members in the community and use the HIA as a tool which makes for easy project conceptualization. This 'being in touch' with the community by the non-government organizations has also been a strong factor in making HIA a non-profit sector initiative in India.

## CONCLUSION

### Next-step HIA innovations in India

What is needed now in India is the strengthening of the community health perspective in HIAs within the EIA process. There are three next-step measures that national and local India health officials can execute to advance the health impact to their HIA investigations. First, explore the application of shorter term levels of HIAs. Shorter HIAs (intermediate or rapid) consume fewer resources than comprehensive studies and take less time which makes them more manageable to execute and provides more immediate health data to impacted residents. Second, move up the application of HIAs in the decision-making process

to the Prospective time frame. Again, it is more cost-effective to prevent future community health problems than to mitigate existing community health problems. Lastly, continue to actively encourage NGO participation in the application of HIAs. The combination of close community ties with the integration of outside health resources makes the work of NGOs executing HIAs in India a community health win-win situation for both the country's health care system and local residents.

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### Funding and Conflict of Interest

This study only analyzed secondary data that was obtained through public accessible resources and did not require any special ethical clearance for them to be obtained, analyzed, or published. The authors do not have a conflict of interest with any of the data sources used in the study nor with the publication avenue.

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# Clinical Evaluation and Detailed Study of Computer Vision Syndrome (CVS) with the Role of Ergonomics in its Management

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## ABSTRACT

**Objective:** To Study The Incidence Of CVS In Computer Users And To Evaluate The Efficacy Of Tear Substitutes & Role Of Ergonomics In The Management Of CVS.

**Materials and Method:** 100 subjects in age group 10-60 yrs., who have been using computer for minimum of 2hrs/day for at least 5-6 days/week, were chosen. Each subject underwent for Visual Acuity examination, Slit Lamp Examination, CVS Scoring & following tests.

(1) Schirmer Test

(2) Tear Film Break up Time (Tbut)

**Results:** Out of 76 subjects having CVS score >6, 52 used the computer for 4 - 8 hrs. & 4 used for <4hrs. Thus, more is the exposure time more is the chances of CVS.

**Conclusion:** There was more improvement after 4 weeks and 8 weeks in the group taking lubricants and ergonomics into consideration than lubricants alone.

**Keywords:** Computer Vision Syndrome, Dry Eye, Lubricants

## INTRODUCTION

Computers are now a way of life. Worldwide approximately 90 million adults use computers regularly. Worldwide approximately 90 million adults use computers regularly so the number of people encountering temporary vision problems due to computer use is also increasing.

The American Optometry Association<sup>1,2</sup> defines Computer Vision Syndrome as a "Complex of eye and vision problems related to near work which are experienced during or related to computer use.

This condition most commonly occurs when the viewing demand of the task exceeds the visual abilities

of the Video Display Terminal (VDT) user. The VDT is an input/output device that contains a screen, a keyboard and a mouse.

Spending more than 2 hours in a day on a computer might lead to symptoms of Computer Vision Syndrome.<sup>3</sup>

Computer Vision Syndrome is mainly caused by decreasing blinking reflex while working for long hours focusing on the computer screen. The normal blinking rate in humans is 16-20 blinks per minute. Studies have shown that the blink rate decreases to 6-8 per minute for people working on the computer screen. This leads to symptoms like eyestrain, headache, sensitivity to light and double vision. Other symptoms include red eyes, contact lens discomfort, changes in color perception and excessive tearing.<sup>4</sup>

In a study by Wendy Strouse Watt<sup>5</sup> it was highlighted that healthy eyes can easily maintain focus

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on the printed page. Characters on a computer screen however don't have this contrast or well defined edges. These characters (Pixels) are brightest at the center and diminish in intensity towards the edges. The eyes have a hard time focusing on pixel characters.

They focus on the plane of the computer screen but cannot sustain that focus. They focus on the screen and relax to a point behind the screen called as the RESTING POINT OF ACCOMODATION or RPA. So the eyes are constantly relaxing to the RPA and then straining to refocus on the screen. This continuous flexing of the eyes focusing muscles, that is, ciliary muscles creates fatigue and feeling of tired eyes that are so common after long hours at the computer.

### **Ergonomics**

Ergonomics in the real sense means laws of (nomos) work (ergon). Computers are an important area where ergonomics has a major role to play. It is the science of designing the job, equipment and workplace to fit the worker by obtaining a correct match between the human body, work related tasks and work tools. By applying the science of ergonomics we can reduce the difficulties faced by regular computer users.

### **To alleviate the symptoms of CVS, following steps can be taken<sup>6</sup>-**

- Concentrate on blinking, whenever you begin to sense symptoms of dry eye or irritated eye.
- Lower your computer screen so that the centre of the screen is 4-8 inches below your eye level and the viewing distance is 20-28 inches.
- Match the computer screen to the brightness of the environment.
- Use font size 12-14
- Use artificial tears in eye drops or gel form to keep eyes lubricated.
- Use of anti- reflective surfaces on monitors
- Take frequent breaks & follow 20-20-20 rule i.e. every 20 minutes look away beyond 20 feet & blink 20 times.

The objective of this study is to find out the incidence of Computer Vision Syndrome in computer users and to evaluate the efficacy of tear substitutes and the role of ergonomics in the management of CVS.

## **MATERIALS AND METHOD**

Subjects for this study were those using computer frequently and from the outpatient departments of Ophthalmology in Santosh Medical College and Hospital, Ghaziabad and following was the regime in which the study was conducted.

A minimum of 100 subjects were randomly selected irrespective of gender, place and nature of computer work and ethnic differences.

### **Inclusion Criteria**

The subjects between age group of 10-60 years who had been using the computer for a minimum of 2 hours/day for at least 5-6 days/week.

### **Exclusion Criteria**

1. Any other known cause of headache.
2. Recent/on-going ocular diseases of Lids, Lashes, Conjunctiva, Cornea
3. Ocular Motility disorders
4. Any other known causes of dry eye like Chemical burns, Trachoma, Keratoconjunctivitis Sicca, Hypovitaminosis A
5. Intake of systemic drugs known to cause dry eye like antipsychotics, antidepressants, diuretics.

### **Pre- Procedural Evaluation**

#### **History**

For the purpose of this study a detailed history was elicited from each subject with special reference to nature of occupation, duration of work on V.D.T or computer usage, area of work, working environment, contact lens usage, duration and nature of presenting symptoms.

#### **Ocular Examination**

1. Visual Acuity (Snellen's) - Uncorrected and Best Corrected
2. Slit Lamp Examination of anterior segment
3. In accordance with the Inclusion and Exclusion criteria the subject underwent the following tests.
  - (1) Schirmer's test

- Used for testing rate of tear formation.
- It uses 5 x 30 mm of No.41 Whatman filter paper strip.
- Placed in inferior cul de sac for 5mins in dimly lit room with fans off.
- Wetting >15mm = normal.....<15mm = tear film instability.

(2) Tear Film Break-Up time (TBUT):

- Used to measure time between instillation of fluorescein & appearance of first random dry spot.
- A moistened 2% fluorescein strip applied to the inferior cul de sac & asked to blink several times.
- Examined using broad beam of Slit Lamp with Cobalt blue illuminating filter.
- Tear Break Up Time of 15-30sec = normal & <10sec = Tear film instability.

(3) Ocular Surface staining: These tests were performed using fluorescein 2% in the form of paper strips. Fluorescein staining was evaluated using cobalt blue filter. It causes spotty staining of the ocular surface in the areas with damage to tight epithelial cells due to dry eye.

(4) Inter blink Interval (IBI):

- Calculated by observing subjects while they read the vision chart without being aware that their blink rate is measured.
- No. of blink/min divided by 60 give IBI.
- It is compared with IBI taken while subject was on VDT usage.

**Computer Vision Syndrome Score**

- Complaint of soreness, heaviness & burning sensation in eyes.
- Complaint of foreign body sensation & grittiness.
- Complaint of intermittent blurring of vision & difficulty in focusing.

- Change in refraction (glasses) more than twice in 6 months.
- On examination: Inter palpebral & lower palpebral conjunctival congestion.

Each of the point was given score of 2, thus making a total of 10 & more than 6 out of 10 was considered abnormal.

After all the above examinations, all the subjects having a Computer vision score of more than 6 underwent a Synaptophore examination, Retinoscopy using a mydriatic. Also fundus examination using both a direct and indirect ophthalmoscope was done.

Management: The 100 subjects were divided into two halves of 50 each. One half was treated with tear substitutes on like carboxymethyl cellulose, Hydroxypropylmethyl cellulose at least 4 times /day and the other 50 were treated with tear substitutes and were counselled for ergonomics and work place designs. Then all subjects were called for a follow up at 4 and 8 weeks. The results were tabulated and evaluated.

**OBSERVATION & RESULTS**

**Table 1: Showing Incidence of Computer Vision Syndrome**

CVS SCORE	Number of Subjects	Percentage
>6	76	76%
<6	24	24%

Out of 100 subjects, 76(76%) subjects had CVS score of >6 & rest 24(24%) had CVS score <6 (considered normal).

- CVS is maximum, 39(52%), in age group of 21 – 30 years.
- Incidence of CVS is 76% (12 females + 64 males) which is more in males 84%(64/76) & maximum in 21 – 30 years age-group ( $\chi^2 = 8.0, p < 0.05$ )

Out of 76 subjects having CVS score >6, 52 used the computer for >8 hours, 20 for 4-8 hours & 4 used for <4hrs. Thus, more is the exposure time; more is the chance of CVS

**Table 2: Showing mean values of schirmer's and tbut tests in the subjects studied on presentation and follow up**

Symptom	On Presentation		4 weeks		8 weeks	
	Mean Schirmer's	Mean TBUT	Mean Schirmer's	Mean TBUT	Mean Schirmer's	Mean TBUT
Redness and Grittiness	20	16	21	18	22	18
Eyestrain	18	18	20	18	20	18
Blurring of Vision	20	16	20	18	20	18
Contact Lens discomfort	17	16	17	16	19	16

It was observed that there was no derangement in Schirmer and TBUT values in subjects of Computer Vision Syndrome.

**Table 3: Showing efficacy of tear substitutes & the role of ergonomics in computer vision syndrome.**

>Group A: Tear substitutes only.

>Group B: Tear substitutes + Ergonomics.

FOLLOW UP	Groups	Eye Strain	Redness	Blurring of Vision
BASELINE VALUES	GROUP A	12	7	10
	GROUP B	14	5	7
4 Weeks	GROUP A	10	6	8
	GROUP B	10	4	5
8 weeks	GROUP A	5	5	5
	GROUP B	2	3	2

There is significant improvement seen in eyestrain & blurring of vision ( $p < 0.05$ ) in Group B when compared to Group A at 4 weeks & 8 weeks. This shows the importance of ergonomics in management of Computer Vision Syndrome.

## DISCUSSION

The present study was conducted on 100 computer users and a detailed history regarding age, sex, occupation, residence etcetera was taken. The duration of work on VDT, screen distance, tilt, lighting, AC airflow, number and duration of breaks was also asked. Symptoms were noted down and accordingly CVS score was given. Proper Ophthalmic examination was done including the Dry Eye tests. The results of the study are discussed below as follows:

Incidence of Computer vision in Computer Users and the relationship between exposure time and Computer Vision Syndrome:

The National Institute of Occupational Safety and Health states that 50% of work forces use computers and 88% of computer users using it for more than 2 hours/day will develop CVS sometime in their life.

The WHO in 1987 stated that<sup>7</sup> 14-70% computer users have some kind of visual problem. Hochane<sup>8</sup>

found a significant difference in symptoms between those working less than 6 hours and more than 6 hours.

S.B Verma<sup>9</sup> in 2001 studied computer vision syndrome and concluded that vision related problems occur in over 70% of users. Another survey on VDT workers by Blehm C<sup>10</sup> showed that 90% of the VDT workers, working more than 3 hours/day experienced symptoms, 75% of whom worked for more than 6-9 hours. Thus duration of VDT usage has an important role to play in CVS.

The present study has shown the incidence of CVS in 76% of VDT workers, more in males (84%) than in females (16%). Age group being affected to the maximum is 21-30 years. As the exposure time increases so does the frequency of CVS. In less than 4 hours/day, 5.3% of subjects were affected, In 4-8 hours/day of exposure 26.3% subjects show symptoms and a large number i.e. 68.4% of subjects having exposure time more than 8 hours/day show more symptoms and had CVS score >6.

Richa Talwar<sup>11</sup> conducted another study on computer professionals in Delhi and NCR. It was deduced from this study that mean age of subjects showing symptoms was 28.23, Male: Female ratio being 5:3, 30% spent 3-6 hours on the computer, 44% spent 6-9 hours and 26% spent more than 9 hours.

## Efficacy of tear substitutes and the role of ergonomics in Computer Vision Syndrome

Ergonomics is the science of designing the job equipment and workplace to fit the worker.

Monitor placement is an important part of ergonomics. Sommerich ET all<sup>12</sup> concluded that minimum discomfort level occurred when the viewing angle was 17.5 degrees.

Miyao<sup>13</sup> said that Font Size should be 12-14, Pixel size as low as possible, flicker rate as high as possible and dark letters on light backgrounds are generally better.

M Carmen Acosta<sup>14</sup> found out that since blink rates decreases, efforts should be made towards conscious blinking and taking breaks every 20 minutes to half an hour.

### Lubricants/ Artificial tears

Voillon<sup>15</sup> studied the effects of Povidone 2% preservative free drops also taking ergonomics into account and concluded that ergonomics and tear drops both gave a better effect than either alone.

Miljanovich<sup>16</sup> found out that artificial tear and ergonomics both together produce a significant difference in Ocular Surface Disease Index (OSDI) than either alone.

In the present study where we had divided 100 subjects into 2 groups of 50 each and given tear substitutes only in one group and ergonomics was considered with tear substitutes in the other. We saw that there was more improvement after 4 weeks and 8 weeks in the group taking lubricants and ergonomics into consideration than lubricants alone.

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**Conflict of Interest:** None

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All necessary ethical clearances were obtained before starting this study. An informed, written consent was taken from all the patients associated with this study.

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# The Clinical Study of Rheumatoid Arthritis: Describing Spectrum of Involvement of Joints in Patient with Rheumatoid Arthritis

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## ABSTRACT

Rheumatoid Arthritis is well documented but poorly understood disease known to mankind from the dawn of civilisation. Rheumatoid arthritis (RA) is a chronic, systemic inflammatory disorder that may affect many tissues and organs, but principally attacks flexible (synovial) joints. RA usually affects joints on both sides of the body equally. Wrists, fingers, knees, feet, and ankles are the most commonly affected. The disease often begins slowly, usually with only minor joint pain, stiffness and fatigue. About 1% of the world's population is afflicted by rheumatoid arthritis, women three times more often than men. Onset is most frequent between the ages of 40 and 50, but people of any age can be affected. In addition, individuals with the HLA-DR1 or HLA-DR4 serotypes have an increased risk for developing the disorder. It can be a disabling and painful condition, which can lead to substantial loss of functioning and mobility if not adequately treated.

*Keywords: Rheumatoid Arthritis, Synovial Joints, Joint Pain*

## INTRODUCTION

The first recognized description of rheumatoid arthritis was in 1800 by the French physician Dr Augustin Jacob Landré-Beauvais (1772–1840) who was based in the famed Salpêtrière Hospital in Paris.<sup>1</sup> The name "rheumatoid arthritis" itself was coined in 1859 by British rheumatologist Dr Alfred Baring Garrod.<sup>2</sup> It is now defined as a chronic or sub acute systemic connective tissue disorder characterized by inflammatory polyarthritis which is characteristically symmetrical with erosive changes. The term "rheumatoid disease" is often used because, although primarily affecting synovial joints, it is a generalised disorder, which may affect almost any tissue or organ. The disease pursues a prolonged course with exacerbations and remissions.

Onset is usually insidious, often beginning with systemic and joint symptoms. Systemic symptoms include early morning stiffness of affected joints, generalized afternoon fatigue and malaise, anorexia, generalized weakness, and occasionally low-grade fever. Joint symptoms include pain, swelling and stiffness.

The disease progresses most rapidly during the first 6 yr, particularly the first year; 80% of patients develop some permanent joint abnormalities within 10 yr. The course is unpredictable in individual patients.

Joint symptoms are characteristically symmetric. Typically, stiffness lasts >60 min after rising in the morning but may occur after any prolonged inactivity. Involved joints become tender with erythema, warmth, swelling and limitation of motion. The joints involved include the following:

- Wrists and the index and middle metacarpophalangeal joints (most commonly involved)
- Proximal interphalangeal joints
- Metatarsophalangeal joints
- Shoulders
- Elbows
- Hips
- Knees
- Ankles

However, virtually any joint except uncommonly the distal interphalangeal (DIP) joints may be involved. The axial skeleton is rarely involved except for the upper cervical spine. Synovial thickening is detectable. Joints are often held in flexion to minimize pain, which results from joint capsular distension.

Fixed deformities, particularly flexion contractures, may develop rapidly; ulnar deviation of the fingers with an ulnar slippage of the extensor tendons off the metacarpophalangeal joints is typical, as are swan-neck and boutonnière deformities. Joint instability can also occur. Carpal tunnel syndrome can result from wrist synovitis compressing the median nerve. Popliteal (Baker's) cysts can develop, causing calf swelling and tenderness suggestive of deep venous thrombosis.<sup>3</sup>

Established RA is commoner in females than males with sex ratio varying from 2:1 to 3:1. No age group is exempt but the peak incidence occurs between 35- 55 years of age in women and 40-60 years in men.<sup>3</sup>

### MATERIAL AND METHOD

50 cases of rheumatoid arthritis attending the Rheumatology Clinic at Command Hospital, Southern Command, Pune and admitted to it, comprised the material of the present study.

All patients included in the study satisfied criteria of rheumatoid arthritis, as described by "American Rheumatoid Association" which includes:-

1. Morning stiffness.
2. Pain on motion or tenderness in at least one joint.
3. Swelling of one joint, representing soft tissue or fluid.
4. Swelling of at least one other joint (soft tissue or fluid) with an interval free of symptom no longer than 3 months.
5. Symmetrical joint swelling.
6. Subcutaneous nodules over bony prominences, extensor surface or near joints.
7. Typical radiological changes which must include demineralisation in periarticular bone as an index of inflammation, degenerative changes do not exclude diagnosis of Rheumatoid arthritis.
8. Positive test for rheumatoid factor in serum.

9. Synovial fluid showing poor mucin clot formation on adding it to dilute acetic acid.
10. Synovial histopathology consistent with rheumatoid arthritis.
11. Characteristic histopathology of rheumatoid nodule biopsied from any site.

According to the criteria 1 to 5, symptoms or signs must be present for at least 6 weeks. To diagnose classic rheumatoid arthritis at least seven of the criteria enumerated above must be fulfilled. The diagnosis of rheumatoid arthritis is definite if five criteria are present and considered probable if up to three criteria are fulfilled.

A systematic examination of joints was carried out in each case. The joints were carefully inspected for pattern of involvement (symmetrical or asymmetrical), presence of swelling, redness, deformity and wasting of muscles. Palpation was done to detect the nature of swelling (soft tissue or fluid) and presence of local tenderness and raised temperature if any. Movements at affected joints and their range was particularly elicited and recorded.

### OBSERVATIONS

#### Presenting complaints

The main presenting complaints were joint swelling (100%), pain in the joints (92%) and morning stiffness (86%). Presenting complaints also included diminished appetite (32%), malaise (18%) mild to moderate degree of irregular fever (10%) and significant weight loss (6%).

**Table 1. Percentage of Cases showing different symptoms**

Symptoms	No. of cases	percentage
Joint swelling	50	100
Joint pain	46	92
Morning stiffness	43	86
Anorexia	16	22
Malaise	9	18
Fever	5	10
Weight loss	3	6

#### Morning stiffness

It was most common symptom found in 86% cases. The duration of morning stiffness ranged from 15 min to 2 hours. There was direct correlation with disease

activity and duration of morning stiffness. The patients with more active disease had longer duration of morning stiffness.

### Initial joint involvement

The spectrum of the involvement of joints in patients with RA is shown in table 2. It may be seen that the initial joint involvement predominantly was in lower limbs seen in 54% of cases as compared to 46% in the upper limbs. Knee joint was most commonly affected, present in 30% of cases. Small joints of hand were affected in 24% cases whilst those of foot were involved in 8%. The frequency of other major joint affection was ankle (16%), shoulders (12%), wrist (8%) and elbow (2%).

**Table 2. Percentage of Cases showing involvement of different joints**

Joints initially involved	No. of cases	percentage
Knee	15	30
Small joints of hand	12	24
Ankle	8	16
Shoulder	6	12
Wrist	4	8
Small joints of foot	4	8
Elbow	1	2

### Pattern of joint involvement

The disease was symmetrical in 45 cases and asymmetrical in 5 patients. The disease was polyarticular in 49 patients and monoarticular in only 1 patient.

### Total joints affected

The extent of joint involvement at the time when the patient finally presented is shown in table 3. Knee joints were most frequently involved (92%), followed by ankle (78%), wrist (72%), PIP of hand (70%), MCP (66%), elbow (58%), shoulder (56%) and MTP (50%). Other joints uncommonly affected were PIP of foot (28%), hip (10%), cervical spine (8%), sacroiliac (6%) and thoraco lumbar spine (4%). Only 2% of cases showed involvement of sternoclavicular, sternocostal, acromioclavicular, temporomandibular and DIP of hand.

**Table 3. Percentage of joints affected**

Joints involved	No. of cases	percentage
Knee	46	92
Ankle	39	78
Wrist	36	72
PIP of hand	35	70
MCP	33	66
Elbow	29	58
Shoulder	28	56
MTP	25	50

### Deformities

The frequency of the deformities of joints in the cases studied is shown in table 4.

27 patients had the deformities of the affected joints. The common deformities seen were flexion contractures, boutonniere, ulnar deviation at MCP and wrist joints, swan neck, subluxation of joint, "z" thumb, ankylosis and cock up toes. The duration of the diseases does not correlate with the deformity as 11 out of 27 patients had the disease of less than 1 year duration and 12 were having disease for more than 3 years. In remaining 4 cases the duration of the disease ranged between 1 to 3 years.

**Table 4. Frequency of the joints' Deformities**

Type of deformity	No of cases
Flexion contractures	8
Boutonniere	7
Ulnar deviation	7
Swan neck	6
Subluxation	4
"z" thumb	3
Ankylosis	2
Cock up toes	1

## DISCUSSION

Rheumatoid arthritis is a chronic inflammatory poly-arthritis which is characteristically symmetrical, has a prolonged course with exacerbations and remissions, and is accompanied by a general systemic disturbance.

The clinical picture as seen in the west is at variance from the reported series from India.





Fig. 1. Showing symmetrical involvement of 2, 3 & 4<sup>th</sup> MCP joint



Fig. 2. Showing MCP joint involvement with subluxation and early ulnar deviation



Fig. 3. Showing early swan neck deformity (Rt) 3<sup>rd</sup> and 4<sup>th</sup> fingers



Fig. 4. Showing classical swan neck deformity

In the present study a detailed evaluation of clinical profile was studied.

### Morning stiffness and RA

Majority (86%) of the patients manifested the characteristic morning stiffness at the joints. This was evident by their inability to move the interphalangeal and metacarpophalangeal joints in the hands causing impairment of their normal routine activity and thus was quite disabling. The stiffness of lower limb joints was gauged by their ability to move about on waking up. The average duration of morning stiffness in those with active joint disease ranged from 2 to 3 hours.

Other studies, Bose et al<sup>4</sup>, Hart<sup>5</sup> and Kelley et al<sup>6</sup> also highlighted the importance of morning stiffness as a characteristic manifestation in RA and correlate the degree of morning stiffness with the severity of RA.

### Initial joint involvement in RA

Interestingly the joints of the lower limbs were commonly affected, seen in 54% of cases. The commonest joint to be involved being knee (in 30% of cases). The next common group of joint to be affected were small joints of hand namely the proximal interphalangeal and metacarpophalangeal joints.

The frequency of initial joint involvement in RA has been variously reported by foreign workers. Whilst majority of studies highlight the involvement of small joints of hand and foot as by Decker et al.<sup>7</sup>, Desai et al<sup>8</sup>, Buchanan<sup>9</sup>, and Mitra<sup>10</sup>. Others like Shore<sup>11</sup> reported more frequent large joint affection, and yet other study as by Williams<sup>12</sup> found no differences in the frequency of upper and lower limb joints involvement (large or small). John<sup>13</sup> however observed much frequent involvement of lower limb joints in his studies.

### Pattern of joint involvement in RA

The pattern of the joint involvement was characteristically bilaterally symmetrical seen in 90% of cases. Monoarticular involvement was seen in only one case in present study. Our studies are in confirmation with the reported series, all of which highlighted the symmetrical nature of the joint involvement. Reynold<sup>14</sup> and Noskowitz<sup>15</sup> observed asymmetrical pattern of joint involvement in 10% of cases.

Although at onset, the disease was restricted to involvement of less than 3 joints, progressive involvement of multiple joints occurred with passage of time. The frequency of joint involvement, as seen in a stabilized case, revealed that the knee joint was the most frequently involved joint seen in 92% of cases. In that order the other joints involved are ankle (78%), wrist (72%), PIP of hand (70%), MCP (66%), elbow (58%), shoulder (56%) and MTP (50%). The affection of hip joint was uncommon, present only in 10% of cases.

The progressive joint involvement as reported by other series is mostly restricted to the involvement of joints of hand and foot, characteristically those of PIP and MCP. Although, knee joint involvement was seen in many studies, ankle was involved uncommonly as reported by Buchanan<sup>16</sup> Kelley et al<sup>6</sup>. Likewise, temporomandibular joint affection was reported in 55% of cases by Kelly et al<sup>6</sup>. Hip joint involvement is reported only in severe cases and therefore was uncommon. This is borne out by the results of present study as well.

Although Kelley et al<sup>6</sup> in his series found cricoarytenoid joint involvement in 30% of cases manifesting as hoarseness of voice, this was not seen in any of the cases in present study.

Clearly therefore, the pattern of initial joint involvement and its subsequent progression is variable. It appears that the pattern is different in Indian subjects compared to what is seen in western countries.

### Deformities in RA

Deformities of the affected joints were seen in 54% of cases. These included flexion contractures (16%); boutonniere deformity (14%), ulnar deviation (14%),

swan neck deformity (12%), subluxation of joints (8%) and 'z' thumb (6%). The incidence of deformities did not correlate with the duration of the disease. The deformities appeared in patients with disease of less than 1 year duration as frequently as in those with more than 3 years duration. The patients with the deformities did not necessarily have a severe disease. Extra articular manifestations were not commonly seen in those with deformities. These observations indicate that neglect of joint care may be a contributory factor.

Studies by workers in Europe like Hart<sup>5</sup> and Figenbaum<sup>17</sup>, show that the deformities usually correlate with severity, longer duration and seropositivity. In the present study also deformities were more common in patients with the rheumatoid factor positivity. Desai et al<sup>8</sup> from India also found higher incidence of deformity.

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# Prevalence of Leukoplakia in Patients Visiting Dental College in Rural Area of Jaipur, Rajasthan

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## ABSTRACT

**Objectives:** The study was conducted to assess the prevalence of leukoplakia among patients of age 15 years and above visiting Dental College in rural area of Jaipur, Rajasthan.

**Material & Method:** A cross-sectional study was conducted to assess the prevalence of leukoplakia among 6800 out patients at NIMS Dental College, Jaipur, Rajasthan. Subjects were interviewed using a structured proforma. The clinical diagnosis of leukoplakia was made when patient showed documented clinical features of leukoplakia. The statistical analysis was done with SPSS software version 11.5.

**Results:** The prevalence of leukoplakia in the study population was 145 (2.13%). Majority of subjects were males 130 (89.65%). The prevalence of leukoplakia was highest in 45-54 years of age group 71 (1.04%).

**Conclusion:** Prevalence of leukoplakia was 2.13% and was high amongst older age group. Gender comparison showed higher male dominance and majority of subjects were bidi smokers.

**Keywords:** Prevalence, Leukoplakia, Smoking, Tobacco

## INTRODUCTION

Tobacco usage in various forms, either smoked or smokeless, can cause a wide spectrum of oral mucosal alterations or lesions. The type and location of the alteration/ lesion varies with the type of tobacco used, the way it is used, the frequency and duration of use.<sup>1</sup> The study conducted by Neufeld and his co-workers in India, using National Sample Survey (NSS) in 1995-96, constituting 4, 71,143 people of age 10 years and older concluded the prevalence of regular users of smoking tobacco as 16.2% and chewing tobacco as 14%.<sup>3,4</sup> The prevalence of these habits was found to be more among men when compared to women.<sup>4,5</sup>

In 1978, a World Health Organization (WHO) group defined oral leukoplakia as: 'A white patch or plaque that cannot be characterized, clinically or pathologically as any other disease.' The

accompanying text emphasized that the term leukoplakia should carry no histological connotation and should be used only in a descriptive clinical sense<sup>6</sup>

The reasons for the rapid increase of the disease are reported to be due to an upsurge in the popularity of commercially prepared tobacco (Cigarette, bidi, hookah & etc) in India and an increased uptake of this habit by young people is because of addiction to this habits.<sup>7,8,9</sup>

People visiting Out Patient Department of a dental college in rural area of Jaipur, Rajasthan often give history of smoking tobacco usage like bidi, cigarette, hookah, chillum, etc and precancerous lesions like leukoplakia has been widely prevalent among them. So, this study was conducted to assess the prevalence of leukoplakia among patient aged 15 years and above seeking dental care.

## MATERIALS & METHOD

A cross-sectional study was conducted in Out Patient Department, NIMS Dental College and Hospital, Jaipur, Rajasthan. Total of 6800 patients were interviewed and examined for leukoplakia for time period of 6 months from July 2010 to December 2010.

Subjects willing to participate and aged 15 years & above were included in the study. Subjects with any systemic diseases and malignancy were excluded from the study. Ethical clearance was obtained from ethical committee and oral consent was obtained from each participant prior to the study. A pilot study was conducted to check the validity of the questionnaire and based upon the results modification was done in the design of the questionnaire.

Patients were classified into five age groups: 15-24 years, 25-34 years, 35-44 years, 45-54 years, 55 years and above. The examination was done by principal examiner and trained recording clerk was present to record the data in the structured proforma. The clinical diagnosis of leukoplakia was made when patient showed characteristic features of sharply defined white patch or plaque which could not be scraped and surfaces slightly elevated above the surrounding mucosa.<sup>3, 10, 11</sup>

Armamentariums used were sterile mouth mirror, explorer, tweezers, kidney tray instrument pouch, savlon, disposable surgical latex gloves, disposable mouth mask and questionnaires. The statistical analysis was done with SPSS software version 11.5.

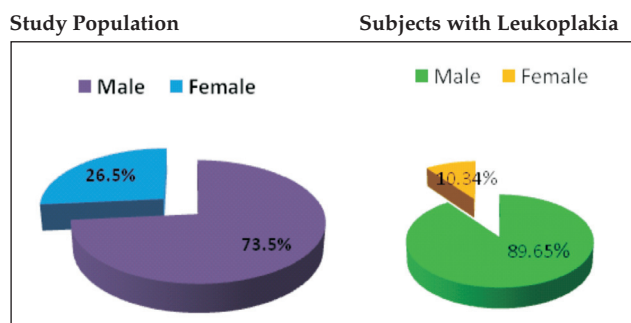
## RESULTS

Table 1 Shows age distribution of study population and subjects having leukoplakia

Variables	Years	Total subjects		Subjects with leukoplakia	
		No.	%	No.	%
Age	15-24	1502	22.08	0	0.0
	25-34	1924	28.9	02	0.01
	35-44	1144	16.82	10	0.14
	45-54	1312	19.29	71	1.04
	55 & above	918	13.5	62	0.91
	Total	6800	100	145	2.13

Table 1 Out of 6800 subjects, 145 (2.13%) subjects presented with leukoplakia. Majority of subjects 71 (1.04%) belong to 45-54 years of age group, followed by 62 (0.91%) subjects in 55 years & above, 10 (0.14%) subjects in 35-44 years, 02 (0.01%) subjects in 25-34 years and none of the subjects showed any clinical finding of leukoplakia in age group of 15-24 years.

Graph 1 Shows distribution of study Population & subjects with Leukoplakia according to male & female



Graph 1 Shows 4998 (73.5%) of the study subjects were males as compared to 1802 (26.5%) females & 130 (89.65%) subjects males were had leukoplakia compared to 15 (10.34%) females.

Table 2 Association of smoking habits with presentation of Leukoplakia

Smoking	Subjects	Leukoplakia
Bidi	490 (7.20%)	70 (48.27%)
Cigarette	414 (6.08%)	52 (35.86%)
Hookah, chillum, etc	86 (1.26%)	23 (15.86%)
Total with percentage	990 (14.55%)	145 (2.13%)

Table 2 shows that out of 6800 subjects, 990 (14.55%) subjects had different kinds of smoking habits. Majority of the subjects 490 (7.20%) had bidi smoking habit, 414 (6.08%) subjects had a habit of using cigarette, 86 (1.26%) subjects used hookah, chillum, etc.

In the present study, leukoplakia was seen in 145 (2.13%) subjects out of whom 70 (48.27%) subjects had bidi smoking habit, 52 (35.86%) subjects smoked

cigarette and 23 (15.86%) subjects used hookah, chillum, etc.

## DISCUSSION

The reported prevalence of leukoplakia in India varies from 0.2% to 5.2%.<sup>12</sup> The overall prevalence of leukoplakia in the present study was 145 (2.13%). This prevalence is in agreement with the results obtained by Mathew AL, et al<sup>13</sup> (1.59%), Imran Mohammed Khan K.F et al<sup>14</sup> (2.8%) and Tony Axéll (2.9%).<sup>15</sup> However a study done by Kovac-Kovacic M<sup>16</sup> (3.6%) showed higher prevalence which could be due difference geographical area and study population.

In the present study, majority of the leukoplakia subjects i.e. 71 (1.04%) & 62 (0.91%) belong to 45-54 and 55 years & above age group thus concluding that prevalence is much higher in older age group. These findings were in agreement with the study by Walls Vander I et al,<sup>17</sup> Sarita K Chitroda, et al<sup>18</sup> and Reichart PA, et al.<sup>19</sup>

In the present study, among 145 leukoplakia subjects, 130 (89.65%) subject were males compared to 15 (10.34%) females thus showing a male predominance. Similar male predominance was also reported in studies, William G. Shafer et al,<sup>4</sup> Walls Vander I et al,<sup>17</sup> Reichart PA, et al.<sup>19</sup>

As per the current study, prevalence of leukoplakia among patients smoking bidi was higher 70 (48.27%) than other smoking habits considered in the study. This finding is similar with the study done by Sarita K Chitroda et al<sup>18</sup> and J. J. Pindborg et al.<sup>20</sup>

## CONCLUSION

With the result of the present study, following conclusions can be drawn. The prevalence of leukoplakia in rural area of Jaipur, Rajasthan was found to be 2.13%. The prevalence was higher in older age group and gender comparison revealed a male predominance. Also, majority of subjects showing leukoplakia were bidi smokers.

Advising patients to quit tobacco use is a dental professional responsibility and may take an active role in nicotine replacement counselling. Smoking cessation should be incorporated as an integral teaching component of the undergraduate dental curriculum, particularly with respect to the prevention and diagnosis of tobacco-induced oral lesions and complications.

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# Analysis of Spatio-Temporal Disease Pattern using Spatial Auto Correlation Methods: Case of Acute Gastroenteritis in Coimbatore District, Tamilnadu, India

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## ABSTRACT

**Background and Objectives:** In epidemiology many of the infectious disease events do not occur randomly in geographical context but occur in clusters. Geographical or spatial analysis comes into play due to the existence of spatial dependence in data. The main objective was to examine the variation in the prevalence of Acute Gastroenteritis using space time autocorrelation methods and to explore possible factors that might have influenced these variations in the study area.

**Method:** To identify the spatial similarity between the estimated Acute gastroenteritis values in the study region spatial autocorrelation was attempted to study the aggregated data of disease incidences. Different methods for measuring seasonal variations was adopted - Simple Averages, Ratio to Trend, Ratio to Moving Average and Link-Relative Methods.

**Results:** The results show that a high incidence is recorded in the I and IV quarters, in all the taluks of Coimbatore district. It is observed that the incidence of Acute gastroenteritis is high in the months of January, February, March, April and November for all the taluks of Coimbatore district. The seasonal trend observations displayed a more comprehensive pattern of disease movement rather than the monthly pattern.

**Interpretation and conclusion:** It is evident that Acute Gastroenteritis is a seasonally dependent disease with more number of cases increasing in the winter season and less cases in the summer season. This methodology will improve the accuracy of public health forecasting and will help in developing mechanisms to combat large seasonal surges of infectious diseases.

**Keywords:** Link-Relative, Ratio To Trend, Ratio to Moving Average, Seasonal Oscillations, Simple Averages, Spatial Autocorrelation

## INTRODUCTION

In epidemiology many of the infectious disease events do not occur randomly in geographical context but occur in clusters. Geographical or spatial analysis comes into play due to the existence of spatial dependence in data. Auto correlation method lends itself for representing the spatial dependence over time during the estimation of model parameters.

A time series is a sequence of measurements equally spaced through time or along some other metameter. Time series data are naturally generated when a population or other phenomenon is monitored over time<sup>1</sup>. Most often in public health and biomedical research, the objective of research is to understand how explanatory variables influence an outcome over time so that regression analysis is used. But with time series



data, observations close together in time tend to be correlated with one another.

Oscillatory secular trends in the incidences of infectious diseases are widely observed phenomena within human communities<sup>2,3,4</sup>. Autocorrelation and spectral analysis was used to examine the oscillatory secular trends in the incidence of pertussis, mumps and measles<sup>4</sup>.

Researchers have used time series analysis to analyze the correlation between diarrhoea epidemics and climatic factors<sup>5,6</sup>. A time series regression model has been applied to assess the impact of long term climate change, especially for extreme diarrhoea epidemics<sup>7,8,9</sup>. Poisson regression model was applied to estimate the impact of daily maximum temperature and rainfall on the number of hospitalizations for diarrhoea<sup>10,11</sup>.

The relationship between monthly Norovirus-associated gastroenteritis outbreak incidence and monthly rainfall was investigated by the method of time series correlation<sup>12</sup>. The monthly number of dengue fever cases in Dhaka, Bangladesh was modelled and the dengue incidence using time series analysis was forecasted<sup>13</sup>. A time series model was applied to demonstrate the effects of climatic factors on dengue haemorrhagic fever incidence in Thailand<sup>14</sup>. In health statistics, timely prediction is very important to prevent health hazards to the community. Emergence of several viral diarrhoea infections due to climate variability have been reported in Bangladesh, Thailand, Australia and China<sup>15,16,17,18,19,20</sup>. An attempt was made to find the influence of season on cholera using time series analysis with special emphasis on relational impact and climate factors<sup>21</sup>. The effects of seasonality and other temporal patterns on the incidence of rotavirus diarrhoea were estimated by using the Box-Jenkins methodology<sup>22</sup>. Time series analysis of climate and disease variables were analysed in Barbados and St. Lucia for Dengue, Asthma, Bronchitis, Respiratory Tract infections and Diarrhoea<sup>23</sup>.

The main objective was to examine the variation in the prevalence of Acute Gastroenteritis using space time autocorrelation methods<sup>24,25</sup> and to explore possible factors that might have influenced these variations in the study area.

## Data collection and methodology

The summary statistics of Acute Gastroenteritis incidence and the environmental factors like temperature and rainfall were calculated for the nine taluks of Coimbatore district of Tamilnadu, South India. The data was collected from 2000 to 2009 from the District Directorate of Health and Preventive Medicine and the District Collectorate for environmental data.

## Defining Neighbourhoods

Defining each area's "neighbourhood" involves special operations that can easily be accomplished in GIS. One way to identify neighbourhoods is based on adjacency, that is, whether or not areas share a common boundary. Among the criterion for identifying neighbourhoods is proximity, the distance between areas. There are two ways of defining proximity with area data. One is to determine the centroid, or central location, for each area, and then calculate the distance between area centroids. GIS can be used to automate these spatial operations and compute locally smoothed Empirical Bayes estimates.

## Local measures of Spatial Autocorrelation

Another important class of methods for exploring area health data includes localized measures of spatial dependence such as Anselin's local indicators of spatial autocorrelation (LISA statistic)<sup>26</sup> and Getis and Ord's  $G^*$  statistic<sup>27</sup>.

Getis and Ord's  $G^*$  statistic illustrates well the structure of these localized measures of spatial dependence. The standardized  $G^*$  statistic is:

$$G_i^* = \frac{\sum_j w_{ij} w_{ij}(x_j) x_j w_i^* \bar{x}}{s[(nS_{ii}^* - W_i^{*2}) - (n-1)]^{1/2}}$$

$G^*$  is positive when high rates of disease cluster in  $i$ 's local neighbourhood. This indicates a disease cluster geographical grouping of high prevalence rates.

## Spatial autocorrelation

To identify the spatial similarity between the estimated Acute gastroenteritis values in the study region spatial autocorrelation was attempted to study

the aggregated data of disease incidences. Here a weight matrix is used to define the spatial relationship of regions. So that regions that are close to be given greater weightage than the distance.

The analysis uses three indices such as Moran's I, Geary's C and Getis Ord to identify the spatial similarity of the cases. The function of each coefficient is described.

Moran's I coefficient of autocorrelation is similar to Pearson's correlation coefficient and quantifies the similarity of an outcome variable among areas that are defined as spatially related<sup>28</sup>.

**Moran's I statistic is given by,**

$$I = \frac{n \sum_i \sum_j W_{ij} (Z_i - \bar{Z})(Z_j - \bar{Z})}{(\sum_i \sum_j W_{ij}) \sum_k (Z_k - \bar{Z})^2}$$

Geary's c is another weighted estimate of spatial autocorrelation<sup>29</sup> but whereas Moran'I considers similarity between neighbouring regions, Geary's c considers similarity between pairs of regions. Geary's c ranges from zero to two, with zero indicating perfect positive spatial autocorrelation and two indicating perfect negative spatial autocorrelation for any pair of regions. Geary's c is given by

$$c = \frac{(n-1) \sum_{i=1}^n \sum_{j=1}^n W_{ij} (y_i - y_j)^2}{2 \left( \sum_{i=1}^n (y_i - \bar{y}) \right) \left( \sum_{i=1}^n \sum_{j=1}^n w_{ij} \right)^2}$$

Getis and Ord's local Gi(d) statistic is an indicator of local clustering that measures the concentration of a spatially distributed attribute variable. Computational details of the Gi(d) statistic are provided by the test statistic<sup>27, 31, 32</sup> which is calculated as;

$$Gi(d) = \frac{\sum_j W_{ij}(d)(x_j - \bar{x}_i)}{s_i \sqrt{\frac{w_i(n-1-w_i)}{n-2}}}$$

**Measurement of Seasonal Variations**

One of the types of fluctuations found in time series data is the seasonal component. The objectives for studying seasonal patterns in a time series are necessitated by the following reasons:

1. To isolate the seasonal variations, i.e., to determine the effect of seasonal swings on the value of the given phenomenon and
2. To eliminate them, i.e., to determine the value of the phenomenon if there were no seasonal ups and downs in the series. This is known as de-seasonalising the given data and is necessary for the study of cyclic variations.

**Different methods for measuring seasonal variations (Gupta and Kapoor, 2007) are**

Method of Simple Averages

Ratio to Trend Method

Ratio to Moving Average Method

Link-Relative Method

**RESULTS AND DISCUSSION**

In the method of Simple Averages, the results show that a higher incidence is recorded in the I and IV quarters, in all the taluks of Coimbatore district. A seasonal pattern is seen which is exhibited in all the taluks where the disease intensity shows a cyclic order. In the Ratio to Trend method a higher incidence is recorded in the I and IV quarters, in all the taluks of Coimbatore district.

From the results of the Ratio to Moving Average method, it is observed that the incidence of Acute gastroenteritis is high for the months of January, February, March, April and November for all the taluks of Coimbatore district. High incidences in December are observed in Avinashi, Mettupalayam, Pollachi and Udumalpet and a high incidence in October was observed in Palladam.

The table of results of the Link Relative method show high incidences of Acute Gastroenteritis in the I and IV quarters of all the taluks of Coimbatore district and high incidences in the III quarter in the taluks of Coimbatore North, Coimbatore South, Palladam, Pollachi and Valparai.

From the results it is evident that Acute Gastroenteritis is a seasonally dependent disease with more number of cases increasing in the winter season and less cases in the summer season.

As many communicable diseases like influenza, cold and diarrheal diseases show distinct seasonal patterns of occurrence, it is necessary to show seasonal variation in the spatial trends. The peak activity of rotavirus infections was mapped and showed strong seasonal and geographical trends<sup>34</sup>.

The study correlates with that of<sup>35</sup> observed winter diarrhoea associated with rotavirus infections. Other findings by<sup>36,37</sup> also support this study. Similar disease patterns were observed in United States<sup>38, 39, 40</sup>, Northern Asia<sup>41</sup>, Australia<sup>42</sup> and Europe<sup>35</sup>. Rotavirus diarrhoea showed a seasonal variation with a high

incidence of the disease in winter months at low relative humidity in North India<sup>18</sup>. Rotavirus infection has been observed throughout the year with a maximum occurrence in November and another peak in the hot and dry months of May<sup>43</sup>.

**Table I: Method of Simple Averages**

TALUKS	I Quarter	II Quarter	III Quarter	IV Quarter
Avinash	109.93	81.53	93.20	115.35
Coimbatore north	117.13	78.95	88.46	115.45
Coimbatore south	113.25	84.18	92.17	110.41
Mettupalayam	118.96	79.78	83.32	117.93
Palladam	110.40	85.23	93.06	111.30
Pollachi	108.07	84.78	91.46	115.68
Tiruppur	115.92	84.53	85.96	113.59
Udumalpet	116.11	89.80	85.95	108.14
Valparai	118.28	79.67	92.40	109.65

**Table II : Ratio to Trend Method**

TALUKS	IQuarter	IIQuarter	IIIQuarter	IVQuarter
Avinash	110.66	81.04	93.34	115.15
Coimbatore north	117.67	79.03	87.38	115.93
Coimbatore south	113.87	84.42	90.73	110.98
Mettupalayam	119.24	79.38	82.13	119.24
Palladam	112.07	84.83	91.64	111.46
Pollachi	110.02	84.43	91.26	114.29
Tiruppur	116.63	83.78	85.01	114.58
Udumalpet	115.85	90.35	85.97	107.83
Valparai	122.54	78.61	90.17	108.67

**Table III: Ratio to Moving Average Method**

TALUK	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Avinashi	124.03	117.50	124.04	101.22	82.55	71.84	72.77	99.63	84.95	91.99	122.26	107.21
Coimbatore north	124.48	132.54	121.58	103.92	71.96	73.80	78.54	89.77	92.08	92.90	121.76	96.66
Coimbatore south	116.26	122.91	118.83	108.68	76.25	78.86	81.91	96.95	98.96	89.87	118.21	92.31
Mettupalayam	128.21	136.87	120.14	111.93	74.40	65.99	75.34	88.13	90.04	90.72	115.94	102.30
Palladam	115.67	115.86	111.81	106.87	82.51	76.85	87.06	98.44	98.05	105.12	108.98	92.78
Pollachi	108.89	120.27	120.60	102.48	80.02	72.59	77.91	93.00	97.68	94.96	122.69	108.90
Tiruppur	125.54	121.05	123.28	106.93	79.75	73.53	74.60	94.78	89.67	93.07	121.53	96.27
Udumalpet	127.09	126.53	121.19	113.85	85.30	73.83	71.64	96.33	79.88	88.67	111.93	103.77
Valparai	140.52	117.54	114.25	106.83	70.53	68.25	86.28	99.90	91.06	102.43	113.50	88.90

**Table IV: Link Relative Method**

TALUKS	I Quarter	II Quarter	III Quarter	IV Quarter
Avinashi	100	69.99	99.52	117.65
Coimbatore north	100	61.87	105.76	112.90
Coimbatore south	100	74.55	107.06	107.94
Mettupalayam	100	63.10	96.86	117.03
Palladam	100	80.51	108.66	106.27
Pollachi	100	75.76	104.19	116.24
Tiruppur	100	70.95	98.57	121.95
Udumalpet	100	76.00	93.44	121.63
Valparai	100	71.78	111.64	112.67

## CONCLUSION

The seasonal patterns of infectious diseases demonstrate the understanding of disease interactions through the use of Spatial Auto-Correlation methods. This will help us to understand the seasonal oscillations of the diseases on a spatial pattern. Moreover, this methodology will improve the accuracy of public health forecasting and will help in developing mechanisms to combat large seasonal surges of infectious diseases.

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# Assessment of Outcome and Improvement in Quality of Life (QOL) after Functional Endoscopic Sinus Surgery in Patients with Chronic Rhino-Sinusitis - A Cross Sectional Study

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## ABSTRACT

**Objectives:** To determine the outcome of Functional Endoscopic Sinus Surgery (FESS/ESS) and improvement in quality of life using symptom score and sinonasal outcome test (SNOT) score in patients with chronic rhinosinusitis

**Study design:** Prospective cross sectional study.

**Materials & Method:** Between June 2011-June 2013, 42 patients (65 sides) diagnosed to have chronic rhinosinusitis (CRS) underwent FESS. At the conclusion of the FESS/ESS operation, cotton ribbon gauze piece soaked with 1 ml Mitomycin-C (0.4 mg/ml) was placed in right/left/ both middle meati for a period of 4 minutes. Following application, nasal cavity was irrigated with sterile normal saline. Patients were examined weekly for 1 month after surgery. Additional examinations were done at the end of 2nd and 3rd month post-operatively. At the end of 3 months follow up the outcome was assessed subjectively comparing symptoms scores, sinonasal outcome test (SNOT) score dividing into four domains.

**Results:** At the end of 3 months follow up a significant decrease (80%) in symptom scores was observed ( $6.64 \pm 1.80$ ,  $p < 0.001$ ). Similarly in SNOT score we observed a significant reduction (71%) in scores ( $17.76 \pm 8.17$ ,  $p < 0.001$ ) and 3.1% cases showed adhesions.

**Conclusions:** CRS patients have remarkable improvement in their symptoms and quality of life after FESS.

**Keywords:** Chronic rhino-sinusitis, SNOT score, FESS/ESS, Topical Mitomycin-C (MMC)

## INTRODUCTION

CRS is an extremely common clinical condition with a life time prevalence of around 15%.<sup>1</sup> In United States, CRS is affecting as many as 30 million people and more than 200,000 sinus procedures performed annually.<sup>2</sup> It is estimated that around 134 million Indians suffer from CRS the symptoms of which include, but are not limited to, debilitating headache,

fever, nasal congestion and obstruction. The National Institute of Allergy and Infectious Diseases (NIAID) estimate that 1 in 8 Indians suffer from chronic rhinosinusitis and this disease is more widespread than diabetes, asthma or coronary heart disease.<sup>3,4</sup> Endoscopic assisted sinus surgery (ESS) has been accepted as treatment modality of choice for chronic sinus disease, as it maintains the sinus mucosa, establishes sinus ventilation and sinus drainage pathway from the natural openings and eliminates pathology effectively.<sup>5</sup> The benefits conferred on patients can be substantial in terms of both symptom reduction and improved quality of life.<sup>6</sup> SNOT-20 is one of the most widely used quality of life (QOL) instruments for sinonasal conditions.<sup>7</sup> SNOT is a

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patient reported measure of outcome in sinonasal disorders like-rhinosinusitis and nasal polyposis and is popular tool to describe patients burden and clinical effectiveness. SNOT covers broad range of health & health related quality of life problems like physical problems, functional limitations and emotional consequences<sup>8</sup>. The validated studies divided the SNOT into four domains: rhinologic, ear and facial symptoms, sleep and psychological domain. Rhinologic domain contained five questions- need to blow nose, sneezing, runny nose, post nasal discharge, thick nasal discharge. Ear & facial symptom domain contained four questions- ear fullness, dizziness, ear pain, and facial pain/pressure. Sleep domain contained three questions- difficulty falling asleep, waking up at night, and lack of good night's sleep. Psychological domain contained six questions- fatigue, reduced productivity, reduced concentration, frustration/restlessness/ irritability, sadness, and embarrassment. Two questions (cough and waking up tired) were not classified into any of these domains<sup>7</sup>. The studies applying SNOT by dividing into these 4 domains are limited in the literature. Therefore, we undertook this study to determine the outcome of ESS in patients of CRS by comparing pre and post-op symptoms, improvement in quality of life (QOL) in 4 domains by using pre and post operative SNOT scores.

## MATERIALS AND METHOD

**Study design:** Prospective cross-sectional study

**Study Duration:** June 2011 to June 2013

**Source of Data:** Patients attending the OPD/IPD of KLES Dr Prabhakar Kore hospital & MRC, Belgaum, a tertiary referral hospital. The patients with symptoms suggestive of Chronic sinusitis as per RSTF criteria were evaluated by symptoms, SNOT-20, CT scan of PNS (Lund Mackay score) and endoscopic findings (Lund Kennedy). 42 patients between the ages 17 to 66 years with clinical and radiological profile of chronic rhino-sinusitis undergoing endoscopic sinus surgery by single surgeon were taken up for the study. The study was approved by the institutional ethical committee. Written and informed consent was taken from all patients regarding the procedure as per the proforma approved by institutional ethical committee.

**Inclusion and Exclusion Criteria:** Patients with features suggestive of chronic sinusitis with or without nasal polyposis, willing to undergo CT scan PNS and ESS were included in the study.

Patients with acute exacerbation of symptoms, established asthma, suspected Cystic fibrosis patients refusing to undergo CT scan, patients with established or impending complications, patients refusing endoscopic surgery and patients with prior sinus surgeries were excluded from the study.

**Methodology:** During the two-year study period between June 2011 to June 2013, 42 patients underwent endoscopic sinus surgery at the hands of single surgeon. In 23 patients bilateral surgeries were performed and in 19 cases unilateral ESS was done, hence making the total operated sides as 65. All patients were subjected to detailed history taking about their symptoms and a thorough and meticulous clinical examination. They were subjected to SNOT score evaluation as well as to document the severity of symptoms and endoscopic examination and CT scan of para-nasal sinuses.

After thorough counseling about the procedure the patients were subjected to endoscopic sinus surgery (ESS). Out of 42 patients, 38 were operated under local anaesthesia and 4 patients who were not cooperative for local anaesthesia were operated under general anaesthesia. Broadly the ESS included uncinectomy, middle meatalantrostomy, anterior or total ethmoidal clearance, sphenoidal and frontal recess clearance. Additional procedures like septoplasty, turbinoplasty and middle turbinate resection was also performed in selected cases. After the completion of procedure a cotton ribbon wick soaked in 1ml of Mitomycin-C (MMC) in a concentration of 0.4mg/ml was placed in middle meatus for a period of 4 minutes with an idea of decreasing post op synechia formation. Discussion regarding its role in prevention of adhesion formation is not discussed here. One vial contains 2 mg of MMC which was diluted with 5ml sterile water to obtain the above concentration.

Follow up visits were done at weekly interval for 1 month, 2 and 3 months and evaluation was done at 3 months follow-up. At follow up visit the following factors were evaluated

- Subjective parameters-facial pain/pressure, nasal block, discharge and hyposmia and SNOT-20 score.
- Endoscopic parameters - Presence of adhesions/synechia, crusting, discharge, polypoidal changes.

Adhesions were noted as per the types A to D, Type A : Adhesion at the junction of anterior end of middle

turbinate and lateral wall, Type B: Partial adhesion between middle turbinate and lateral wall, Type C : Complete adhesion between middle turbinate and lateral nasal wall with obliteration of middle meatus and Type D : Adhesion between middle turbinate or inferior turbinate with septum<sup>5</sup>.

For the measurement of osteal size graduated suction tip was used. For maxillary sinus ostium following grades were used. Grade 1— 0 to 5 mm, Grade 2 – 6 to10mm and Grade 3 - > 10mm

**Statistical analysis:** Statistical analysis was done using SPSS-16 trial version and apart from demographic data of cases, paired t test, Wilcoxon signed rank test, Mc Nemer’s test were used and p<0.05 was considered as significant.

**RESULTS**

In this study of 42 cases, we had 22 male & 20 females cases, aged ranged from 17 to 66 years with mean 32.3±11.95yrs (17-66years, p=0.43). In 42 cases,

in these 23 patients were operated bilaterally and 19 unilaterally thus totally making 65 sides.

All 42(100%) patients presented with nasal obstruction and in 40 patients it was of more severe nature (e” grade 3). The other symptoms in order of frequency of presentation were- nasal discharge in 32 (76.1%) facial pain in 29 (69%), & hyposmia in 8(19.4%) patients. When assessed 3 month post-operatively, facial pain was relieved in 28(96.6%) of 29 patients, nasal obstruction was relieved in 15(35.7%) patients and improved to grade 1 in 26(61.9%) cases, and nasal discharge was relieved in 7(21.9%) cases and improved to grade 1 in 21(65.6%) of 32 patients. Out of 8 cases of hyposmia, 2 cases had improvement in severity from grade 2 to grade 1, and 2 cases continued to have grade 4 hyposmia. For facial pain, nasal discharge, nasal obstruction the post-operative score improvement was statistically significant (p<0.001) and for hyposmia also it was significant (p=0.046). The mean post-operative score was 1.59±1.08 (decreased by 80%) and mean difference was 6.64±1.80 which was statistically significant (p<0.001, Table 1).

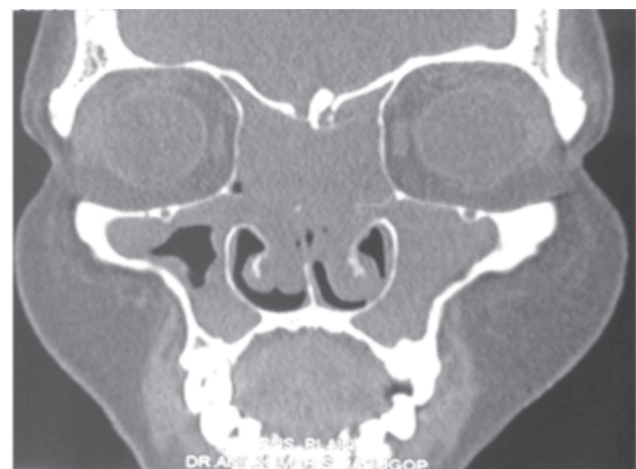
**Table 1: Pre & post operative Symptoms**

Symptoms	Severity grading-Pre-op							Severity grading -3 Months Post-op							Statistical TestApplied
	0	1	2	3	4	5	Total	0	1	2	3	4	5	Total	
Facial pain	13	0	5	15	9	0	42	41	1	0	0	0	0	42	p<0.001
Nasal obstruction	0	1	1	12	26	2	42	15	27	0	0	0	0	42	p<0.001
Nasal discharge	10	4	7	18	3	0	42	17	25	0	0	0	0	42	p<0.001
Hyposmia	34	2	4	0	2	0	42	34	6	0	0	2	0	42	p=0.046
Mean of pre-op score								8.24± 2.34							
Mean of post-op score								1.59± 1.08							
Mean difference								6.64± 1.80							
Paired t-test								p<0.001							

Pre-operative endoscopy (Lund Kennedy Score) – 42 patients constituted 84 sides endoscopically. Discharge was present in 65 sides, odema was present in 64 sides and polyp was present in 24 sides. Mean Lund Kennedy score(out of 6) on right side was 2.3±1.74 and on left side was 2.9±1.62.

CT scan PNS (Lund Mackey score) details were noted to know the involvement of sinuses and extent of disease. The mean score on right was 4.59±3.71 and on left side was 5.19±3.24 (Fig 1)

Procedures done- In 42 patients, 23 patients underwent ESS bilaterally and 19 patients unilaterally thus making total of 65 sides of surgery. Out of these 65 procedures uncinectomy was done in 64(98.5%),



**Fig. 1. CT scan showing involvement of frontal, maxillary and ethmoidal sinuses bilaterally.**



middle meatus antrostomy with osteomeatal clearance was done in 62 (95.4%), total ethmoidectomy was done in 33 (50.7%), anterior ethmoidectomy was done in 15 (23.1%), frontal recess clearance in 18 (27.7%), sphenoid sinus clearance in 21 (32.3%).

At third follow up we had 2(3.1%) cases with synechiae (Type A), no crusting, polypoidal mucosa in 1(1.5%) and discharge in 3(4.6%) cases. At third follow up we had 59 Grade 2 and 3 Grade 3 cases which shows progressive narrowing of maxillary sinus ostium from first to second and from first to third follow up, which was statistically significant (p<0.001-McNemer’s test). No local or systemic side-effects of MMC application were noted in any of our patients.

**Pre & post operative SNOT score comparison**

In this study SNOT was divided into four domains<sup>7</sup> and comparison was done pre and post operatively at

the end of 3 months. Patients subjectively improved in Rhinologic domain (5 questions) - need to blow nose, sneezing, runny nose, post-nasal discharge and thick nasal discharge. On statistical analysis the improvement in these rhinologic domain was significant(p<0.001).

Ear & facial symptom domain contained four questions- ear fullness, dizziness, ear pain, and facial pain/pressure. There was improvement in this domain. With respect to dizziness the improvement was not significant (p=0.102). Sleep domain contained three questions- difficulty falling asleep, waking up at night, and lack of good night’s sleep, which showed significant statistical improvement (p<0.001). Psychological domain contained six questions- fatigue, reduced productivity, reduced concentration, frustration/restlessness/ irritability, sadness, and embarrassment. In this domain also there was significant statistical improvement (p<0.001, Table. 2)

**Table 2: Comparison of pre-operative and post-operative SNOT-20 score**

Snot	Pre Op					No. of Patients Affected	Post Op					AWilcoxon's Signed Rank Test
	Score						Score					
	0	1	2	3	4		0	1	2	No. of Patients affected		
1. Need to blow nose	6	6	16	9	5	36	16	25	1	26	p<0.001	
2. Sneezing	14	10	7	8	3	28	21	17	4	21	p<0.001	
3. Runny nose	8	8	6	17	3	34	12	27	3	30	p<0.001	
4. Cough	21	10	8	3	0	21	34	8	0	8	p<0.001	
5. Post-nasal discharge	16	5	11	10	0	26	29	13	0	13	p<0.001	
6. Thick nasal discharge	16	3	14	8	1	26	30	12	0	12	p<0.001	
7. Ear fullness	27	11	3	1	0	15	38	4	0	4	p=0.001	
8. Dizziness	39	1	2	0	0	3	42	0	0	0	p=0.102NS	
9. Ear pain	34	4	3	1	0	8	40	2	0	2	p=0.016	
10. Facial pain/pressure	12	2	6	11	11	30	16	23	3	26	p<0.001	
11. Difficulty falling asleep	11	9	14	4	4	31	24	17	1	18	p<0.001	
12. Wake up at night	13	12	10	5	2	29	33	8	1	9	p<0.001	
13. Lack of a good night’s sleep	9	13	9	9	2	33	27	14	1	15	p<0.001	
14. Wake up tired	15	11	11	3	2	27	26	15	1	16	p<0.001	
15. Fatigue	10	14	9	7	2	32	28	13	1	14	p<0.001	
16. Reduced productivity	13	12	13	3	1	29	27	15	0	15	p<0.001	
17. Reduced concentration	8	16	13	4	1	34	26	14	2	16	p<0.001	
18. Frustrated/Restless/Irritable	10	9	17	6	0	32	26	16	0	16	p<0.001	
19. Sad	17	7	13	5	0	25	30	12	0	12	p<0.001	
20. Embarrassed	26	6	8	2	0	16	29	12	1	13	p=0.001	
SNOT	Mean±SD of score											
Mean of pre-op score	25.02±11.55											
Mean of post-op score	7.26±5.01											
Mean difference	17.76±8.17											
Paired t-test	p<0.001											

## DISCUSSION

A study by P. Murthy and Sudipta Banerjee<sup>9</sup> showed that symptoms- facial pain, headache, nasal obstruction, nasal discharge, smell disturbance and overall discomfort improved with statistical significance ( $p < 0.001$ ) but most improved were nasal obstruction and facial pain.

Similarly Netkovski J and Sirgovska B<sup>10</sup> in their study showed Nasal obstruction improved in 87%, post nasal discharge in 74.3%, anterior nasal discharge in 70.5%, headache in 59.4%, and hyposmia in 58.7% of the patients.

Hemant Chopra et al<sup>11</sup> also had improvement in all symptoms especially nasal obstruction (83%) and nasal discharge (86%).

In our study facial pain relieved in 96.6% patients, nasal obstruction was relieved in 35.7% and improved in 61.9% patients (total 97.6%), and nasal discharge was relieved in 21.9% and reduced in 65.6% (total 87.5%) patients after ESS. Improvement in all these symptoms was clinically and statistically significant but in case of hyposmia though the patients improved in severity, it was not statistically significant. The comparison of these studies with our study shows that was overall improvement of symptoms after ESS.

The studies by Browne J P et al<sup>8</sup> and Pynnonen et al<sup>7</sup> showed validation of SNOT and improvement in rhinologic domain, ear & facial symptoms sleep and psychological domains. Accordingly, our study has also shown improvement in these 4 domains of SNOT. This also supports division of SNOT into four domains was methodically sound and clinically meaningful.

## CONCLUSIONS

The symptoms of CRS had remarkable improvement after ESS. SNOT helps to know post-intervention improvement not only in rhinologic symptoms but also in other domains like ear & facial symptoms, sleep and psychological domains.

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**Conflict of Interest:** The authors declare that they have no conflict of interest.

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# Seroprevalence of Transfusion Transmitted (Single and Dual) Infections in Blood Donors of Western U.P. India

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## ABSTRACT

**Background:** Blood transfusion service (BTS) is an integral part of health care system which primarily aims at providing adequate and safe blood. Transfusion transmitted infections (TTI) pose constant threat to safety of recipients of blood. Therefore all donated blood should be screened against these infections.

**Aims & objectives:** This retrospective study was carried out to know seroprevalence of different Transfusion transmitted infections in healthy blood donors of Western U.P. to prevent transmission of diseases.

**Material and method:** Blood units collected from healthy non remunerated, replacement and voluntary donors within blood bank premises of Sharda hospital, Greater Noida, over a period of 6 years (2007-2012) were screened against NACO recommended TTI- HIV, HBsAg, HCV, Syphilis and Malaria parasite.

**Results:** Total donations were 9592. Out of which 330 donors were sero reactive and 18 showed co infections (dual infection). Seropositivity for HBsAg was present in 168 donors (1.75%), HCV - 116 (1.208%), RPR for syphilis 52 (0.54%) and HIV - 12 cases (0.12%). Majority of single and co infections were in 21-40 yrs age group. Co infection was present in 18 cases. RPR done for syphilis was a common positive marker in all 18 cases of co infection. Other infections were HBsAg -11 cases (61.1%), HCV - 6 cases (33.3%) and HIV - one case (5.55%).

**Conclusion:** Blood bank should follow more stringent donor selection criteria and promote voluntary donation. Public awareness regarding mode of spread of TTI and judicious use of blood will reduce the threat of transfusion transmitted infections.

**Keywords:** *Transfusion transmitted diseases, Blood donors, Hepatitis B surface antigen, Hepatitis C virus, Human immune deficiency virus*

## INTRODUCTION

Transfusion of blood and blood products is a life saving intervention in various medical and surgical emergencies.<sup>1</sup> In some instances it can transmit infectious diseases which are fatal. Widman FK has claimed that with every unit of blood transfused, there is 1 % chance of transfusion associated problems including transfusion transmitted infection<sup>2</sup> The infections transmitted by blood are HIV, Hepatitis B and C, Syphilis, Malaria and infrequently Cytomegalovirus, Epstein Barr virus, Brucellosis.<sup>1</sup>

Preventing transmission of these diseases through transfused blood is a great challenge in transfusion

medicine. As per NACO recommendations, screening of donated blood for HIV, HBsAg, HCV, Syphilis and Malaria is mandatory. Screening for these markers not only prevents disease transmission in the recipient but also helps to identify seroprevalence of these infections in apparently healthy donors that helps to judge preventive strategies to be followed in a particular geographical region.

In the past several decades great advancement has occurred in detecting various Transfusion transmitted infections (TTIs). Further advanced ELISA has become commercially available. NACO also recommends 3<sup>rd</sup> or 4<sup>th</sup> generation ELISA for HIV I & II which are 100%

sensitive, to be used at blood banks for screening of donated blood<sup>3</sup> Problems of 'window period', false negative results, genetic variability in viral strains and technical errors still remains unsolved.<sup>3, 4</sup> Although seroprevalence of TTI in blood donors has been studied widely, the data on co infections (more than one TTI) is sparse. The present retrospective study was aimed at identifying the seroprevalence of TTI and patterns of co infections among healthy donors over a period of 6 years.

## MATERIAL AND METHOD

The present retrospective study was carried out at Blood Bank, School of Medical sciences and Research & Sharda hospital Greater Noida over a period of 6 years (January 2007 to December 2012). Blood donors were selected as per standard protocols. All blood units were collected from voluntary and replacement donors within blood bank premises. All blood units were screened for HIV, HBsAg and HCV using ELISA (Biorad/RFCL). Test for Syphilis was done by RPR (Tulip Diagnostics). Test for malaria was done by Para bank (Tulip diagnostics).

The number and distribution of seropositive cases was noted. Further, cases with combination of two infections were labeled as co infection. The number and distribution of co infection was analyzed.

More than two infections were not found in any case in our study.

## RESULTS

Over a period of 6 years, 9592 blood donors were screened for markers of transfusion transmitted diseases. Out of 9592, 8935 (93.15%) were replacement donors while 657 (6.85%) were voluntary donations. Majority of donors were male 9368 (97.69%) and only 224 (2.31%) were females (Table 1). This gender difference can be because of social taboo against blood donation and the fact that a large number of females in India are anemic that renders them unfit for donation.

Out of 9592 donors, 330 were seropositive, including 15 voluntary donors. Eighteen sero positive donors had co infection out of which 17 were replacement donors. Sero reactivity as well as co infection was higher in replacement donors as compared to voluntary donors (table-2)

Table 1: Year wise distribution of accepted donors

Year	Total donation	Voluntary	Replacement	Male	Female
2007	568	73	495	552	16
2008	1538	125	1413	1514	24
2009	1773	68	1705	1738	35
2010	2188	87	2101	2138	50
2011	2113	97	2016	2066	47
2012	1412	207	1205	1360	52
Total	9592 (100%)	657(6.85%)	8935(93.15%)	9368(97.69%)	224(2.31%)

Age wise distribution of accepted and seroreactive donors is shown in table 3. While looking at age group distribution it can be seen that majority of accepted donors-5945/9592 (55.72%) as well as seropositive donors-183/330 (55.45%) were from 21-30 years age group followed by 31-40 year age group that constituted 2596(27.06%) donors with 96(29.09%) seropositive cases. These are sexually active age groups of community and therefore carry high incidence of infection. Sex wise distribution showed 9/224(4.01%) females were seropositive as compared to 321/9368(3.41%) males.

Year wise trends in TTI are shown in table 2&4. 168 cases were positive for HBsAg, 116 for HCV, 52 for

RPR, 12 for HIV. None of the donors was positive for malaria. Of 16 seropositive voluntary donors, 10 were positive for RPR. No voluntary donor was positive for HIV. In 18 cases showing co infection, all cases were seroreactive for syphilis. Eleven of these showed seroreactivity with HBsAg, 6 with HCV and 1 with HIV. seropositivity may indicate promiscuous behavior in regional population and such cases can be potential threat for society to increase STD.

Prevalence of various seromarkers at different ages (Table 5) shows maximum number of co infection in 21-30 years age group.

**Table 2 : Year wise distribution of accepted and seropositive donors**

Year	Donations	HIV positive	HBsAgPositive	HCV Positive	RPR positive	Co infection
2007	V-73R-495	V-0R-0	V-0R-16	V-0R-4	V-0R-1	V-0R-1
2008	V-125R-1413	V-0R-1	V-0R-17	V-3R-21	V-0R-12	V-0R-12
2009	V-68R-1705	V-0R-2	V-2R-25	V-1R-17	V-1R-1	V-1R-2
2010	V-87R-2101	V-0R-8	V-2R-30	V-0R-26	V-1R-9	V-0R-2
2011	V-97R-2016	V-0R-0	V-0R-51	V-0R-30	V-0R-6	V-0R-0
2012	V-207R-1205	V-0R-1	V-2R-23	V-1R-13	V-4R-17	V-0R-0
Total	V-657R-8935	V-0R-12	V-6R-162	V-4R-112	V-6R-45	V-1R-17

V- Voluntary donor, R- Replacement donor

**Table 3: Age group wise classification of accepted and seroreactive donors**

Age group	Accepted donors	Seroreactive donors
18-20	968 (10.09%)	24 (7.27%)
21-30	5345 (55.72%)	183(55.45%)
31-40	2596 (27.06%)	96 (29.09%)
41-50	618 (6.44%)	23(6.96%)
51-60	65 (0.68%)	4(1.2%)
Total	9592 (100%)	330 (100%)

**Table 4: Year wise distribution of seroreactive donors**

Year	Total Donation	HIV	HBs Ag	HCV	RPR positive
2007	568	0(0)	16(2.81%)	4(0.704%)	1(0.176%)
2008	1538	1(0.07%)	17(1.11%)	24(1.56%)	12(0.78%)
2009	1773	2(0.11%)	27(1.52%)	18(1.02%)	2(0.11%)
2010	2188	8(0.37%)	32(1.47%)	26(1.19%)	10(0.46%)
2011	2113	0(0%)	51(2.41 %)	30(1.41%)	6(0.29%)
2012	1412	1(0.07%)	25(1.78%)	14(0.99%)	21(1.49%)
Total	9592	12(0.13%)	8(1.75%)	116(1.21%)	52(0.54%)

**Table 5: Age wise distribution of different seromarkers**

Age group	HIV	HBsAg	HCV	RPR	Total	Co-infection
18-20	0	14	8	2	24	0
21-30	8	96	59	33	196	13
31-40	2	52	36	8	99	03
41-50	2	5	10	9	25	02
51-60	0	1	3	0	4	0
Total	12	168	116	52	348	18

## DISCUSSION

In spite of screening of donated blood with most advanced techniques, TTI continue to be a burden to safe blood transfusion practice. Professional donors and donors with high risk behavior such as drug addicts, homosexuals, and commercial sex workers carry more risk of TTI positivity.<sup>4</sup> Transfusion of blood and blood components is life saving for innumerable patients. On the contrary blood and blood components are one of the important routes for transmission of TTI. In developing countries absolute safe transfusion

is far away which need awareness, education and improved technology for attaining zero level of transfusion acquired infection.<sup>5</sup>

Our study was dominated by replacement donors (93.15%) who were relatives or friends of recipient. Voluntary donors constituted only 6.85% which is far less when compared with Dimple et al & Gagandeep et al who found 31.4% & 45% voluntary donors respectively.<sup>1,4</sup> NACO states number of voluntary donations increased from 9% to 50 % in India from 2006 to 2011.<sup>4</sup> In our study also the number of voluntary

donors increased from 3.97% in 2010 through 4.59% in 2011 to 14.66% in 2012, though the rise is less as compared to Piyush et al, Dimple et al.<sup>1,3</sup>. The overall seroreactivity was 3.44% -3.51% in replacement donors and 2.43 % in voluntary donors. Many studies from different parts of India have documented similar findings of high seroreactivity in replacement donors which can be because of concealing their history of illness and paid donors posing as relatives. The seroreactivity in voluntary donors in our study is higher as compared to Dhar et al (1.09%), Gagandeep et al (0.43%).<sup>4,5</sup> This difference may be because of high prevalence of these infections in this area, low quality donor selection or lack of public awareness. The commonest seromarker among voluntary donors was RPR positivity. As is true for single infection, the co infections were also common in replacement donors - 17/18(94%) were replacement donors.

Age wise distribution of donors showed majority of accepted donors were from 21-40 yrs age (84.53%) which is comparable to Piyush et al – (94%)<sup>3</sup>. Majority of donors were males ( 97.69 %) similar to that of PA Giri et al, Sinha et al - who found 95.27% & 90.36%

contribution from male donors. Partly this gender difference can be explained on the basis of high prevalence of anemia in Indian females, cultural habits and partly to social taboo against donation. Therefore female population should be educated regarding blood donation & encouraged to donate blood by holding camps in Women College, on Women's day, Mother's Day etc. Besides constituting large donor group, 21-40 yrs donors showed highest seroreactivity (84.53% of positive cases) and co infectivity (88.9% cases of co infection). Piyush et al and Gagandeep et al also found similar findings<sup>3,4</sup> This is sexually active group of community therefore constitute major risk group for transfusion transmitted infections. In cases of co infection all 18 were positive with RPR , 11/18 were showing seroreaction for HBsAg ( 61.1% % ) , 6 with HCV ( 33.3% ) 1 with HIV(5.55%) . Co infection rates of HBsAg are comparable to Gagandeep et al & Dhar et al (table6) who found HBsAg co infection in 58.8% and 66.6% respectively<sup>4,5</sup>. Next common coinfections in their study were HIV 49% & 63.3% cases respectively as contrast to 5.55% cases in our study. Both these authors found VDRL co infection in 62.7% & 50% respectively as compared to 100% cases in our study.

**Table 6. Prevalence of co infections in different studies from India**

Study,Duration	HIV+ HBsAg	HIV+ HCV	HIV+ Syphilis	HIV+ HCVHBsAg	HBsAg+ VDRL	HCV+ VDRL	HBsAg+ HCV	HIV+ HBsAg+VDRL
Gagandeep etal(2001-05)	22.7%	4.59%	18.25%	-	22.7%	18.25%	9.1%	4.5%
Dhar etal(2006-11)	23.3%	6.79%	20%	10%	20%	6.7%	10%	3.33%
Present study(2007-12)	-	-	5.55%	-	61.1%	33.3%	-	-

**Table 7. Comparison with other studies of TTI**

Study	HIV	HBsAg	HCV	VDRL
Gagandeep etal	0.6%	1.7%	0.8%	0.7%
Dhar et al	0.1%	0.8%	0.11%	0.13%
P A giri et al	0.07%	1.09%	0.74%	0.07%
Dayal etal	0.19%	2.63%	0.34%	Not done
Dimple Arora et al	0.3%	1.7%	1.0%	0.9%
Present study	0.13%	1.75%	1.21%	0.54%

The commonest seromarker in present study was HBsAg-168/9592 (1.75 %). Detailed analysis and comparison with other TTI studies- revealed that HBsAg was commonest seromarker with a varied seroprevalence from 0.8% (Dhar et al) to 2.63 % (Dayal et al) in different regions of India, followed by HCV( table 7). In India transfusion associated Hepatitis B infection is estimated to be approximately 50% in multiple transfused patients and 1.5% in post surgical patients which indicates merely absence of HBsAg is not sufficient and more appropriate methods like NAT

or IgM anti-HBc should be introduced to minimize the disease transmission<sup>9</sup>.

Mann et al stated that developing countries account for 90% of new HIV cases<sup>10</sup>. It is documented that in 15% of total patients infected with HIV, blood transfusion has been responsible mechanism<sup>11</sup>. But in our study only 0.13% cases were HIV positive showing a low prevalence of the disease in this region. HIV testing was done by 3<sup>rd</sup> & 4<sup>th</sup> generation ELISA. HIV-NAT further reduces the Window period from 16 days

to 10 days as compared to HIV ELISA and thus risk of acquiring HIV from window period blood donor gets reduced from 1 in 4,93,000, to 1 in 9,86,000<sup>12</sup>.

Yearly trends showed a marked increase in RPR cases especially in 2012. Gagandeep et al and Dimple Arora et al also found increasing trends of RPR reactivity<sup>1,4</sup>. Sero- positive blood donors were called for counseling and majority of them gave history of exposure/high risk behavior retrospectively. Although transfusion transmitted syphilis is not a major hazard in modern transfusion medicine<sup>9</sup> but seroreactivity for RPR shows donor indulgence in high risk behavioral activity and possibility of window period for viral infections.

### CONCLUSION

TTI and co infections pose continuous threat for safe blood supplies therefore more stringent donor screening criteria's should be followed for blood donation and voluntary donations should be encouraged. Public awareness regarding criteria's for blood donation, mode of spread of TTI should be made to reduce the rate of seropositivity.

In spite of all these measures, absolute safe blood supply is a far off dream due to window period during infection and therefore judicious use of blood and its components is recommended.

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# Burden of Disease Trends in India in 21st Century

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## ABSTRACT

India has successes in reductions of certain communicable diseases, much more remains to be achieved for non-communicable diseases.

**Communicable Diseases:** The eradication of Smallpox and Guinea worm came about. Plague and vaccine preventable illnesses brought under much control. In 1988 WHO passed resolution for the eradication of poliomyelitis by the year 2000. Leprosy in 1981 was nearly 25% of the world total. Multi-drug therapy reduced prevalence from 57.6 per 10,000 in 1981 to 5.0 per 10,000 in 1995. Tuberculosis: In 1955-1958 nearly 1.5% of the population suffered from radiologically active pulmonary tuberculosis of whom 25% were sputum positive. The HIV-TB co-infection, increased its incidence. Malaria: In 1953 malaria incidence was 75 million cases and 0.8 million deaths annually. It fell down to 0.05 million cases in 1961. Its resurgence in 1977 had nearly 47 million new cases (particularly of Plasmodium falciparum). This was further reduced to 2.5 million cases in 1984. Acute diarrhoeal diseases: It had been a major problem in the past, continued to remain so by the end of 20th century. Each year children below 5 years suffer from 2-3 episodes of diarrhoea and 0.7 million died from it.

**Non-Communicable Diseases:** Prevalence of coronary heart diseases and hypertension in 1990 was higher in urban populations. Cancer: In India in 1992 the increase of cancers in big cities was 80/100,000 people as compared to 289/100,000 in developed countries. Diabetes mellitus: The prevalence rate of diabetes in urban population of four major regions of India has increased from 0.9 - 3.8% in 1978 to 9.5 - 13.5% in 2001. It was observed higher in urban populations. Accidents and injuries in 1999 were on increase and appeared to emerge as the leading causes of morbidity and mortality in the age group of 15 to 34 years. Mental Disorders: In 1911, Overbeck and Wright estimated the prevalence to be 26-28/1000 for the Indian population. Subsequent studies observed it to be 2 to 8% with higher rates in the urban areas. Suicides: There were 89,000 suicides in 1995 in India, increasing to 96,000 in 1997 and 104,000 in 1998.

**Aim and objective:** To study the BOD trends in India in the beginning of 21st Century.

**Material and methods:** It was a retrospective study. Data regarding the burden of major diseases in India in the beginning of 21st century and around it were collected, examined, analyzed and the valid conclusions were drawn.

**Findings:** *Communicable diseases:* Morbidity trend: Eight major communicable diseases reporting around one lakh or more cases annually from the year 2001 to the year 2012 have shown a rising trend. Mortality trend: Thirteen communicable diseases reporting annually, around 100 or more deaths from 2001 to 2011 have shown a trend of rise. During the intervening period fluctuations have been observed for the various diseases.

**Non-communicable diseases:** Morbidity due to non-communicable diseases accounts for the second largest share of the disease burden in India after communicable diseases. The major non-communicable diseases like hypertension, coronary heart disease, diabetes mellitus, cancer, mental disorders and suicides have shown a sharp rising trend from the year 2001 to 2011. Blindness is expected to remain more or less the same during the next two decades.

**Conclusion:** There is the trend of a "protracted" double burden of infectious and chronic diseases in 21st century. Health care delivery system should be reorganized, to reduce BOD both for the communicable and non-communicable diseases. Future research is needed for a deep root level understanding of the epidemiological, socio-economic, genetic, and environmental factors for bringing the control. Effective measures to reduce the BOD may be taken from the primary health care setting level to higher levels.



## INTRODUCTION

Burden of disease (BOD) estimations provide the foundation for interventions for diseases control and to form the public policy. Indian scenario trends of BOD before the dawn of 21<sup>st</sup> century are given below in this introduction and the trends in the beginning of 21<sup>st</sup> century have been studied.

India has many successes with regard to reductions in certain communicable diseases, much more remains to be achieved in the areas of non-communicable diseases, trauma and disaster/outbreak management. Different regions of the world have adopted different measures for assessing health status and disease burden. Lack of uniformity in assessments has led to difficulties in effecting global comparisons of health needs and BOD. The large scale global BOD study initiated by WHO in 1990 provided the much needed answer to the above problem by developing an index called disability adjusted life years (DALY).<sup>1</sup>

### Communicable Diseases

**Smallpox:** A highly contagious, disfiguring and often fatal disease, smallpox was endemic in India with characteristic epidemic spells ranging from 4–7 years and accounted for nearly a third of all deaths in the 18th and 19th centuries. Vaccination was introduced in India in 1802 from England, its impact was felt only beyond the 1880s. The disease claimed over 150,000 lives in the late 1950s in India. The eradication came about, with the last case recorded in Assam in 1975. Global efforts by World Health Organization (WHO) eradicated smallpox from the entire world in 1980 (with the last case occurring in Somalia in 1977).<sup>2</sup>

**Dracunculiasis (Guinea worm):** India has been home to dracunculiasis since ancient times. Since the launching WHO supported National Guinea worm Eradication Programme in 1984, the number of cases has fallen from 40,000 to only 9 cases recorded in three villages of Jodhpur district of Rajasthan by 1996. The last reported case was in August 1996.<sup>1</sup>

**Plague:** India has suffered several outbreaks of plague. In 1895–96, India was caught in the major pandemic with Calcutta and Bombay being the major cities. Plague was a major public health problem until the mid 1940s and subsided thereafter presumably due to large scale spraying of DDT meant for malaria control. The last laboratory confirmed human cases in India were reported in 1966 from Karnataka. India which was presumed to be free of plague, was beset

by 876 cases and 54 deaths – characteristic of presumptive plague between August and October 1994.<sup>3</sup>

**Vaccine preventable diseases:** EPI and UIP in India have brought down the incidence of these vaccine preventable childhood illnesses, thereby lowering the infant and child mortality rates in the country. In 1988 the World Health Assembly passed a resolution calling for the eradication of poliomyelitis from the world by the year 2000.<sup>4</sup>

**Leprosy:** In the pre-independence era, much of the relief work on leprosy was undertaken by missionaries on religious, philanthropic and compassionate grounds. In the post-independence period, introduction of sulphones – has revolutionized the concept of leprosy chemotherapy. National Leprosy Control Programme was launched in 1955. In India there has been a steady increase in estimated leprosy cases from 2.5 million in 1961 to 4 million in 1981, accounting for nearly 25% of the world total at that time. Leprosy cases in India dropped by nearly 80% of the 1981 figure to 0.68 million in 1996 due to the introduction of multi-drug therapy (MDT). Prevalence has thus declined from 57.6 per 10,000 in 1981 to 5.0 per 10,000 in 1995 and remained at that level till March 2000. It is predicted that the chances of resurgence of leprosy following integration would be negligible.<sup>1</sup>

**Tuberculosis:** Tuberculosis, malaria and diarrhoeal diseases once considered to be controlled have re-emerged. Even today India bears nearly 25% of the global burden of tuberculosis.<sup>5</sup> The ICMR National Sample Survey (NSS) in 1955–1958 and other subsequent studies revealed that nearly 1.5% of the population suffers from radiologically active pulmonary tuberculosis of whom 25% are sputum positive. The HIV–TB co-infection, may increase the incidence of tuberculosis from the present 1.8 per 1000 (9th Plan).<sup>6</sup> Though mortality rates have fallen considerably from 800/100,000 people in 1920, to 462/100,000 in the mid-1950s and between 40–80/100,000 at present, the number of people dying due to TB annually continues to be over half a million. Morbidity continues to remain high with TB constituting nearly 3.7% of DALY losses due to communicable diseases in the country (World Development Report, (1993)).<sup>7</sup>

In India drug resistant tuberculosis has been encountered and associated with the introduction of short-course chemotherapy (SCC) and MDT. Compared to global prevalence of 48%, multi-drug

resistant tuberculosis has been found to vary from 0–6% in most regions of India.<sup>8</sup>

The government of India initiated a National Tuberculosis Control Programme in 1962. In 1993, a Revised National Tuberculosis Control Programme (RNTCP) was implemented as a pilot project covering 13.85 million and later scaled up in 1999 to cover over 130 million people. An important component of RNTCP is Directly Observed Treatment – Short Course (DOTS).<sup>1</sup>

**Malaria:** Right from the pre-independence era malaria has been a major public health problem. Spraying of DDT in the late 1940s on an experimental basis in hyper-endemic areas proved a turning point in the history of malaria control. In 1953 at the time of the launching the National Malaria Control Programme, malaria incidence was of the order of 75 million new cases and 0.8 million deaths annually. This led to the conversion of the National Malaria Control Programme

to an Eradication Programme in 1958. Under this scheme within 5–7 years malaria was successfully controlled from nearly 3/4th of the country and incidence rates fell from 75 million new cases in 1953 to 0.05 million cases in 1961.<sup>5</sup>

India experienced a resurgence of malaria (particularly *Plasmodium falciparum*) with new cases touching 47 million mark in 1977. In 1977, therefore, a modified plan of operation was launched. This led to the stabilization of the incidence of malarial cases to approximately 2.5 million cases since 1984 to the present and about 1122 deaths in 1994. A revised strategy to control malaria was launched by National Malaria Eradication Programme (NMEP) in 1995. In addition to early detection and prompt treatment, it entailed adoption of an integrated and intersectoral approach to malaria control supported by promotion of IEC and community participation.<sup>1</sup>

#### **Acute diarrhoeal diseases:**

*Diarrhoeal diseases which have been a major problem in the past continue to remain so even today (by end of 20<sup>th</sup> century).* It is estimated that each year children below 5 years suffer from 2–3 episodes of diarrhoea and 0.7 million die from it. *Coverage of safe water has improved considerably from a meagre 4.5% in 1947 to 80% in 1997.*

<sup>1</sup> At the time of independence only 2% enjoyed adequate sanitation. During the first three five year plans safe water supply and sanitation were included

as part of the health budget. However, by the fourth five-year plan, health was dissociated from water supply and sanitation.<sup>9</sup>

#### **Non-Communicable Diseases**

**Coronary heart diseases and hypertension:** Community-based epidemiological studies in 1990 suggest that the prevalence of coronary heart diseases (CHD) as well as hypertension is higher (65–97/1000) in urban population as compared to rural populations (10–27/1000). The total prevalence rate of CHD based on a Delhi study was found to be 31.9/1000 adults. It was 39.5/1000 in males and 25.3/1000 in females.<sup>10</sup>

**Cancer:** Approximately 12% of all deaths in the world is attributed to cancers of various forms. In India the increase of cancers in Bangalore, Bombay and Madras in 1992 was 80/100,000 people as compared to 289/100,000 in developed countries as stated by WHO in 1996. The leading sites of cancer are oral, lung, oesophagus and stomach cancers among men and breast, oral and cervix in women as stated by ICMR in 1994–95. Oral cancers account for 50 to 70% of all cancers in India compared to 2–3% in the UK and USA.<sup>11</sup>

**Diabetes mellitus:** In India, the prevalence of diabetes mellitus (DM) is estimated between 2 and 3% in rural and urban populations, respectively. A multicentric ICMR study in 1999 revealed that the prevalence for the country as a whole was 1.73% for those over 15 years of age. Prevalence in urban populations was estimated to be between 0.95% to 3.8% while that for rural areas ranged between 0.60% and 1.93%. WHO states India as the “diabetic capital of the world” which is likely to house the highest number of diabetics (over 57 million) by the year 2025.<sup>1</sup> Studies have shown that the prevalence rate of diabetes in urban population of four major regions of India has increased from 0.9 - 3.8% in 1978 to 9.5 - 13.5% in 2001.<sup>12</sup>

**Accidents and injuries:** Accidents and injuries are on increase and appear to emerge as the leading causes of morbidity and mortality in the age group of 15 to 34 years. Between 1957 and 1979 there has been an increase of 461% in deaths due to traffic accidents in Delhi. From 1971 to 1991 India recorded a 277% increase in road traffic fatalities as reported by WHO in 1996. India has a fatality rate in road accidents that is 20 times that of developed countries. Registrar General of India has stated data recorded for all injury

related fatalities reflect 20–30% of the actual. Accidents and injuries account for 17% of DALY losses in the country as reported by World Health Report 1999.<sup>1</sup>

### Mental Disorders

As early as 1911, Overbeck and Wright estimated the prevalence to be 26–28/1000 for the Indian population.<sup>13</sup> Subsequently, the mental health advisory committee of India in 1999 estimated the prevalence to be 2% of the total population.<sup>14</sup> In 1998 a meta-analysis reported the total prevalence to be 58/1000 with 48.9/1000 for the rural population and 80.6/1000 for the urban population.<sup>15</sup> Some major Indian studies, computed the total rate to be 73/1000.<sup>16</sup>

India has a high rate of suicides; 89,000 persons committed suicide in 1995, increasing to 96,000 in 1997 and 104,000 in 1998, which is a 25% increase over the previous year (WHO 2001b). The burden of mental disorders is highest among young adults aged 15-44 years, which is the most economically productive section of the community. India spends just 0.83% of its total health budget on mental health (WHO 2001a).<sup>17</sup>

While DALY losses due to infectious diseases are expected to decline from 56% in 1996 to 25% by 2020, the same due to non-communicable diseases on the other hand is projected to increase from 29% in 1990 to over 57% in 2020.<sup>18</sup>

Thus, keeping the situation stated in the above paragraphs in consideration, the study was designed.

### AIM AND OBJECTIVE

To study the trends of burden of disease in India in the beginning of 21<sup>st</sup> Century.

### MATERIAL AND METHOD

**Study design:** This was a retrospective study. **Methodology:** Data regarding the burden of major diseases in India particularly in the beginning of 21<sup>st</sup> century and around it<sup>19-22</sup> were collected, examined, analyzed and the valid conclusions were drawn.

### FINDINGS

Findings of this study are shown in tables of communicable diseases and salient features of non-communicable diseases and accidents in India from 2001 to 2012.<sup>19,20</sup>

### Communicable diseases: Morbidity trend:

Morbidity trend of eight major communicable diseases reporting around one lakh or more cases annually from the year 2001 to the year 2012 is shown in table 1A and 1B. Total disease burden reported in the country has increased during these years as there were 33680330 cases of communicable diseases in the year 2001 and 48298257 in the year 2012. Total disease rate per lakh population has also increased during these years. It was 3265 in the year 2001 and it has reached 3837 in the year 2012. Disease burden of malaria has shown a gradual decline. All viral infections have also shown some fluctuations and decline. The remaining diseases have shown a gradual rising trend with some fluctuations.

**Mortality trend:** Mortality trend in respect of thirteen communicable diseases reporting annually, around 100 or more deaths from 2001 to 2011 is shown in table 2A and 2B. The overall number and rates of deaths of communicable diseases observed have shown a trend of rise from the year 2001 to 2011. The number of deaths in the year 2001 was 37147 and in the year 2011 it has increased to the level of 72636. The rate of deaths per lakh population in the year 2001 was 3.615 in the year 2011 and that has reached to the level of 6.081. During the intervening period fluctuations have been observed for the various diseases.

There are many other communicable diseases like HIV, H1N1, Rabies etc. that further add minor burdens of disease.

### Non-communicable diseases:

Many parts of India are experiencing a growing burden of non-communicable diseases. Joshi et al. in 2006 show that noncommunicable and chronic diseases are the leading causes of death in rural India. The study was conducted in 45 villages in East and West Godavari in Andhra Pradesh and has an estimated population size of 180162. Mortality data were recorded through an ongoing surveillance system and information on causes of death was ascertained using the verbal autopsy for 98% of deaths. A specific underlying cause of death was assigned for 82% of all verbal autopsies. The leading causes of death were diseases of the circulatory system (32%), injury and external causes (13%), infectious and parasitic causes (12%), neoplasms (7%) and respiratory diseases (5%).<sup>21,22</sup>

Morbidity due to non-communicable diseases accounts for the second largest share of the disease

burden in India after communicable diseases<sup>19,20</sup>.

**(a) Hypertension:** Studies conducted for the prevalence of hypertension with different sample sizes in the different groups above 18 years of age in the urban and rural areas are shown in table 3. These studies show that the prevalence of hypertension is rising with the age and passage of time.

**(b) Coronary heart disease:** The estimated numbers of the cases of coronary heart disease from the year 2000 to 2015 are as shown in table 4. This was 27040912 in the year 2000 and for year 2015 it is estimated to be 61522343. It depicts that about 146% disease burden is to be added.

**(c) Diabetes mellitus:** The number of estimated cases of diabetes mellitus is shown in table 5. It was estimated to be nearly 25814117 for the year 2000, which is expected to reach a figure of nearly 45809149 cases in the year 2015. It depicts that about 83% disease burden is to be added.

**(d) Cancer:** The number of projected cases of cancer is shown in table 6. It was estimated to be nearly 946172 for the year 2008, which is expected to reach 1148758 cases in the year 2020. It depicts that about 21.7% disease burden is to be added during these years.

**(e) Accidents:** Incidence of deaths due to accidents in India from 2003-2011 is shown in table 6. It was 259625 in the year 2003 while it reached 390884 in the year 2011.

**(f) Mental disorders:**

**Prevalence:** Studies in 1998 & 2001 show that point prevalence of major mental and behavioral disorders in India was estimated at 65/1000 population in all ages and both sexes.

For the year 2001, an estimated 67 million people with major mental disorders, 20.5 million with Common Mental Disorders and 10 million with alcohol dependency problems required services in India.<sup>22</sup>

A WHO and India's Ministry of Health and Family Affairs, coordinated study done in 11 centres across India on mental health in the year 2009 indicates that about 10% of the population in India have mental health problems.<sup>23</sup> National Health Profile 2010 shows that major mental disorders rate has reached 1% and that of minor mental disorders to the level of 5 % of

the population<sup>21</sup>.

**Disability:** Mental disorders in 2000, accounted for 12.3% of disability adjusted life years (DALY) and 31% of years lived with disability. Projections suggest that mental disorders will increase to 15% of DALY by 2020.

**Number of commission of suicides:** In (a) 1995: 89,000 (b) 1997: 96,000 (c) 1998: 104,000 (d) Age group with highest burden

The burden of mental disorders is highest among young adults aged 15-44 years and it is projected that India will see substantial increases in these in the next two decades.

**(g) Blindness**

Estimated prevalence of blindness in 2004 was 11.2 (10.2 among male and 12.2 among female) per thousand population and is expected to remain more or less the same during the next two decades.

## CONCLUSION

This study indicates that in the beginning of 21<sup>st</sup> century India has the trend of a "protracted" double burden of infectious and chronic diseases that constitute major causes of morbidity and mortality. French called this a protracted polarized model of epidemiological transition<sup>24</sup>. Observations contrary to this have been made by Gupta et al in 20011.<sup>1</sup> This shows that measures for the prevention, control and eradication of communicable diseases especially for the emerging and re-emerging infections should be continued with enhanced efforts in the areas of the country with high prevalence. BOD of major non communicable diseases has shown a rising trend in all adult age groups. More than half of this rise can be accredited to demographic change but the contribution of increased prevalence of risk factors is also substantial.<sup>21, 22</sup> *Health care delivery system* should be reorganized and the health budget to be increased further, national health programmes should be formulated both for the communicable and non-communicable diseases keeping the BOD in view and rapid response is needed to contain the emerging and re-emerging communicable diseases. *Future research* is needed for a deep root level understanding of the epidemiological, socio-economic, genetic, and environmental factors for bringing the control and reducing the BOD. From this study it is observed that though the specific disease targeted programmes and measures have succeeded in eradication and bringing

down the numbers and percentage of certain diseases like small pox, guinea worm disease, polio, plague, vaccine preventable diseases etc. but the overall disease burden of the communicable diseases is far from reduction. This may be attributed to the emerging and re-emerging infections or better methods of detection and reporting system of these diseases. The proportionate increase in BOD of non-communicable diseases is higher than that of the communicable diseases. Hence, further studies regarding this need to be conducted so that the effective measures for the prevention and control of these may be taken from the primary care setting level to other higher levels.

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# A Study on Patient Satisfaction through Extemporaneous Responses from Patients in a Tertiary Care Hospital

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## ABSTRACT

Understanding satisfaction and service quality have, for some considerable time, been recognized as critical to developing service improvement strategies. The inaugural quality assurance work of Donabedian (1980) identified the importance of patient satisfaction as well as providing much of the basis for research in the area of quality assurance in healthcare<sup>1</sup>. Based on this a study was conducted at Nizam's institute of medical sciences, a renowned tertiary care hospital, with a very short questionnaire consisting of two questions to know spontaneous responses from patients / attendants about services which gave them maximum satisfaction and dissatisfaction. Results showed that the most satisfying factor was doctors services rendered to the patients and the most dissatisfying factor was regarding housekeeping services of the hospital. It could be noted that majority of patients were happy with doctor services, but considerable portion of patients showed dissatisfaction towards nursing and housekeeping services, which are to be considered seriously by the hospital management. Few patients responded with communication gap with doctors and other hospital staff. Around half of the patients showed dissatisfaction because of delay in services. On the whole patient satisfaction is mediocre and has great scope for improvement, which can be done through proper planning, monitoring and appraisal.

**Keywords:** Patient Satisfaction, Patient Reported Service Quality and Quality of Health Care

## INTRODUCTION

Patient satisfaction and experiences are important parts of healthcare quality, but patient expectations are seldom included in quality assessments. The inaugural quality assurance work of Donabedian<sup>1</sup> (1980) identified the importance of patient satisfaction as well as providing much of the basis for research in the area of quality assurance in healthcare. In the healthcare sector, the importance of measuring patient satisfaction is well articulated (Lin and Kelly, 1995)<sup>2</sup> with patient satisfaction having been studied and measured extensively as a standalone construct and as a component of outcome quality (Heidegger et al., 2006) and in particular in quality care assessment studies (Sofaer and Firminger, 2005)<sup>3, 4</sup>. Four different approaches have been described in a systematic review of the patient-satisfaction literature: approaches based on expectations; approaches based on health-service attributes; economic approaches; and holistic Approaches<sup>5</sup>.

A hospital can survive only if it can maintain optimum level of patient satisfaction. Unfortunately it is almost impossible to satisfy all the patients as the expectations of patient vary based on type of patient, their level of income, nature of treatment and mode of payment. Further, both Crowe et al. (2002) and Urden (2002) separately point out that patient satisfaction is a cognitive evaluation of the service that is emotionally affected, and it is therefore an individual subjective perception<sup>8, 9</sup>. In semi government hospital like NIMS poor patients, patient from credit organizations form major share of clientele and on the other hand hospital's reputation for good medical services also attracts considerable number of VIP patients. Hence, there is a need to satisfy both the categories to the most possible extent. Based on this a study was conducted at Nizam's institute of medical sciences with a very short questionnaire consisting of two questions to know spontaneous responses from patients / attendants about services which gave them maximum satisfaction and dissatisfaction. A patient may have

many experiences during hospital stay, but spontaneous response makes them express most satisfactory and dissatisfactory services. This would guide hospital administration to strengthen patient satisfaction and thereby hospital reputation, by rendering improved services in dissatisfactory areas.

### **AIM AND OBJECTIVES:**

To analyze the satisfying and dissatisfying factors of a patient, during hospital stay in a tertiary care hospital.

### **METHOD AND METHODOLOGY**

A study was conducted for one month randomly with mere two questions, the most satisfied service and most dissatisfied service with patients / attendants during their hospital stay. The questionnaire was translated to the local language to get proper responses and was collected by both medical and non medical hospital administrators. Adequate care was taken to cover all categories of patients from remote places to city dwellers, children to aged patients, those from different departments in the study. In case of patients being treated in ICU's information has been collected from their attendants. Descriptive statistics were used to analyze the data obtained. There is no consensus on how to best conceptualize the relationship between patient satisfaction and their perceptions of the quality of their healthcare. O'Connor and Shewchuk (2003) emphasised that much of the work on patient satisfaction is based on simple descriptive and correlation analyses with no theoretical framework<sup>10</sup>.

The following questionnaire was distributed in all patient care areas in the Nizam's institute of medical sciences.

1. During your stay in the hospital please mention the category of service, you are most satisfactory with?
2. During your stay in the hospital please mention the category of service, you are most dissatisfactory with?

### **OBSERVATIONS**

Most of the participants gave more than one answer to each question. The whole responses were compiled

and grouped into following seven groups for further analysis.

#### **Doctor's Services**

1. Feed back about patient's illness
2. Time spent with patients
3. Most of the times only junior doctors were examining the patients.
4. Attitude and behavior of the doctors

#### **Nursing services**

1. Sympathetic / vehement behavior
2. Time spent with patients
3. Response by nursing staff to their problems
4. Attitude and behavior of the Nurses
5. Administration of medication

#### **Housekeeping services**

1. Cleanliness
2. Bribing
3. Attitude and behavior of the class IV employees
4. Inconvenience caused due to pests and mosquitoes
5. Same person is doing cleaning of bathrooms and bed making.
6. Rough handling of patients while shifting from theatres, ICU's etc.

#### **Canteen services**

1. Quality of food.
2. Cleanliness of serving utensils
3. Taste of food served.

#### **Accommodation**

1. Prolonged waiting for allocation of ward beds.
2. Delay in allocation of special rooms.
3. Patients are being kept in ICU's due to lack of vacant beds in wards



**Communication**

1. Lack of information regarding Whereabouts of the patient
2. Lack of information regarding doctors availability
3. Lack of guidance in getting essential certificates, estimation, insurance certificates etc.
4. Lack of guidance for location of diagnostic areas

**Waiting time**

1. Delay in registration of white cards.
2. Delayed O.P billing procedures.
3. Time lapses in getting refund of money.
4. Delay in getting doctor consultations.

**Table 1: Responses given by patients /attendants on hospital services**

	Total Number of Patients with Satisfaction		Total Number of Patients with Dissatisfaction	
	Number	Percentage	Number	Percentage
Doctor Services	394	82%	70	14%
Nursing Services	148	31.4%	269	57.2%
Housekeeping Services	75	14.7%	369	72.3%
Canteen services	20	03.7%	190	35.6%
Communication	35	06.5%	270	50.6%
Bed Accommodation	—	—	237	44.7%
Waiting Time	—	—	280	52.5%

**RESULTS**

A total of 530 patients from all patient care areas were covered. The objective behind the design of questionnaire was to elicit one spontaneous satisfying service and one dissatisfying one. It was very encouraging to note that most of the patients (table-1) were satisfied with the care and treatment provided by doctors. 14% of patients expressed feeling of discomfort regarding few issues like some doctors spending less time with them, lack of feedback from consultants, follow up being done only by junior doctors and lack of attention from senior consultants. About 57.2% of patients felt that nursing services were not good, while only 31.4% patient were satisfied with nursing care. It is heartening to note that as much as 72.3% of patients were unhappy with the house keeping services, like cleanliness, hygiene, attitude of workers. 35.6% of patients felt that Canteen services were not up to the mark and needs improvement while rest did not comment about it. It is very unfortunate to note that 50.6% of patients / attendants were not getting proper information/communication regarding patients' condition, results of lab tests etc. A special mention needs to be made of very few departments, where patients/ attendants were very much satisfied with doctors for explaining their condition and treatment given in detail. 44.7% of patients were dissatisfied with delay in providing bed

accommodation by management and a total of 52.5% patients replied that they were subjected to excessive delays at various areas of the hospital leading to increased length of stay, which needs immediate attention. Some of the patients expressed their dissatisfaction for not having lounge, and also regarding civil and electrical problems leading to inconvenience.

**DISCUSSION**

The main objective of this short questionnaire is to find out the main satisfaction area and dissatisfied area, so that necessary steps can be taken by the management to maintain the same or even higher standards in areas with greater percentage of patient satisfaction and to identify bottlenecks in the services which are not up to the expectations and take necessary measures for their rectification. It has to be remembered that if certain percentage of patients are satisfied with particular service, it does not mean that all others are dissatisfied and vice versa, as they might not have given their opinion regarding that particular service. The concept of felt needs and real needs can be applied for this pilot study. Felt needs are the expected standard of hospital services by the patient, while real needs refer to standard of services to be given as per the protocol of the organization. The management should put maximum efforts to correlate

both to the maximum within the limitations of hospital. A study by Gotlieb et al. (1994) on patient discharge, hospital perceived service quality and satisfaction offered evidence of a clear distinction between perceived service quality and patient satisfaction<sup>11</sup>.

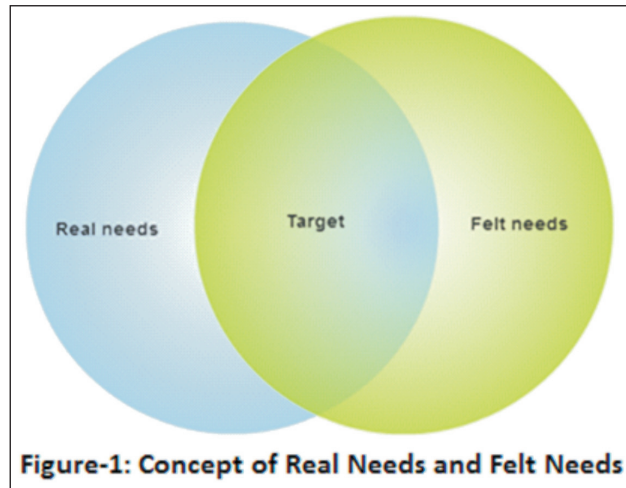


Fig. 1. Concept of Real needs and Felt needs

The feedback clearly indicates that there are few major and minor problems, which need immediate attention from the authorities and results showed that the most satisfying factor was doctors services rendered to the patients and the most dissatisfying factor was regarding housekeeping services of the hospital.

When the patient's opinion given on the Medical and Doctors services is considered, 82% of patients were feeling happy about doctor services. 14% of patients were unhappy regarding lack of feedback of illness and progress, consultants spending less time with them and junior doctors being given maximum responsibility of their treatment instead of senior consultants. These issues can be solved through recruiting sufficient medical staff, delegation of work and responsibilities among senior and junior faculty and preparing proper schedule to interact with the patients and patient's attenders.

Nursing care is the backbone of any successful health care organization. 57.2% patients felt deficit in sympathetic, courteous behavior, timely drug administration from nursing staff. Excess work burden, lack of sufficient staff and lack of motivation may be the cause of above. Therefore continuous motivation and training programs & recruitment of sufficient staff would solve the problem to greater extent.

The image of the hospital always depends upon clean hygienic surroundings, which also show effect on patients' psychological condition. As considerable percentage of patients are dissatisfied with workers attitude, cleanliness, bribing etc. the management has to give top priority to rectify this problem and stringent action should be taken against workers not performing their duties in a proper way. Regular monitoring by senior housekeepers is must to check bribery and lack of cleanliness. Patients and attendants also should be made aware of importance of keeping their surroundings clean through posters, slogans etc<sup>7</sup>.

Around 35.6% of patients are complaining that the food supplied by canteen was not tasty and some are complaining that the food is not in accordance with the nutritional standards prescribed by doctors. This problem can be taken care of by, regular monitoring by administrative staff and preparation of food under guidance of diet specialists. Cleanliness of cooking area and utensils should be specially taken care of.

One of the key factors for success of a hospital is having good communication system to guide patients at various stages like to guide them to specific consultants, Lab areas, various wards, billing area etc. communication between patient and consultant, consultant and nursing staff, patient and nursing staff is also equally important. In a study on conversational approach, published in encyclopedia of hospital administration and development, all the doctors expressed usefulness of approach for doctor – patient relation and none denied it<sup>6</sup>. Not to forget patient has right to know what is being done to him and what his problem is. 50.6% of patients are having the problem with identification of diagnostic areas, information about doctor's availability, patient's whereabouts, how to get estimation certificate, reimbursement and insurance details. The management and departmental staff has to take remedial measures to solve this through fixture of sufficient number of sign boards to guide patients, provide all the necessary information at the reception counter courteously, get location of various wards, Diagnostic facilities written on the wall in O.P waiting area in local language and appoint sufficient Public relation officers to guide the patients.

52.5% of patients were complaining that they have had bitter experience of excessive delays in getting investigations, delay in consultation, delay in OP billing procedures, abnormal delay in getting surgeries done etc . There should be a combined effort from management and department personnel in bringing

down the delay with proper coordination between various departments and proper planning. Decreased length of stay is advantageous not only to the patients but also brings more revenue to the hospital as more number of patients can be treated within short time. Some of the patients had been facing the problem in getting beds, both in general ward & special rooms. This problem cannot be completely eliminated keeping in view heavy patient clientele to the hospital but can be brought down to some extent through decreasing length of stay of patients. Further effective use of beds can be achieved only when patient deserve admissions are hospitalized and the O.P services should be efficiently conducted to minimize demand as in patient services.

During our feedback few patients/ attendants mentioned minor problems like lack of lounge for EMD, lack of toilets especially for ICU's patient attendants, and regarding civil and electrical problems, which can be easily rectified by planning and allocating funds towards them.

### CONCLUSION

The very purpose of this questionnaire was to find out major positive and negative aspects of the various kinds of services being provided at NIMS. The feedback clearly indicates that there are few major and minor problems, which need immediate attention from the authorities and results showed that the most satisfying factor was doctors services rendered to the patients and the most dissatisfying factor was regarding housekeeping services of the hospital. It is efficient medical services, which are attracting patients from throughout the state in spite of deficiencies in other areas. Patient satisfaction monitory system has to be implemented as the public is becoming more sophisticated in knowledge of disease process and more demanding for consumer accountability from the health professionals. On the whole patient satisfaction is mediocre and has great scope for improvement, which can be done through proper planning, monitoring and appraisal.

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# Variation in the Mode of Origin and Level of Formation of Sural Nerve

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## ABSTRACT

Variations of nerve are not only of anatomic and embryological interest but also of clinical importance. Their adequate knowledge will help in increasing surgical precision and decreasing morbidity. In present study variations in mode of origin and level of formation of sural nerve was studied. The material for the present study comprised of 60 lower extremities belonging to 30 adult human cadavers obtained from Deptt. of Anatomy, GMC, Amritsar. The sural nerve was identified and its mode of origin and level of formation was studied. In present study, sural nerve was formed by union of medial sural nerve (from tibial nerve or from nerve to medial head of gastrocnemius) and lateral sural nerve (from common peroneal nerve) in 83.33% limbs. It was formed by medial sural nerve alone in 15% limbs. In 1.67% medial and lateral sural nerve were separate. The site of formation was in middle 1/3rd of leg in 20% limbs and distal 1/3rd of leg in 80% limbs.

The sural nerve is usually used as grafting material. So these described variations are helpful for planning operative approaches that minimise risk of sural nerve injury. Moreover the anatomic course of nerve in distal leg and ankle makes it susceptible to local trauma and also to increased risk of injury during surgical intervention at ankle.

**Keywords:** Medial Sural Nerve, Lateral Sural Nerve, Nerve Injury, Grafting Material

## INTRODUCTION

The sural nerve is a sensory nerve that originates in lower leg and provides sensory innervations to lateral and posterior part of inferior third of leg and lateral side of foot.<sup>1</sup> Classically the sural nerve comes from communication between medial cutaneous nerve of leg which is branch of tibial nerve and perforating branch from lateral cutaneous nerve which is a branch of common peroneal nerve.<sup>2</sup> Sural nerve is a cutaneous nerve which begins as a branch of tibial nerve (medial

sural nerve) and descends between two heads of gastrocnemius muscle, under posterior fascia which perforates to receive communicating branch from lateral cutaneous nerve of leg at different levels. The sural nerve thus formed runs slightly obliquely downwards crossing lateral border of tendo calcaneus and passing behind and then below lateral malleolus and crosses dorso-lateral aspect of foot.<sup>3</sup>

The anatomic course of nerve in distal leg and ankle makes it susceptible to local trauma and also increases the vulnerability to trauma during various surgical interventions.<sup>4</sup> Clinically, sural nerves are used widely for diagnostic purposes as in nerve conduction velocity studies and for biopsy. Since the sural nerve is the most frequently used sensory nerve in nerve transplantation, familiarity with variations in its course and distribution plays important role in these procedures.<sup>5</sup>

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**MATERIAL AND METHOD**

The material for the present study comprised of 60 lower extremities belonging to 30 adult human cadavers obtained from the Department of Anatomy, Government Medical College, Amritsar. Deep fascia from posterior surface of popliteal fossa was stripped off and fat from its upper angle was removed to expose tibial nerve and common peroneal nerve. Vertical midline incision from popliteal fossa was extended running along lateral edge of tendocalcaneus and ending in lateral infra malleolar region. From tibial nerve, medial sural cutaneous nerve was traced downwards, similarly from common peroneal nerve, lateral sural cutaneous nerve; its communicating branch was identified and traced. The site of formation

of sural nerve were designated as popliteal fossa, upper, middle and lower 1/3<sup>rd</sup> of leg.

**RESULT**

**Origin:** The medial sural nerve arose from posterior aspect of tibial nerve in 48 (80%) limbs and from medial head of gastrocnemius in 12 (20%) limbs. It was formed by union of medial sural nerve (from tibial nerve or nerve to medial head of gastrocnemius) and lateral sural nerve (from common peroneal nerve) in 50 (83.33%) limbs. It was formed by medial sural nerve alone in 9 (15%) limbs and lateral sural nerve was absent in these limbs. In 1 limb i.e. 1.67% medial sural and lateral sural nerves were separate. Where lateral sural nerve is absent; the medial sural nerve gave all branches of sural nerve.

**Table No.1. Percentage distribution of mode of origin of sural N.**

Mode of origin	No. of limbs with particular mode of origin [n (%)]		
	Right30(100%)	Left30(100%)	Total60(100%)
Posterior aspect of tibial N.	24(80.00%)	24(80.00%)	48(80.00%)
Common trunk with N. to med. head of gastrocnemius	06(20.00%)	06(20.00%)	12(20.00%)

**SITE OF UNION**

In present study, site of union was in middle 1/3<sup>rd</sup> of leg in 10 (20%) limbs and distal 1/3<sup>rd</sup> of leg in 40 (80%) limbs.

**DISCUSSION**

Bilateral asymmetry was present in pattern of sural nerve. It occurred in about 80% of cadavers. This study showed that sural nerve is formed by union of medial sural cutaneous nerve and lateral sural cutaneous nerve in (83.33%) limbs and continuation of medial sural nerve alone in 15% limbs. In 1.67% medial sural and lateral sural nerves were separate.

Ortiguela et al<sup>7</sup> found that sural nerve was formed by union of medial sural cutaneous nerve and lateral cutaneous sural nerve in 80% and by medial sural nerve alone in 20%.

Coert and Dellon<sup>6</sup> found that sural nerve was formed by union of medial sural cutaneous nerve and

lateral cutaneous sural nerve in 96% and by medial sural nerve alone in 4%.

Mestdagh et al<sup>2</sup> found that sural nerve was formed by union of medial sural cutaneous nerve and lateral cutaneous sural nerve in 67.56% , by medial sural nerve alone in 18.91%, by lateral sural nerve alone in 2.72% and medial and lateral nerves were separate in 10.81%.

Mahakkanukraun and Chomsung<sup>1</sup> found it to be formed by the union of medial sural cutaneous nerve and lateral sural cutaneous nerve in 67.10%, medial sural cutaneous nerve alone in 32.20% and by union of medial sural nerve and extra branch in 0.70%. The variations would be from racial differences or due to number of cadavers studied.

Aktan et al<sup>8</sup> found that sural nerve was formed by union of medial sural cutaneous nerve and lateral cutaneous sural nerve in 70.00% , by medial sural nerve alone in 16.70%, by lateral sural nerve alone in 6.70% and medial and lateral nerves were separate in 06.60%.

**Table No.2. Comparison of formation of sural nerve from contributing nerves**

Author	Year	No. of limbs studied	% of no. of limbs with given contributing Ns.				
			MSN+LSN	MSN	LSN	MSN+EB	MSN+LSN Separate
Ortiguela et al <sup>7</sup>	1987	20	80.00%	20.00%	-	-	-
Coert and Dellon <sup>6</sup>	1994	50	96.00%	04.00%	-	-	-
Mestdagh et al <sup>2</sup>	2001	37	67.56%	18.91%	02.72%	-	10.81%
Mahak-kanukraun & Chomsung <sup>1</sup>	2002	152	67.10%	32.20%	-	00.70%	-
Aktan et al <sup>8</sup>	2005	30	70.00%	16.70%	06.70%	-	06.60%
Present study	2008	60	83.33%	15.00%	-	-	01.67%

In our studies, the site of convergence of medial sural cutaneous nerve and lateral sural cutaneous nerve to form sural nerve occurred mostly in distal third of leg (80%). In 20% of cases it occurred in middle

1/3<sup>rd</sup> of leg. In study conducted by Coert and Dellon<sup>6</sup>, the site of union was also at popliteal fossa. In study of Mahakkanukraun and Chomsung,<sup>1</sup> in addition of above sites it was also present at ankle.

**Table No. 3. Comparison of site formation of sural nerve**

Author	Year	No. of limbs studied	No. of limbs having particular level of formation of sural nerve [n(%)]			
			Popliteal fossa	Middle 1/3 of leg	Distal 1/3 of leg	Ankle
Coert and Dellon <sup>6</sup>	1994	96	12(12.50%)	-	84(87.50%)	—
Mahakkanukraun & Chomsung <sup>1</sup>	2002	102	6(05.88%)	2(01.97%)	68(66.66%)	26(25.49%)
Present study	2008	60	-	12(20.00%)	48(80.00%)	-

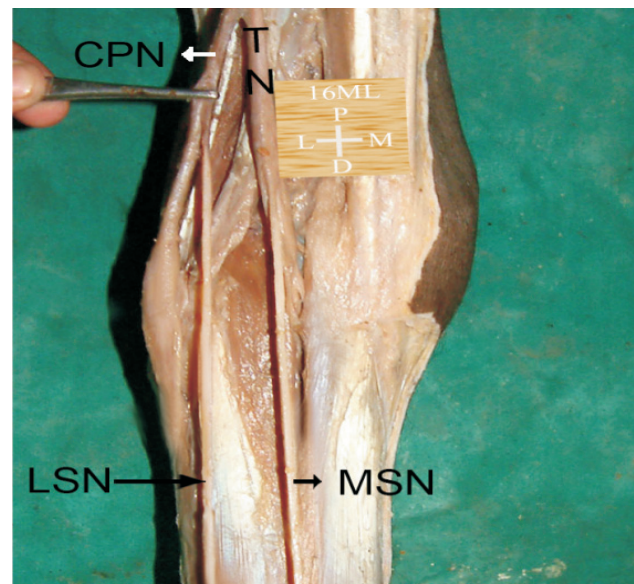
The classification of sural nervous system explains symptomatology of its compression as it crosses posterior fascia. Sural nerve can be lacerated or compressed anywhere along its course from its exit in calf fascia to foot. Symptoms includes pain, paraesthesia and sensory loss over lateral aspect of foot and ankle corresponding to sural nerve territory.<sup>9</sup>

Anatomic studies have demonstrated presence of potential sites for entrapment of sural nerve as it travels through deep fascia, particularly, with knee extension which may be clinically relevant especially in patients with history of diabetes.<sup>4</sup> The sural neuropathy is most commonly due to trauma as cited in literature. It can be secondary to ankle fracture also.

The knowledge of anatomy allows one to avoid nerve injury during saphenous nerve stripping or surgical repair of injuries to hind foot.<sup>5</sup>

Also techniques of harvesting nerve grafts can be improved as it is recommended that use of lateral sural cutaneous nerve as an alternative for biopsy or grafting decreases incidences of painful neuroma and altered sensations over lateral aspect of foot and ankle.<sup>1</sup>

A technique of endoscopic sural nerve harvest is devised to minimize donor site scarring in paediatric patients requiring peripheral nerve graft procedure. Indications of surgery include obstetrical brachial plexus palsy and ulnar nerve neuroma.<sup>10</sup>



**Fig. 1.** Two separate sural nerves; lateral sural nerve (LSN) from common peroneal nerve (CPN) and medial sural nerve (MSN) from tibial nerve(TN).

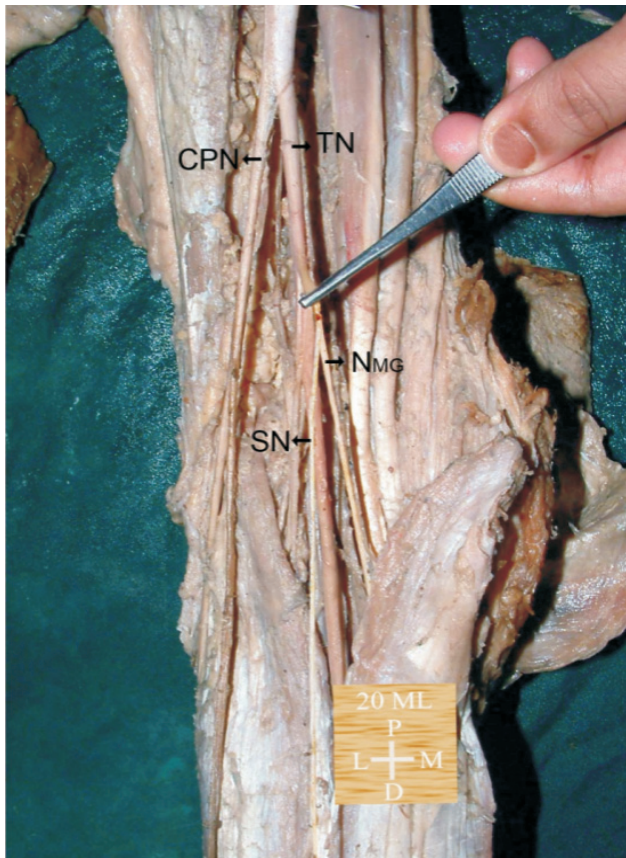


Fig. 2. Sural nerve (SN) arising from nerve to medial head of gastrocnemius (NMG) TN-Tibial nerve CPN-Common peroneal nerve

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